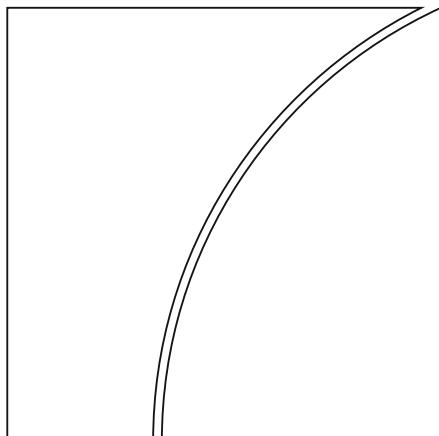




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Inflation and labour markets



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Foreword

Inflation shot up in both emerging market economies (EMEs) and advanced economies (AEs) in the wake of the Covid-19 pandemic. While labour market developments were not a key source of the surge, they could become important for the persistence of inflation and, thus, the path of disinflation. Despite this, there is comparatively little work on how labour market developments affect inflation in EMEs, quite in contrast to a substantial body of work in AEs. Instead, attention has mostly focused on other inflation drivers, for instance exchange rates. To fill this gap, the Bank for International Settlements dedicated its annual meeting of emerging market Deputy Governors to the topic of "Inflation and labour markets in the wake of the pandemic". The meeting was held in Basel 16 – 17 March 2023.

The current volume contains a background paper by BIS staff as well as contributions by the participating central banks. Using the responses to a survey of EME central banks, the BIS background paper analyses the structure of labour markets in EMEs, wage formation and the relationship between wages and inflation. While there are important parallels, there are also notable differences across countries, both within and between regions. For example, a few countries feature strong unions and collective bargaining, while these are mostly absent from others. Such parallels and differences are also apparent in the central bank contributions, which dig deeper into individual country cases.

We hope that the present volume will only be a starting point that triggers further research on this important topic.

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Inflation and labour markets

Julián Caballero, Michael Chui, Emanuel Kohlscheen and Christian Upper¹

Abstract

While labour markets were not the key source of the recent spike in inflation, they could become important for the persistence of inflation. By late 2022, most EME central banks reported strong labour markets but a low risk of adverse wage-price spirals. Wage indexation has fallen sharply over the last decades and so has the pass-through of wage increases back to consumer prices. Labour costs in EMEs now account for only 20–35% of total production costs in EMEs on average, and increased exposure to international market contestability may have put a lid on the power to raise prices. That said, indexation remains important for minimum wages and informal indexation to past inflation implies that central banks should remain vigilant so as to avoid a transition from a low- to a high-inflation regime.

JEL classification: E30, E50, J30, F60.

Keywords: emerging markets, globalisation, indexation, informality, inflation, labour cost, labour market, minimum wage, Phillips curve, unemployment, wage-price spiral, wages.

¹ The views expressed in this paper are those of the authors and not necessarily those of the BIS. We would like to thank Claudio Borio, Stijn Claessens, Hyun Song Shin and Alexandre Tombini for useful comments, and Rodrigo Barradas, Burcu Erik, Rafael Guerra and Berenice Martinez for great work with the data.

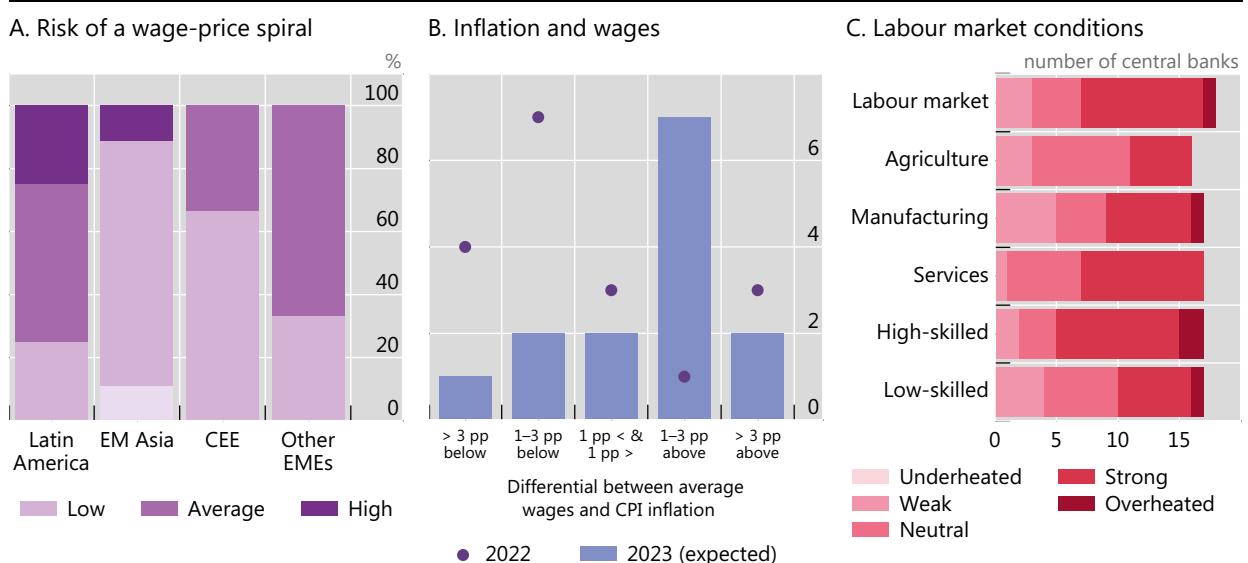
Introduction

Inflation has returned in both emerging market economies (EMEs) and advanced economies (AEs). The timing and intensity of the surge in 2021 differed across jurisdictions, but by late 2022 inflation stood well above central bank targets almost everywhere. Initially, the prices of only a limited number of goods went up, including those of food, energy and selected manufactures, but over time inflation became more broad-based. While inflation appears to have peaked in many EMEs, there are questions regarding how quickly it will decline, if at all, from its current high levels.

While labour markets in EMEs have generally tightened, they do not appear to have been a key source of inflation so far. This could change, though, as workers might at some point seek to recoup the significant and widespread losses in their purchasing power. Whereas the vast majority of EME central banks regard the risk of outright wage-price spirals as low or average (Graph 1.A),² many expect average wages gains to outstrip headline inflation in 2023 (Graph 1.B). Wage pressures could be especially strong for highly skilled workers, for which the market is typically much tighter (Graph 1.C). This could drive up unit labour costs, which would in turn put pressure on firms to increase prices. The services sector could be most affected, owing to pent-up demand and a much higher weight of labour costs.

Perceived risk of wage-price spirals and labour market tightness

Graph 1



Source: BIS survey responses.

Against this background, this note takes a step back and explores the links between inflation and labour market conditions in EMEs. It begins by proposing a framework to examine the engine of inflation – the wage-price nexus. The next section reviews some of the structural features in which EME labour markets differ

² The responses could reflect a more restrictive definition of wage-price spirals than the one used in this paper. In this note, wage-price spiral, or equivalently price-wage spiral, is used as a shorthand for a self-reinforcing feedback loop between price and wage increases that permits sustained inflation. The process need not be explosive or raise inflation over time. See Borio et al (2023).

from those in AEs as well as from each other and explores the implications for the inflation process. The third section analyses the relationship between labour market conditions, wages and inflation in EMEs. The fourth section applies this analysis to the current situation and discusses the risk that substantial wage increases keep inflation high for some time. An annex looks at the role of labour market indicators in the monetary policy process. The note draws on the responses to the targeted survey and country notes.

The wage-price nexus: the inflation engine

Understanding the wage-price nexus is key to deciphering the inflation process. The extent to which self-sustaining spirals can take hold depends critically on the “pricing power” of both firms and workers. All else equal, higher pricing power will go hand in hand with higher inflation.

An important question is what determines pricing power. There are two types of factors: those that are independent of the inflation rate, and inflation itself. Independent factors, in turn, can be divided into cyclical and structural. The degree of slack in labour and product markets – a key variable in the Phillips curve – is the main cyclical factor. Structural factors include globalisation, technology and demographics as well as the political priorities that influence the structure of labour and product markets. In turn, higher inflation increases agents’ incentives and ability to raise wages and prices, which in turn helps to sustain inflation. It can also leave a long-lasting imprint on structural features of wage- and price-setting, most notably the degree of indexation. Of course, all these factors interact. For instance, inflationary pressures from tight labour markets can be stronger if inflation is high and if the (structural) supply elasticity of labour is low.

In order to reduce some of this complexity, it can be useful to use a “two-regime” view of inflation, as in Borio et al (2023) and BIS (2022). This stylised view identifies a low- and a high-inflation regime.

In a low-inflation regime, measured inflation mostly reflects sector-specific price changes that are only loosely correlated with each other. In other words, price co-movement across different goods and services is small. In addition, wages and prices are also loosely linked with each other. As a result, price shocks tend to dissipate quickly and inflation tends to be *self-stabilising*.

In a high-inflation regime, matters are very different. The common component of price changes is much greater and inflation becomes highly sensitive to changes in salient prices, such as those of food and energy, as well as to fluctuations in the exchange rate. Importantly, wages and prices are more tightly linked, which means that price shocks can have substantial knock-on effects. As a result, in a high-inflation regime inflation is *not* self-stabilising.

This view also sees transitions from low-to high-inflation regimes as self-reinforcing. As inflation rises, it becomes more of a focal point for agents’ behaviour, fuelling the transition. Thus, the risk is that inflationary shocks may be strong and persistent enough to trigger a transition. This risk, in turn, will depend on structural factors that influence the pricing power of workers and firms, in turn influenced by the history of inflation itself.

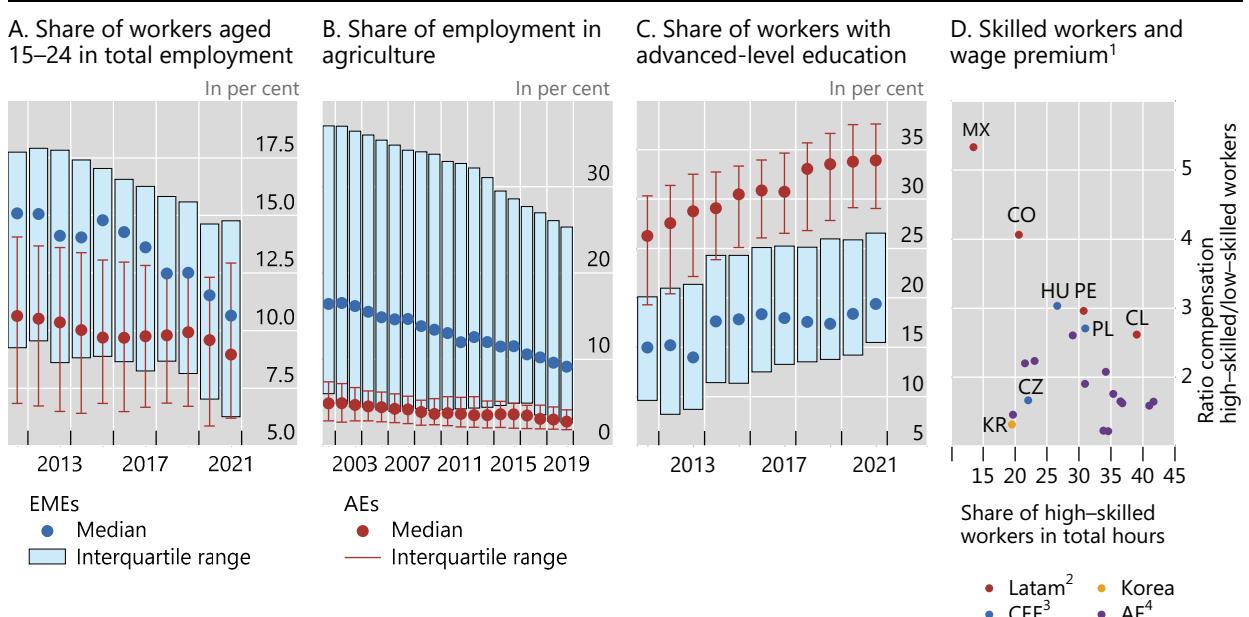
Structural characteristics of EME labour markets

Labour markets in EMEs tend to be quite different from those in AE in ways that can affect their role in the inflation process. Three features stand out: (i) a large and elastic supply of relatively low-skilled workers coexisting with a much smaller and far less elastic one for high-skilled workers; (ii) a high degree of informality; and (iii) a major role for minimum wages. These features affect the pricing power of labour and wage formation, and thus inflation dynamics.

EMEs tend to have a larger and more elastic supply of low-skilled workers than AEs, which limits workers' pricing power. This is due partly to demographic factors, such as the typically younger and faster-growing population in EMEs, but economic factors also play a role. In particular, EMEs tend to have a much larger agricultural sector that tends to pay very low wages and to serve as a reservoir of (unskilled) workers. Large numbers of workers have moved from rural to urban areas as economic opportunities have arisen. While still important, these differences have naturally narrowed over the years as the demographic transition reached EMEs and a large part of the rural population moved away from agricultural activities (Graphs 2.A and 2.B).³

Labour supply is becoming less elastic, skilled workers earn large premiums

Graph 2



¹ Skilled workers: those with a completed college degree or higher educational attainment. Low-skilled workers: those with no formal qualification. Median figures of 2010–17 or latest available; except for KR (2008–09). Compensation for each skills group is computed based on total hours worked, total compensation and corresponding shares by skill group reported in the KLEMS database for the total economy. ² Chile, Colombia, Mexico and Peru ³ Czechia, Hungary and Poland ⁴ Austria, Belgium, Germany, Denmark, Finland, France, Italy, Japan, the Netherlands, Portugal, Sweden, the United Kingdom and the United States.

Sources: ILO; KLEMS data sets; World Bank. BIS staff calculations.

³ For example, China's exceptionally strong growth over the past few decades was supported by a large-scale migration from the countryside to the cities. Between 1982 and 2020, total employment in agriculture fell by 45%.

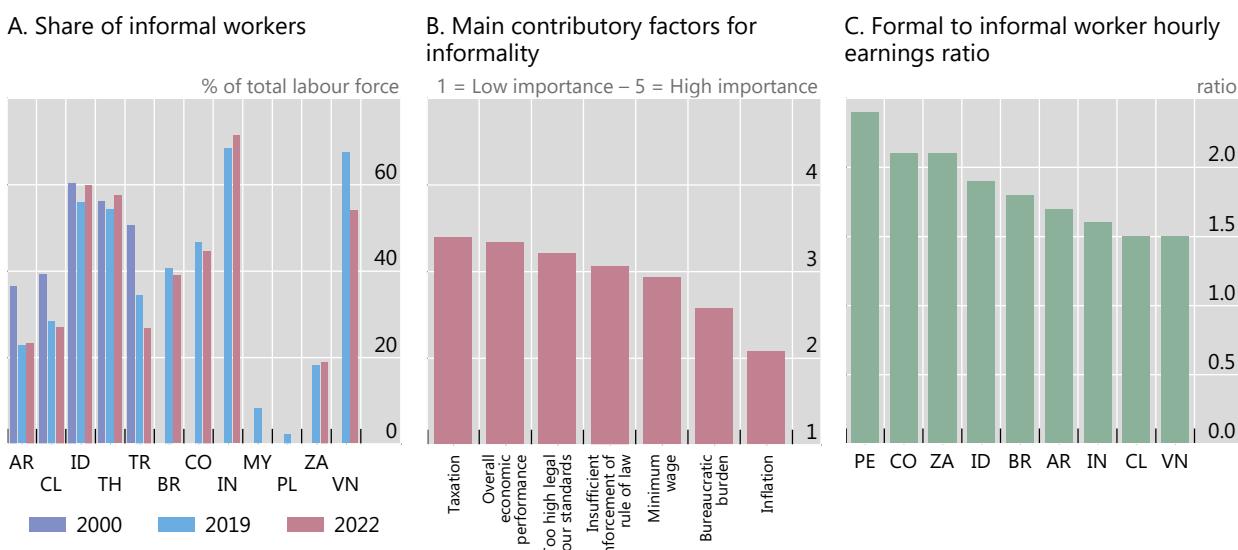
One important remaining gap relates to education. The share of skilled workers – those with a college degree or higher – in the workforce is significantly lower in EMEs than in AEs (Graph 2.C).⁴ This comes with an inelastic supply of skilled workers and the associated outsized skills premium in EMEs. While in AEs the ratio of earnings of high-skilled workers to low-skilled ones is about 1.5, it is five times in, say, Mexico (Graph 2.D).

A second key difference vis-à-vis AEs is a large informal sector. The share of workers employed informally ranges from the low single digits in Poland to well over one half in India, Indonesia, Peru, Thailand and Vietnam (Graph 3.A).⁵ Reasons for the high degree of informality include taxes, high standards and the bureaucratic burden in the formal labour market, high minimum wages and a poor enforcement of legal standards (Graph 3.B). Since family and self-employed workers often work informally, a large share of employment in the agricultural sector is informal (around 94% globally). In India, agriculture's employment share of over 40% contributes to a large informal sector (see country note).

A large degree of informality affects inflation through a variety of mechanisms. It increases the supply elasticity of labour in the formal economy, which diminishes workers' pricing power. It reduces the wage bargaining power of workers, since informal workers are generally unorganised and have few alternative employment options. And it dampens business cycle fluctuations, acting as a shock absorber.

High share of labour market informality in EMEs

Graph 3



Sources: OECD, KIBIBIH database; BIS survey responses.

There is substantial evidence of this shock absorber role during downturns, as the informal sector provides a safety net for workers made redundant in the formal one. This helps to limit income losses and supports aggregate demand, thereby mitigating price volatility. That said, this buffer is far from perfect. The lower

⁴ Based on industry level data, this translates into a low share of the total hours worked by skilled workers, which in EMEs is about 20% while in AEs it is above 35%.

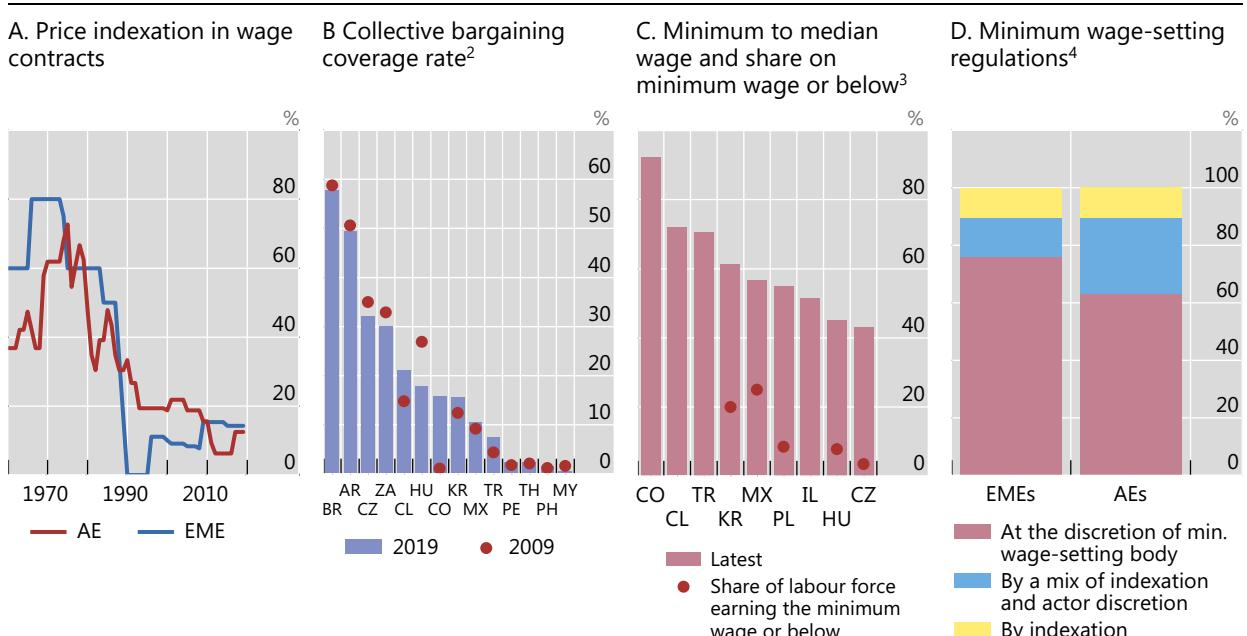
⁵ The definition of informality is inevitably country-specific.

productivity of the sector results in much lower wages than those in the formal sector.⁶ For example, household surveys show that in Argentina, Brazil, Chile, India, Indonesia and Vietnam, a formal worker earns at least 1.5 times more than their informal peer per hour worked. And the ratio exceeds 2 in Colombia, Peru and South Africa (Graph 3.C).⁷ Thus, all else equal, a shift to the informal sector would tend to reduce aggregate demand.

As in advanced economies, wage indexation has become less prevalent in EMEs in recent years (Graph 4.A), which should reduce inflation persistence.⁸ The decline in formal indexation arrangements owes both to the lower levels of inflation in most countries as well as to policy actions aimed at reducing indexation.⁹

Minimum wages and collective wage bargaining arrangements

Graph 4



¹ Share across 33 AEs and 16 EMEs upon data availability. ² The collective bargaining coverage rate is defined as the share of the number of employees whose pay and/or conditions of employment are determined by one or more collective agreement(s) as a percentage of the total number of employees. In some cases, data for 2019 and 2009 are the latest and earliest available respectively. ³ Data on share of labour force earning the minimum wage or below are available for only five economies. ⁴ Based on available data extracted from the OECD/AIAS, *ICTWSS* database for 29 EMEs and 19 AEs.

Sources: OECD; OECD/AIAS, *ICTWSS database*; BIS survey responses.

⁶ OECD/ILO (2019) estimates that average labour productivity in the informal sector of emerging and developing economies is less than half that in the formal sector.

⁷ In addition, since informal workers tend to be excluded from the financial system, more informal work can weaken the credit channel and dampen monetary policy transmission (see country note from India, and Alberola and Urrutia (2020)).

⁸ See, for instance, estimates in López-Villavicencio and Saglio (2017), who find a steady decrease in wage indexation over time as inflation fell.

⁹ The note from the Central Bank of Argentina points out that the government has managed to avoid the widespread inclusion of indexation clauses in wage bargaining during the recent high inflation period. The note from the Central Bank of Chile remarks that indexation of nominal wages to past inflation in 2021–22 was 50% lower than pre-pandemic.

That said, even in the absence of formal indexation, there could still be mechanisms that link wage settlements to past inflation, for instance if economic agents are backward-looking or are compensated for past losses in their purchasing power.¹⁰ This can come through collective bargaining agreements, which cover a sizeable part of the workforce in some countries, for instance in Argentina and Brazil (Graph 4.B), as well as through minimum or public sector wages.

Minimum wages matter far more in EMEs than in AEs. Since they are often fairly high compared with median wages, they are binding for a large part of the labour force (Graph 4.C). An extreme case is Colombia, where the minimum-to-median wage ratio is almost 90%. In addition, minimum wages often serve as a benchmark for private sector wage negotiations, as do other wages set by the governments, including those for its own employees (eg in Argentina and Indonesia). Many empirical studies have also found that average wages in the informal sector in EMEs tend to rise with the minimum wage in the formal sector (eg Boeri et al (2011)). All this means that changes in minimum wages spill over to large swathes of the wage distribution. Again, Colombia is an extreme case, with changes in the minimum wage affecting all quintiles of the wage distribution, even the upper one.¹¹

The adjustment mechanism for minimum wages differs across countries and tends to be closely linked to inflation. While in a minority it is rules-based, in most it is discretionary. This is even more so in EMEs than in AEs (Graph 4.D). When rules-based, it is typically indexed to inflation.¹² Several central bank notes point out that inflation is a key input into discretionary adjustments – an element of informal indexation. The adjustment frequency also varies significantly, eg twice a year in Chile, once a year in the Philippines and Turkey,¹³ and sometimes even much less frequently in economies without formal mechanisms.

Wages and inflation

The engine of sustained inflation is ultimately a self-reinforcing feedback loop between price and wage increases – wage-price spirals, in short. While it is difficult to disentangle causality, a regression analysis indicates that the sensitivity of wage growth to past inflation is larger in EMEs than in AEs (Graph 5.A).¹⁴ This sensitivity has been relatively steady in recent decades, with a pass-through of between 45%

¹⁰ See eg country note from South Africa, which points out that “inflation expectations, particularly by labour unions, tend to be backward-looking”.

¹¹ In turn, the impact on inflation will naturally depend on firms’ pricing power. There is evidence that firms pass on increases in the minimum wage to their customers. For instance, Harasztsosi and Lindner (2019) find that, when the minimum wage was raised persistently between 1996 and 2008 in Hungary, lifting the minimum median wage ratio from 35% to 55%, around 75% of the increase was paid by consumers and only 25% by firm owners.

¹² In Poland, the minimum wage level also depends on future price developments. The government is obliged by law to raise the minimum wage within a year if the (projected) annual inflation rate exceeds 5%.

¹³ During the pandemic, the Philippine regional wage boards suspended minimum wage adjustments. But with larger-than-expected increases in 2022, minimum wage growth reverted to its pre-pandemic trend.

¹⁴ See also Borio et al (2023).

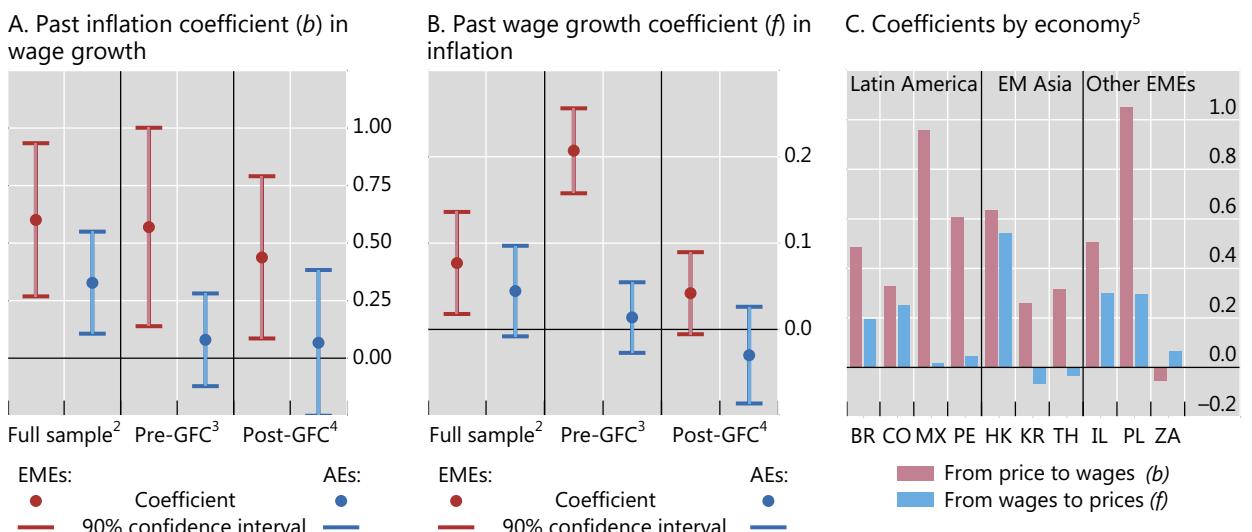
and 60% within a year. In the other direction, the effect of past wage growth on inflation has been much more limited in both EMEs and AEs, and not statistically significant after the Great Financial Crisis (GFC) (Graph 5.B).¹⁵

At first sight, the relatively high pass-through from inflation to wages in EMEs may seem at odds with a very elastic supply of (unskilled) labour with little bargaining power. That said, it could reflect three things. First, informal workers are heavily concentrated in retail trade and services and may not have the skills to easily transfer to other sectors, which would drive up the bargaining power of workers there. Second, the lower elastic supply of skilled workers, who have a disproportionate weight in total wages owing to a large skill premium. Furthermore, it could reflect the importance of the minimum wage and its regular *de facto* indexation to inflation, particularly in economies with historically high inflation.

Regionally, the exercise conducted above also shows that the average past inflation coefficient (b) in wage growth is strongest in Latin American countries and weakest in emerging Asia (Graph 5.C). This is partly related to the much more extensive inflation history in Latin America, which may have left a legacy on wage determination conventions. Indeed, the country-specific estimated coefficients tend to be higher in countries that have experienced high levels of inflation at least once over the last 40 years.

Wage growth responds to past inflation, but the reverse feedback is weak¹

Graph 5



¹ Estimations are based on a panel of quarterly data for 14 EMEs, with fixed effects:

Panel A: wage growth(t+4) = $a + b \times \text{inflation}(t) + c \times \text{unemployment gap}(t) + d \times \text{labour productivity growth}(t)$, and

Panel B: inflation(t+4) = $e + f \times \text{wage growth}(t) + g \times \text{unemployment gap}(t) + h \times \text{labour productivity growth}(t)$.

² Full sample = 1994–2022. ³ Pre-GFC = 1994–2007. ⁴ Post-GFC = 2008–22. ⁵ Central estimates based on a much smaller sample, varying between 33 and 107 observations, depending on economy.

Sources: OECD; ILO; BIS calculations.

¹⁵ Of course, the very recent period estimations using aggregate indicators need to be treated with caution as developments may differ across sectors. That said, after more than three years since the start of the pandemic, many of these effects have already been washed out.

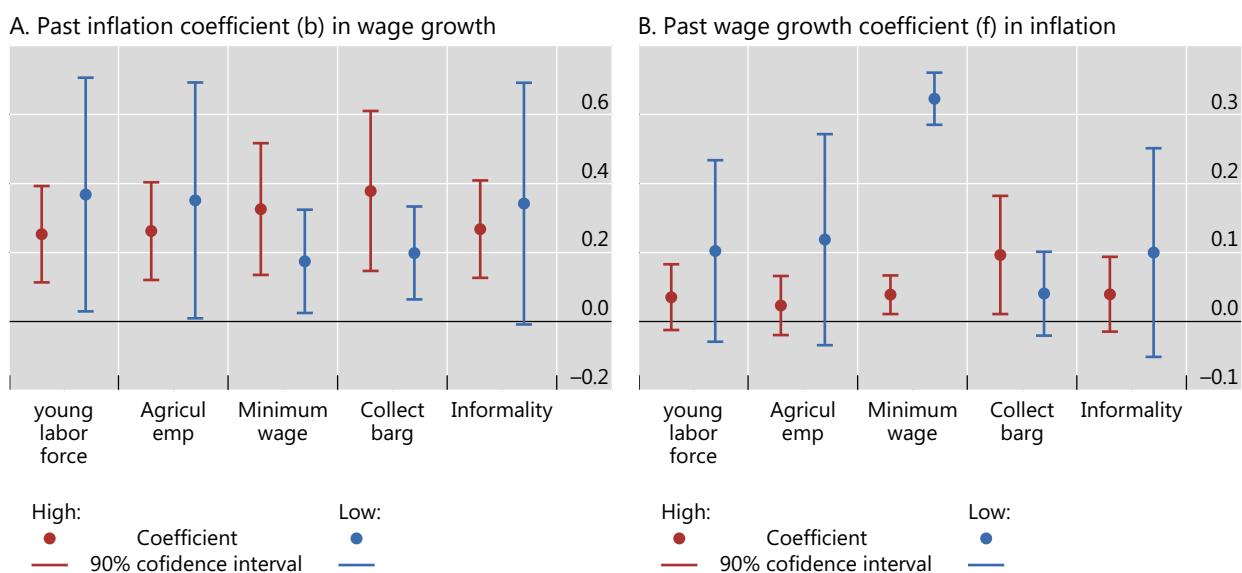
Going in the reverse direction, the pass-through from wages back to inflation has typically been small. It has also declined from an average of 21% before the GFC, to just 4% since then (and has become statistically insignificant) (Graph 5.B). In AEs, this pass-through has been even lower, though, perhaps because of the lower average levels of inflation.

As an indicative exercise, the sample was split along several dimensions depending on whether countries had above or below median indicators. The central estimates suggest that workers are compensated more for past inflation when the workforce is less young, less agricultural, less informal, and under higher minimum wage regulations and collective bargaining. That said, the smaller samples in these cases do not allow us to say that these differences are statistically significant (Graph 6.A). In the reverse direction, wages tend to impact inflation more when workers are older, less agricultural and formal, and also when workers are covered less by minimum wages but are under collective bargaining agreements. (Graph 6.B)

Workers' compensation for past inflation increases with minimum wages and collective bargaining¹

Coefficients

Graph 6



¹ Estimations are based on a panel of quarterly data for 14 EMEs, with fixed effects:

Panel A: $\text{wage growth}^s(t+4) = a^s + b \times \text{inflation}^s(t) + c \times \text{unemployment gap}^s(t) + d \times \text{labour productivity growth}^s(t)$, and

Panel B: $\text{inflation}^s(t+4) = e^s + f \times \text{wage growth}^s(t) + g \times \text{unemployment gap}^s(t) + h \times \text{labour productivity growth}^s(t)$. Where s denotes the state of the economy: high or low. Sample 1994–2022.

Sources: OECD; ILO; national data ; BIS.

Overall, the very modest feedback from wages to prices could also reflect the low share of labour costs in the total costs of production and the impact of globalisation. Labour costs account for a lower share of total costs in EMEs than in AEs (Graph 7.A), presumably reflecting lower wages.¹⁶ This makes it easier for firms to absorb

¹⁶ At the same time, though, production in EMEs tends to be more labour-intensive, although this does not seem to offset the impact of lower wages, at least at the aggregate and sector levels.

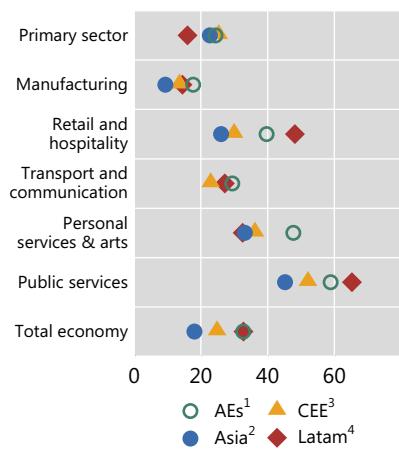
increases in wages rather than passing them on to their customers. Globalisation has probably also played a role in the general reduction of pass-through from wages to prices. This is because, if production is globally distributed rather than local, domestic wages will matter even less for final prices. Also, the scope for price-setters to simply pass local cost increases through into final prices will be more limited if markets are highly contestable (through both trade and outsourcing of production to lower-production-cost countries).

Last but not least, the pass-through from wages to inflation could also be low or non-existent if higher wages are compensated by increased productivity, leaving unit labour costs unchanged. In the medium to long term, wage developments in EMEs have been roughly in line with labour productivity, at least on average (Graph 7.B). That said, the average masks very large differences across countries.

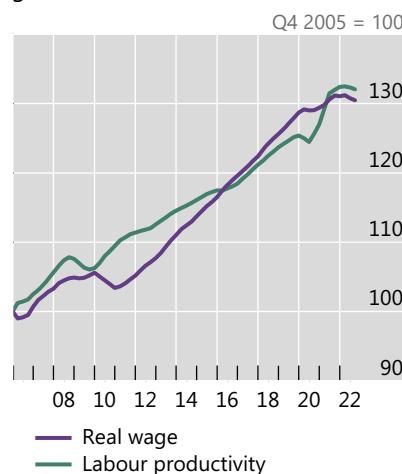
Wage growth has again become more sensitive to output

Graph 7

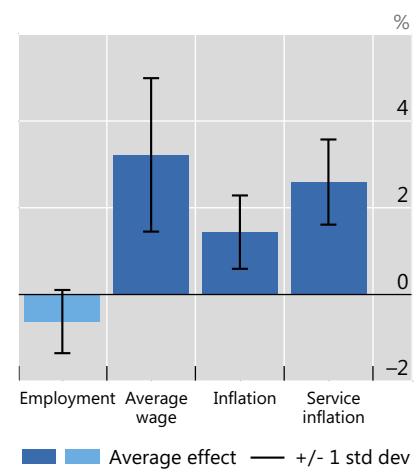
A. Share of labour compensation on total gross output



B. In the long run, real wage growth aligns with labour productivity growth⁵



C. Minimum wage increases followed by higher inflation in services⁶



¹ AT, BE, DE, DK, FI, FR, IT, JP, NL, PT, SE, UK, US ² IN, KR ³ CZ, HU, PL ⁴ CO, MX, PE. The plot shows the median across broad sectors for 2010–17 (in the case of KR for 2008–09). ⁵ Labour productivity is gross domestic output at fixed prices divided by total employment.

Real wage is average wage divided by national CPI. Simple averages across economies. Based on information for BR, CL, CO, CZ, HK, HU, IL, KR, PE, PH, TH and ZA. ⁶ Based on the estimated Phillips curve: wage growth(i) = $\alpha + b \times \text{inflation}(i, t-4) + c \times \text{output gap}(i, t-4) + d \times \text{labour productivity growth}(i, t-4) + \text{country fixed effects}(i) + e(i, t)$. The estimation was done on a panel with quarterly data from BR, CL, CO, MX, PE, CZ, HU, PL, HK, KR, PH, SG, TH, IL and ZA between 2000 and 2022. Alternatively, the (negative of the) unemployment gap was used instead of the output gap. Gaps are simply the difference between the respective variable and its trend obtained through a one-sided HP filter.

⁶ Light-blue colour bar indicates not statistically significant. Estimated average effects of 10 episodes in which the ratio of national minimum to aggregate wages was raised by more than 10% within a year, without subsequent reversal. The effect was obtained by regressing the respective variable of interest against a minimum wage hike dummy (contemporaneous and lagged), year and country fixed effects

Sources: ILO; IMF; OECD; World Bank; KLEMS data sets; BIS calculations.

Large increases in minimum wages qualify the overall picture of a low pass-through from wages to inflation, especially in the services sector, where unskilled workers are more prevalent (Graph 7.A). An event study of 10 episodes in EMEs in which the ratio of national minimum to aggregate wages was raised by more than 10 percentage points shows a substantial impact on average national wages and

inflation.¹⁷ The estimated average effect of these large increases on CPI inflation was 1.4 percentage points and for services inflation 2.6 percentage points within one year (Graph 7.C).¹⁸

Labour markets and inflation: post-pandemic and beyond

Going forward, whether wages will catch up with price increases will be a key determinant of the disinflation process. Nominal wage growth picked up in many EMEs (Graph 8.A).¹⁹ The pace of wage growth was strongest in central and eastern Europe (CEE), rising at double-digit rates in late 2022. Especially at the beginning of the pandemic, strong growth partly reflected a “composition effect”, as it was primarily low-wage workers employed in contact-intensive activities that dropped out of the labour force.²⁰ This effect reversed in 2021 and 2022 when these workers returned. High inflation meant that a rising nominal wage growth did not translate into higher real wages (Graph 8.B). After recording increases in 2020, many EMEs saw stagnating or even declining real wages in 2022. In many economies, for instance Argentina, Peru and Czechia, real wages are still below pre-pandemic levels; and in all but a few they are below the level implied by the pre-pandemic trend (Graph 8.C).

The rapid nominal wage growth in most EMEs reflects a combination of tight labour markets and rising inflation. Employment and labour force participation rebounded quickly from the initial Covid-19 shock and returned to pre-pandemic levels in most EMEs by the end of 2022 (Graph 9.A). Unemployment rates also fell back to pre-Covid levels (Graph 9.B).²¹ Some economies, for example, Czechia and Singapore, also report high job vacancies to unemployment rates (Graph 8.C). In others, these rates are low, although this could also reflect limited incentives to report vacancies. In Chile, a central bank survey shows that 88% of sampled firms experienced difficulties in finding workers in early 2022, even though employment remained well below pre-pandemic levels.

¹⁷ These post-2000 episodes were from China (2x), Czechia, Korea, Mexico, Hungary (2x), Poland (2x) and Thailand. The median minimum wage increase across these 10 episodes was 20.3%.

¹⁸ Interestingly, these minimum wage increases did not reduce employment in a significant way. This evidence aligns well with that of the previous academic literature on minimum wages (eg Cengiz et al (2019) and Dube (2019)), and the country note from Hungary.

¹⁹ Availability of timely data as well as definition of wages and sectoral coverage varies across countries. The analysis focuses, to the extent possible, on wages defined as rates paid for nominal time of work (hour, week or month), comprising basic wages and salaries, cost-of-living allowances and other guaranteed and regularly paid allowances, and measured for the whole economy.

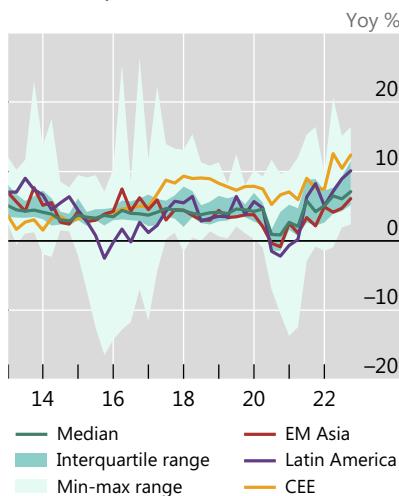
²⁰ See ILO (2022). The Bank of Israel note develops methods to improve the quality of the analysis.

²¹ The recovery was far from even, with contact-intensive sectors tending to lag the recovery. In some economies, for instance in Brazil and Israel, employment in the accommodation and food services and transportation sectors was still below pre-pandemic levels up to Q3 2022, while that in the information and communications and financial services sectors (dominated by high-skilled labour) had risen by almost a fifth.

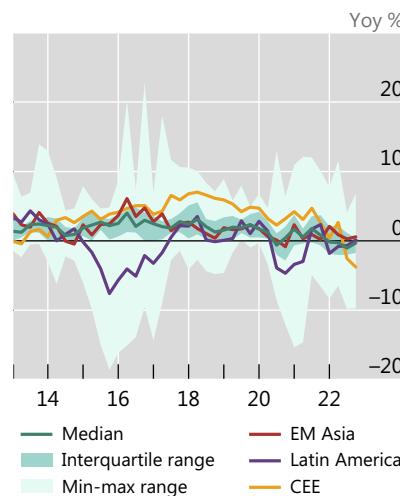
Recent losses have left real wages below pre-pandemic levels

Graph 8

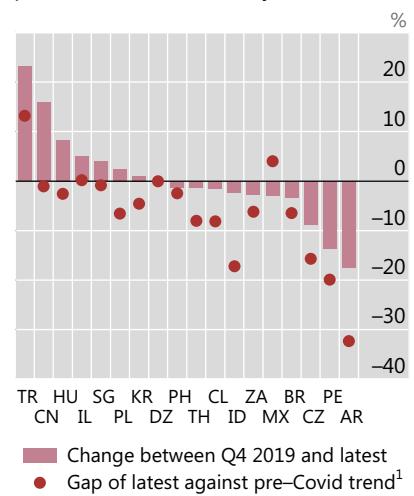
A. Nominal wage growth picked up after the pandemic ...



B. ... but real wage contracted in some economies



C. Real wages are below pre-pandemic levels in many economies



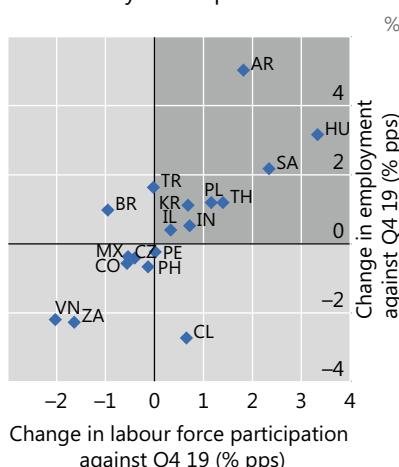
¹ Log-linear trend from 2010 to 2019.

Sources: Refinitiv Datastream; national data; BIS calculations.

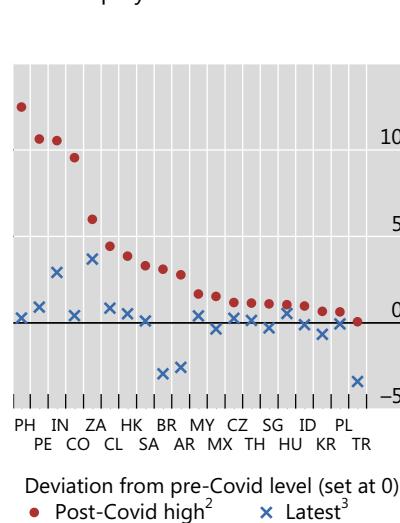
EME labour markets are showing signs of tightness

Graph 9

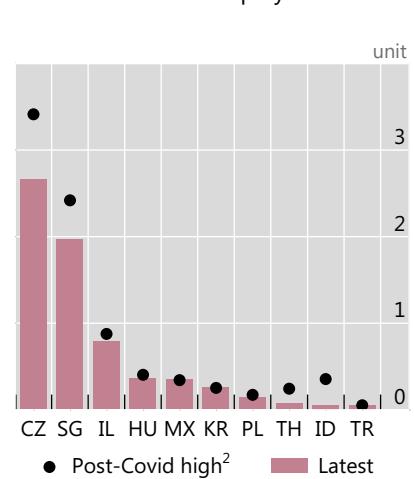
A. Employment and participation rates mostly above pre-Covid



B. Unemployment¹



C. Vacancies to unemployed⁴



EM Asia: IN, KR, PH, TH and VN. Latin America: AR, BR, CL, CO, MX and PE. Central and eastern Europe (CEE): CZ, HU and PL. Other EMEs: IL, SA, TR and ZA.

¹ Definitions differ across countries. Deviation from Q4 2019 figures (pre-Covid level). ² Maximum value for Q1 2020–Q1 2022. ³ Data up to Q4 2022, but AR, BR, CO, PH, TH, SA, ZA and TR up to Q3 2022. ⁴ Unfilled vacancies to unemployed population aged 15 and over. ⁵ For SG, from 2012–22; for MX for 2019–22. For ID, from 2012–21; for KR, from 2018–22 (based on projected data for unemployed in 2022).

Sources: ILO; Refinitiv Datastream; national data.

Developments in informal employment largely mirrored those in the formal labour market. In contrast to the usual countercyclical behaviour discussed above, informal employment fell sharply during the early stages of the pandemic and recovered subsequently. This unusual behaviour is at least partly due to the fact that many workers in contact-intensive activities are employed informally (ILO (2022)).

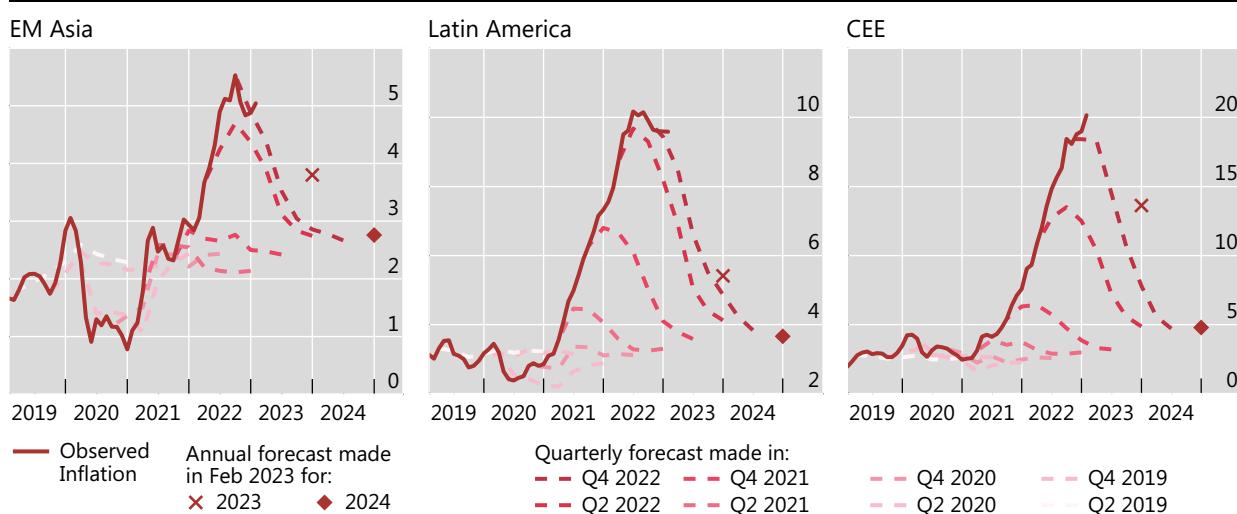
In some economies, changes in migration flows help explain recent wage dynamics. In several Asian economies, for instance Malaysia, Singapore and Thailand, migrant workers left the country during the pandemic and by end-2022 had only partly returned as the demand for labour recovered.²² The opposite happened in Poland, where a large number of Ukrainian refugees joined the labour force.

Rising inflation also contributed to the significant wage growth seen in 2022, in line with the relatively large pass-through from inflation to nominal wages documented in the previous section. At the same time, inflation went up faster than anticipated (Graph 10), which could explain the stagnation or even decline in real wages during that year. This is also in line with the decline in formal indexation mechanisms documented above.

Inflation surprised on the upside and is expected to decline only gradually¹

In per cent

Graph 10



¹ Simple average across regions. EME Asia: CN, HK, IN, ID, KR, MY, PH, SG, TH and VN. Latin America: BR, CL, CO, MX and PE. CEE: CZ, HU and PL.

Sources: Refinitiv Datastream; national data; Consensus Economics.

The extent to which high wage increases will make disinflation more difficult depends on several factors:

One such factor is the evolution of labour market tightness itself. In some countries, for instance Chile, labour markets have become less tight already. In others, eg in Singapore and Thailand, they are expected to become less tight owing to a combination of monetary tightening, slowing growth and increased labour supply owing to returning migrants. This should reduce wage pressures.

²² See eg notes from Malaysia, Singapore and Thailand.

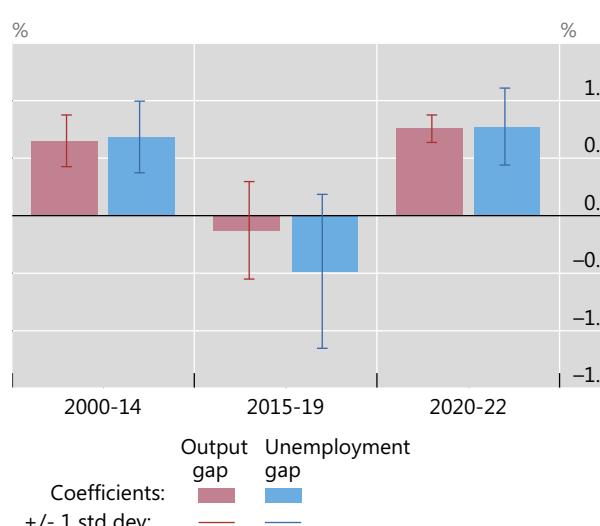
A second factor is the outlook for inflation. Professional forecasters expect inflation to gradually decline in 2023 and 2024. Evidence on the expectations of employers, unions and households is more sketchy, but there are signs at least in some Latin American countries that they could expect only a very slow disinflation, which could increase demands for higher wages and the willingness on the employer side to grant them.

A third factor concerns the bargaining power of labour and the behaviour of benchmark wages, in particular the minimum wage. There is evidence that wage increases have become more sensitive to unemployment and output gaps across EMEs since the Covid-19 pandemic. The central estimate is that average wages will increase by 0.75 percentage points for every percentage point change in the output gap. That is, the wage Phillips curve appears to have steepened (Graph 11.A). This could reflect that the bargaining power of labour has strengthened, owing to withdrawals from the labour force and sectoral mismatches. Such an interpretation is supported by the outward shift of the Beveridge curve in some countries: post-Covid, vacancy rates are substantially higher than similar unemployment rates in the past would have suggested. It is unclear, though how persistent these effects will

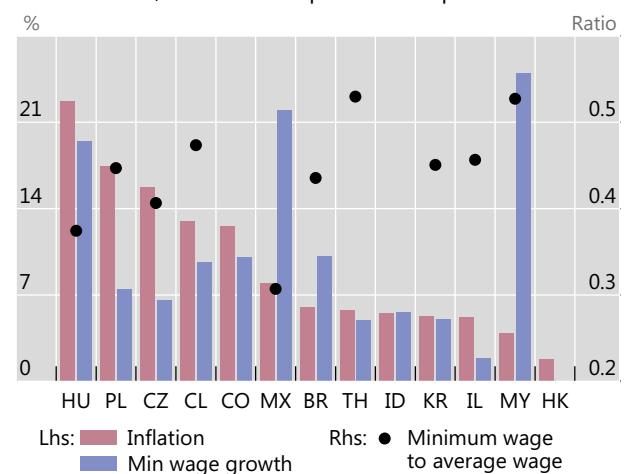
Phillips curves have steepened

Graph 11

A. EMEs' wage Phillips curve has steepened¹



B. Inflation outpaced minimum wage increases in most EMEs in 2022, with some important exceptions²



¹ Based on the estimated Phillips curve: wage growth(t) = $a + b \times \text{inflation}(i, t-4) + c \times \text{output gap}(i, t-4) + d \times \text{labour productivity growth}(i, t-4) + \text{country fixed effects}(i) + e(i, t)$. The estimation was done on a panel with quarterly data from BR, CL, CO, MX, PE, CZ, HU, PL, HK, KR, PH, SG, TH, IL and ZA between 2000 and 2022. Alternatively, the (negative of the) unemployment gap was used instead of the output gap. Gaps are simply the difference between the respective variable and its trend obtained through a one-sided HP filter. ² Data for 2022 end-year.

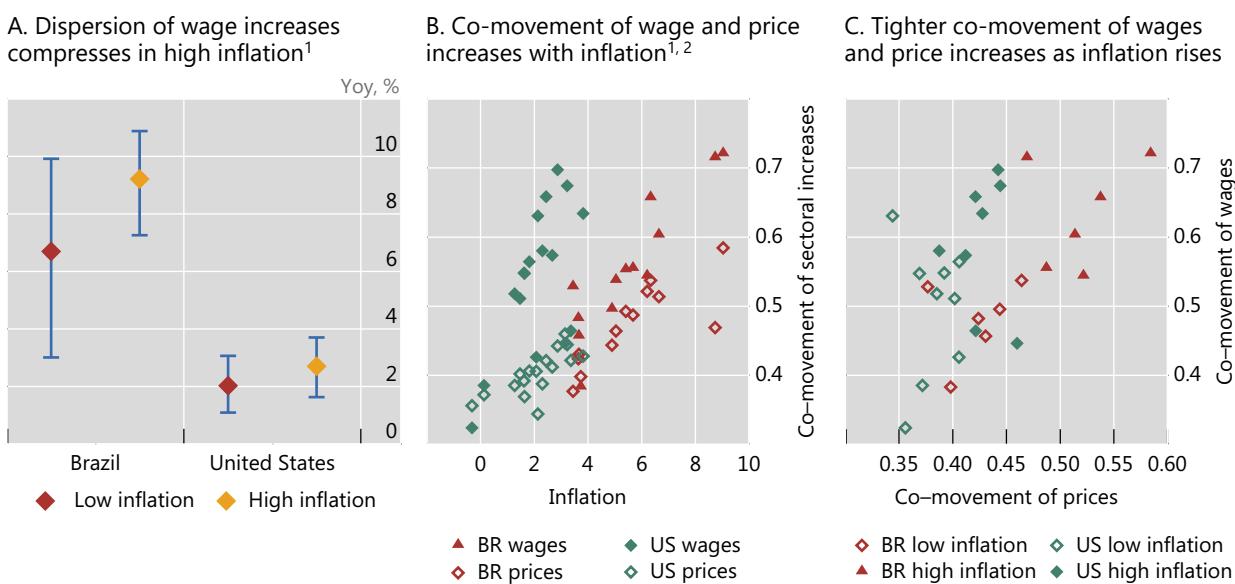
Sources: OECD; World Bank; Refinitiv Datastream; national data; BIS calculations.

be.²³ ²⁴ But it could also reflect increases in minimum wages and their impact on the wage distribution. There have been some significant increases in minimum wages in some countries recently (Graph 11.B), with more in the pipeline (eg Colombia, Malaysia and Mexico).

A fourth factor concerns the potentially self-reinforcing nature of transitions to high-inflation regimes. Separate estimates suggest that the output gap elasticity is 0.5 when inflation is below 5%, doubling to 1.0 when inflation is above 10%. And there is evidence that wage increases co-move more strongly across sectors and with inflation itself when inflation is higher – suggesting that inflation acts as a stronger focal point for behaviour. For example, in past years of high inflation in Brazil –

High inflation becomes a coordinating device in wage- and price-setting

Graph 12



¹ For Brazil, annual median sectoral wages are computed from employee-firm linked data. Firms are classified in 563 sectors following Brazil's industry classification (CNAE). For the United States, wage data is for 474 sectors reported by the BLS. ² For Brazil, sectoral end-year inflation based on IBGE's IPCA 384 segments/products. For the United States, sectoral data for 108 sectors as reported by the BLS. ³ Following Mink et al (2007), co-movement across sectors is computed as the sum of the absolute distance of sectoral wage (or price) increases from a reference point, scaled by the sum of absolute wage (or price) increases across sectors (multiplied by -1). The plot scales the measure to vary from 0 to 1, increasing in co-movement. The plots use as reference point the average annual inflation rate. The results are qualitatively similar if the average wage increase across sectors is used as reference point.

Sources: RAIS/CAGED; IBGE; BLS; BIS calculations.

²³ For example, the Beveridge curve in Thailand shifted to the right in 2020 (ie, there are more job vacancies for any given level of unemployment) owing to labour demand-supply mismatches: job vacancies for low-skilled factory workers, which had been filled by migrant workers pre-pandemic, were not attractive for the unemployed with better education. In Singapore, shortfalls of non-resident workers in certain sectors caused a rise in the vacancy-unemployment ratio. See Bank of Thailand (2022) and Monetary Authority of Singapore (2022).

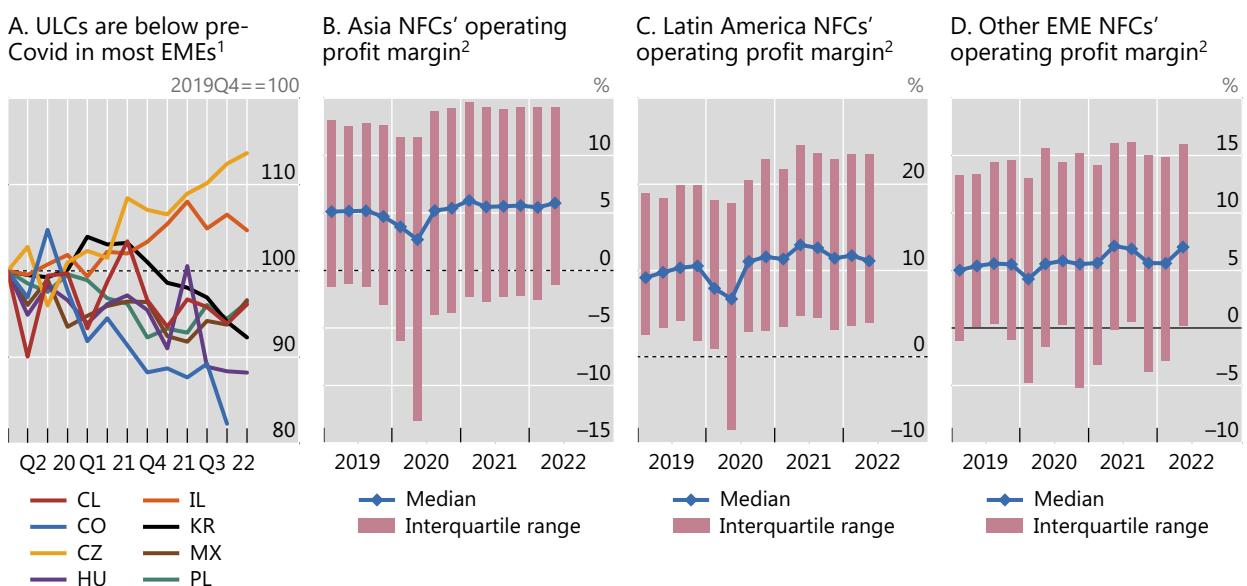
²⁴ Alternatively, we also estimated a vector error correction model of wage formation, taking account of the long-run cointegration between real wages and labour productivity. When estimated for the panel, the results indicated that only past inflation and the output or unemployment gap were statistically significant drivers of wage increases within a one-year horizon. The residual of the cointegration vector and exchange rate variations had effects that were not statistically significant. These panel results do not rule out the possibility that these terms could be important in specific countries.

defined as above median inflation – the dispersion of wage growth across sectors was typically higher (Graph 12.A). Furthermore, the higher inflation, the higher was the co-movement of sectoral wage increases with inflation (Graph 12.B) and the tighter the relationship between wages and prices (Graph 12.C). Similar dynamics are observed in the United States.

Finally, an important factor influencing the impact of wages on inflation in the near term is the ability and willingness of firms to absorb higher labour costs without increasing prices. At least until mid-2022, labour costs and profits did not seem to have been negatively affected by the pickup in nominal wages. Indeed, unit labour costs (ULCs) fell in most economies compared with pre-pandemic levels (Graph 13.A), presumably reflecting increased automation and other pandemic-induced productivity-enhancing investments.²⁵ Lower ULCs and higher prices can explain why firms' profits also held up quite well in 2021–22 in most EMEs, despite higher transport, energy and other input costs (Graphs 13.B–D).

Firms' profits held up well amid lower unit labour costs

Graph 13



¹ Unit labour costs in total economy, based on employed workers. ² Operating profit margin is the ratio of operating income to total revenues. Asia: HK, KR, ID, IN, MY, PH, SG, TH. Latin America: AR, BR, CL, CO, MX, PE. Other EMEs: CZ, HU, IL, PL, SA, TR, ZA. In all cases, based on the sample of non-financial corporations that reported quarterly balance sheet statements in Q1 2022 and Q2 2022.

Sources: OECD; Refinitiv Datastream; Capital IQ; BIS calculations.

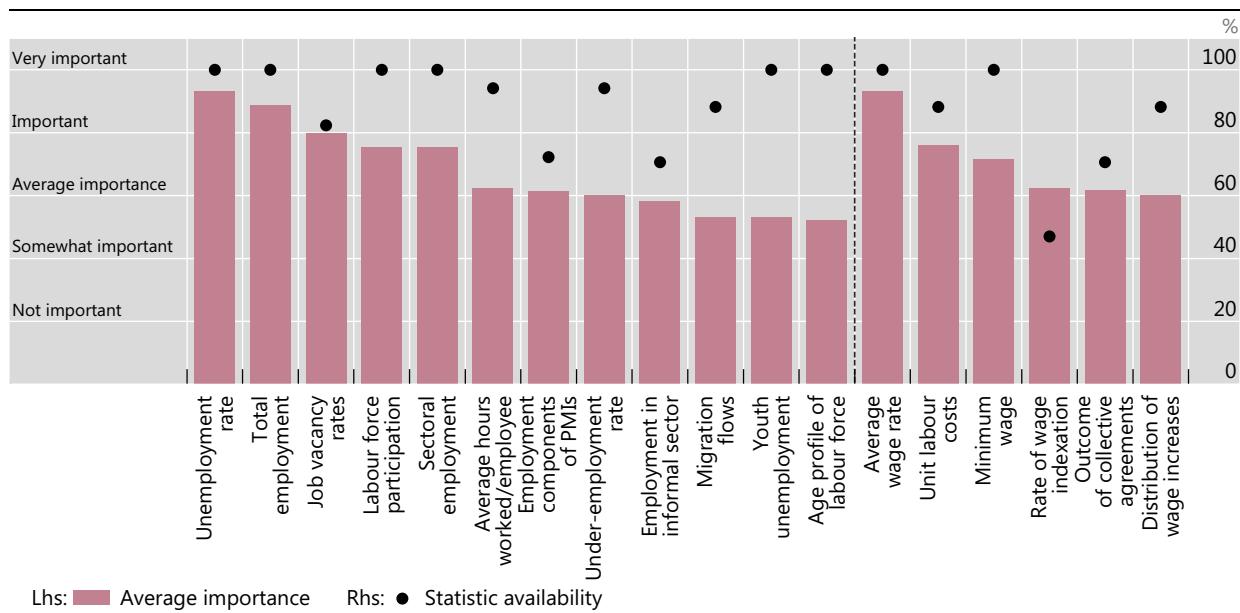
²⁵ The exceptions are Czechia and Israel, which had very tight labour markets in 2022.

Annex: labour market indicators in the policy process

Central banks monitor labour market conditions closely, and place high importance on assessing them. The indicators regarded as most important are aggregate ones, such as unemployment and employment, wages, job vacancies and ULCs. These indicators are particularly important for estimating Phillips curves, a key input informing monetary policy decisions. For these indicators, data availability is generally not an issue (Graph 14).

Importance and availability of labour market indicators

Graph 14



Source: BIS survey responses.

However, in an environment where labour markets are recovering amid great uncertainty, central banks may need to look beyond these broad aggregates. Job flows data (eg the number of new hires or separations) can be useful in improving the monitoring of the recovery after large shocks, such as the Covid pandemic. An increase in employment during a particular period can be caused by a rising number of hires or falling number of layoffs, which could have quite different implications for the inflation outlook.²⁶ Unfortunately, such data tend to be less easily available.

The Covid crisis also showed that developments at the sector level can be very relevant for the inflation process. The pandemic and its containment measures had a very uneven impact on employment and wages across sectors. This distorted the signal embedded in aggregate indicators such as average wage and labour productivity. Furthermore, some sectors may feature strongly in the aggregate labour markets data but have only a minor impact on inflation. A case in point is the technology sector in Israel. Since the lion's share of its output is exported, the large wage increases in that sector will affect inflation much less than the sector's large

²⁶ In Israel, to improve the understanding of the unemployment situation during the pandemic, a new unemployment rate that included furloughed workers was introduced to monitor the broader-definition job losses across sectors, particularly in the contact-intensive industries.

economy-wide wage bill would have suggested (see country note). Such sectoral data often come from structural employment and earnings survey, which are more readily available in AEs than in EMEs. And long reporting lags can add to the problem.

Wage data are also an issue, especially in the informal sector. Not many EMEs compile official data on informal wages. An alternative is to monitor the developments of minimum wages, assuming that wages in the informal sector move in lockstep.

Micro-level data are important to answer questions such as whether the Covid shock led to scarring in the labour market. Admittedly, this issue is less relevant for inflation today but can have a long-term bearing on inflation through its impact on the level and path of potential output. For example, if unemployment causes the depletion of skills that erodes the employability of certain groups of workers, the high levels will persist for a while, even after the economy has fully recovered. School closures, which were lengthy in some EMEs, could also reduce the skill level of future labour market entrants. Unfortunately, the data necessary to answer such questions are scarce in many EMEs.

In some jurisdictions where official survey data are less granular or published with long lags, central banks can employ new data-mining technologies to help improve monitoring and analysis.²⁷ For example, the Hong Kong Monetary Authority has started to apply data science techniques such as web-scraping to browse online job advertisements and extract near real-time information on changes in labour demand. This information has the additional advantage of containing highly granular features, such as employment type, education level and skill requirements, and sometimes remuneration. The Reserve Bank of India has also developed a coincident monthly index for informal sector activity, improving its monitoring of this important sector.²⁸

²⁷ Instead of examining the wage-price dynamics, the Bank of Poland note employs micro-level data to estimate the labour market's reaction to economic policy shocks, so as to improve the understanding of policy design and implementation for achieving the objective of sustained employment.

²⁸ See Bhowmick et al (2022).

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Inflation and labour markets: the view from Argentina¹

Recent developments in the global economy have once again brought to the fore the link between inflation and the labour market. In Argentina, labour market dynamics have long weighed on inflation, and both institutional and macroeconomic factors have added to inertia. In this note, we review recent inflation performance in Argentina – especially since the pandemic – and its relation to labour market conditions.

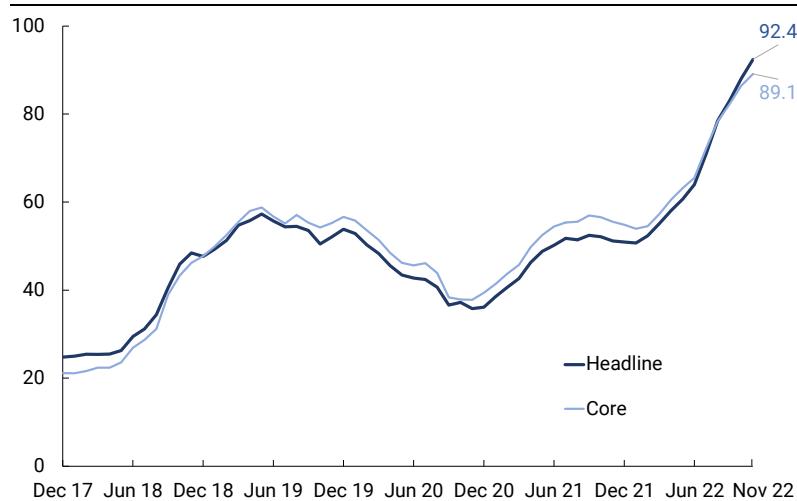
Recent inflation performance

The Argentine economy has shown high and persistent inflation for over a decade. Between 2018 and 2019, inflation rose significantly, reaching 53.8% year on year (yoY) in December 2019 (Graph 1). In 2020, the initial impact of the pandemic was a temporary drop in inflation. The initial drop in international commodity prices at the beginning of the pandemic and the strong domestic recession led to inflation dropping to 36.1% yoY by end-2020 (minus 17.7 percentage points compared with 2019).

Argentina headline and core inflation

yoY % change

Graph 1



Source: national institute of statistics (INDEC).

¹ Sergio Woycheszen, Central Bank of Argentina (BCRA). Note prepared for the BIS Emerging Markets Deputy Governors' meeting in Basel between 16 and 17 March 2023. All information included is current as of 12 January 2023. Inputs from the Economic Research area at BCRA are gratefully acknowledged.

At the macroeconomic level, the pandemic response involved a significant increase in the fiscal deficit. With access to international markets curtailed and only a small domestic currency debt market, greater monetary financing of the Treasury was required. It also entailed a countercyclical domestic credit response (fostered by public policy) that was necessary to alleviate the effects of the crisis on families and companies. The resulting expansion of liquidity put pressure on the foreign exchange (FX) market and on exchange rate stability. Additionally, a set of factors largely linked to the pandemic explain rising inflation during 2021 – which was at a rate of 50.9% yoy as of end-2021. These factors include:

- hikes in the prices of services that had previously seen relative prices deteriorate significantly in 2020 due to the quarantine (for example restaurants, hotels, and cultural and recreational activities);
- an increase in international commodity prices and global inflation; and
- shortages of inputs due to international supply disruptions.

In 2021, the national government proposed reducing the fiscal deficit and its monetary financing, while the Central Bank of Argentina (BCRA) tightened monetary policy in response to inflation. However, high inflation inertia made it difficult to lower inflation. This inertia is due to backward-looking inflation expectations and the characteristics of wage negotiations, that make transitory shocks persist. Such persistence is due, to a large extent, to wage-price spirals (second-round effects).

Inflation increased sharply in the first quarter of 2022, reaching 6.7% month on month (mom) in March and 6.0% mom in April. Several exogenous factors contributed to this increase, over and above the pre-existing inertia:

- unfavourable domestic weather conditions (forest fires in the province of Corrientes that caused significant environmental damage affecting the supply of fruit and vegetables);
- a significant increase in the international prices of agricultural raw materials, energy and global manufacturing that accelerated after the start of the conflict in Ukraine;
- the war in Ukraine and economic sanctions imposed on Russia generated supply restrictions and major distress in global value chains, contributing to an increase in global inflation rates;
- increases in the prices of regulated goods and services (mainly the rates of public energy services) also had an impact, which – after a marked delay in their relative prices – put pressure on the general dynamics of prices; and
- the end of the freezing programmes and price agreements adopted by the national government that helped to temporarily contain inflation in the final months of 2021.

After a brief reduction of inflation in May and June 2022, domestic financial volatility increased from the beginning of July, while uncertainty about the exchange rate was rising and inflation expectations rose again, in the context of growing market concerns about the ability to fulfill commitments to the International Monetary Fund (IMF). Higher uncertainty was also largely due to the impact of the war in Ukraine on Argentina's fiscal and external accounts. The rise in international energy prices generated an expansion in spending by the national government on subsidies to

families and companies through the containment of public utilities tariffs for natural gas, electricity and public services such as transportation. The external accounts and the exchange market were under pressure during much of 2022 due to the need to allocate a significantly greater sum of dollars for energy imports. This set of factors explained a new acceleration in domestic prices. Inflation registered peaks of 7.4% and 7.0% mom in July and August 2022, respectively.

In 2022, Argentina agreed an extended fund facility with the IMF, through which the national government aimed to cut the fiscal deficit and its monetary financing, while the BCRA would maintain positive real interest rates – as it had already announced as part of its Objectives and Plans for that year. During 2022, fiscal and monetary policies were tightened. Additionally, the national government reached agreements with many private companies to slow the rise in prices for many products and thus to be in a position to reduce inflationary inertia. The first results are promising: monthly inflation gradually decreased to a level around 5% in November and December.

Labour market conditions

In this context of high and persistence inflation, the role of wages is worth assessing. We first describe recent labour market conditions and then present an econometric analysis of the main factors driving Argentina's inflation.

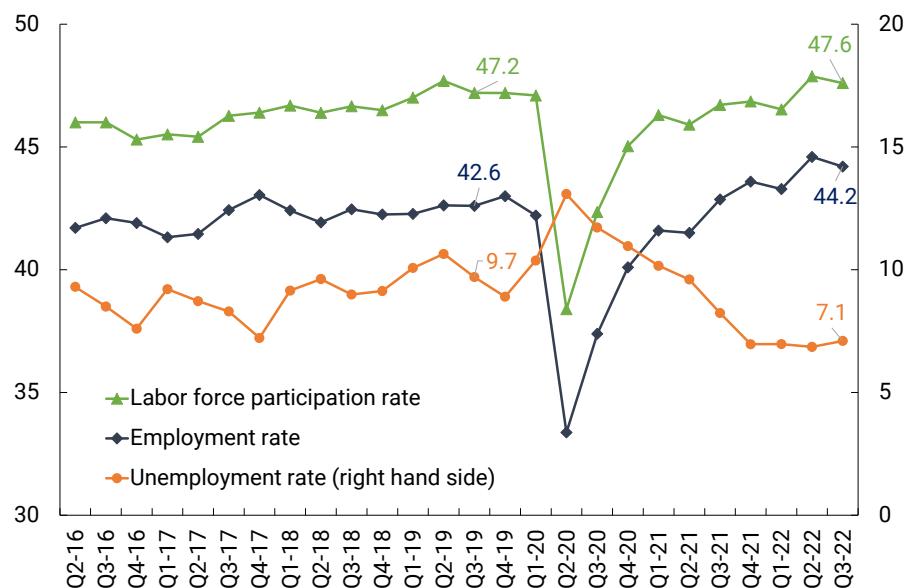
The general picture shows an overperforming labour market after the pandemic. During the third quarter of 2022, Argentina's employment rate, at 44.2% was close to the highest level reached during the new household survey series (starting in the second quarter of 2016). That high water mark was achieved in the second quarter of 2022. At the same time, for the fourth consecutive quarter, unemployment posted its lowest figures since the fourth quarter of 2015 (at approximately 7%). Meanwhile, the labour participation rate was also near its maximum peak, at 47.6% which was minus 0.4 percentage points compared with the second quarter of 2022, seasonally adjusted (Graph 2).

Nevertheless, in the last two years there has been an increase in low-quality labour market activity. The proportions of informal employees and self-employed people have risen, in contrast with decreasing levels of formal employment. The informal sector is, by definition, less regulated (Graph 3). This structural feature enabled a more dynamic recovery after the pandemic (following a significant decrease in the overall level of labour market activity). However, it also tends to imply lower wages and fewer benefits for workers, and may have caused a lower recovery of the average wage in the economy than might otherwise have been the case.

Main labour market indicators

In percent

Graph 2

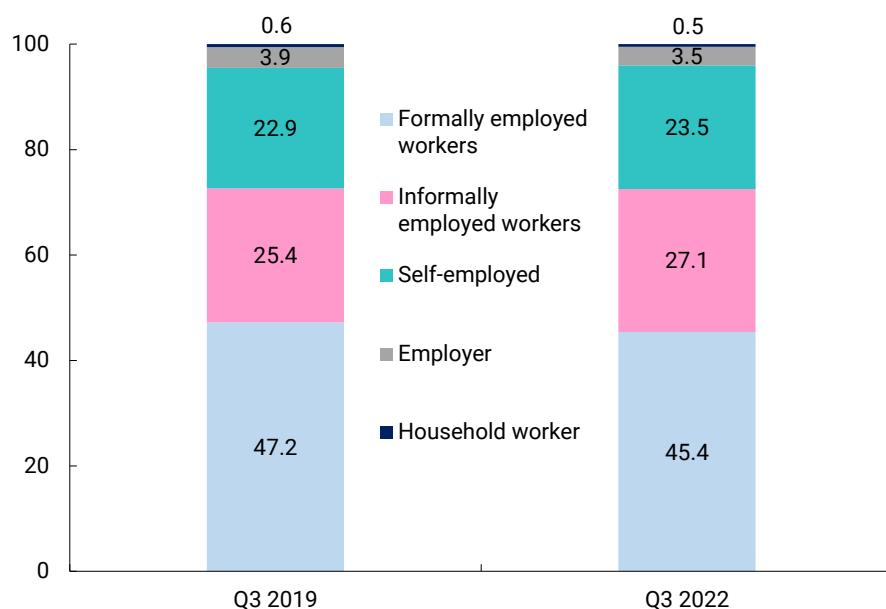


Source: national institute of statistics (INDEC).

Employment by category

In percent

Graph 3



Source: national institute of statistics (INDEC).

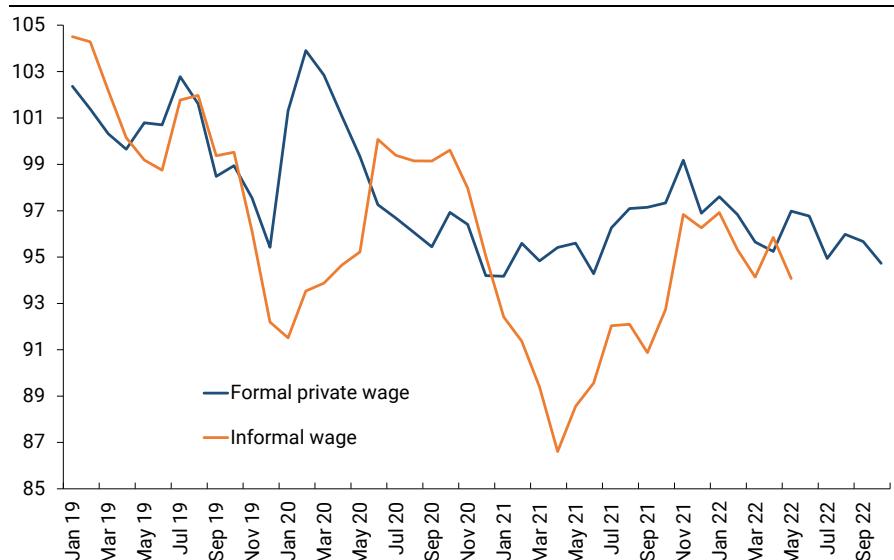
Another structural feature of the labour market is strong unions and centralised negotiations that aim to protect the purchasing power of wages. Unions are independent of each other in their bargaining processes, but they tend to follow a similar trend.

The pandemic disruption led to different evolutions of real wages in formal and informal segments (Graph 4). In the last year, that difference seems to have vanished, with real wages at a lower level. The latest estimations point to a decrease in real wages of around 4% yoy in December 2022. In the face of this, unions have already negotiated important increases in wages for the first quarter of 2023. Average nominal wage increases are reaching more than 100% for 12-month settlements.

Real wages by type of employment

Index 2019 = 100

Graph 4



Source: national institute of statistics (INDEC).

Due to Argentina's high-inflation regime, labour market tightness explains only part of the wage growth process. Inflation acceleration since the second quarter of 2022 impacted wage bargaining. There has been a shortening in the duration of wage contracts to hedge against volatile inflation expectations. On average, wage contracts have changed from a duration of one year to six months, in which there is a nominal wage increase every one and a half months. Also, higher inflation expectations triggered greater heterogeneity among wage agreements in terms of extensions and the percentages of increases.

That said, it is impossible to understand wage dynamics without looking at the evolution of the external sector and devaluation expectations. When inflation accelerates, wages begin to incorporate expectations about the trajectory of the exchange rate and inflation, where balance of payments dynamics plays a fundamental role.

In that regard, year 2021 was exceptional in two different ways. Firstly, the speed of the recovery was closely associated with the normalization in the marginal

propensity to consume, because of rapid vaccination and economic openness, coupled with an expansionary fiscal policy. Thus, the growth of the economy was possible without an increase in real wages. The second factor refers to additional exports caused by both price and quantity effects. Since output growth always increases demand for imports, this additional source of foreign exchange, allowed economic recovery without the need for a drastic jump in the exchange rate to correct the external imbalance.²

However, the picture in 2022 changed considerably. The data indicate that export quantities decreased by 2%, compensated partially by a jump in prices of about 16%. On the other hand, the war between Russia and Ukraine put pressure to energy's import prices, that grew by 16%. Moreover, strong GDP expansion of 5% caused an increase of import quantities of 12%. The combination of these effects, added to the 2021 current account surplus of almost USD 5 billion, a negative flow of USD 8 billion, worsening the prospects for international reserves accumulation and creating incentives to reverse the real exchange appreciation occurred during the pandemic.

The combination of tight labour markets, strong output growth and fragile external conditions contributed to progressively move the inflationary regime from a 3% monthly to a 6% during the second semester of 2022. In this context, workers tried, without success, to recover the losses in real wages experienced in the pandemic, but also, they raised the demands adjusting the claims to the new context of the accelerated crawling peg, high inflation and devaluation risk.

Despite high inflation, the government managed to avoid widespread indexation clauses in wage bargaining. However, there is anecdotal evidence of wage indexation for particular unions. During a brief period (2017–18) indexation clauses were applied in an inflation targeting programme. As the targeted objectives were not achieved, the use of these kinds of clauses was abandoned by both the unions and the government.

On the other hand, salaries set by the government, such as the minimum wage, have some influence on wage behaviour. They are useful as a threshold to guide private sector negotiations in terms of nominal expectations. Some social expenditure by the government is tied to the evolution of the minimum wage. The government set a, once and for all, supplementary "end of year bonus" for low wage formally employed workers.

Finally, there are no significant effects of cross-border or domestic migration in labour market and wage dynamics. Further, no long-lasting pandemic effects are observed that could have an impact on wage negotiations. Labour markets already seem to have normalised. The only significant change is the increase remote working, although that is only suitable for certain kinds of jobs.

² As early documented by Prebisch (1949), in economies with incomplete input output matrices, output growth causes an increase in imports, not only of consumption goods, but more importantly, of capital goods and inputs that cannot be domestically produced due to the lack of technical knowledge. Given the low-price elasticity of domestic exports, therefore, devaluations solve the external imbalance, but through their negative effect on output caused by inflation and the subsequent fall in real wages. This "technological dependency" is still a major problem in Argentina.

Inflation and labour markets: an econometric analysis

There are different channels through which wage dynamics influence inflation. These are related to the relative tightness of the labour market and to different institutional arrangements such as the existence of powerful trade unions or labour protection legislation that may influence workers' bargaining power.

The effect of wages on prices may be exerted either directly, as the source of the shock on prices, or indirectly, fueling inflation inertia. The latter occurs when the economy has powerful formal or informal mechanisms for adjusting nominal contracts to past inflation. This prevents the rate of inflation from falling (or from falling fast enough), even when the shock that generated the initial price rises has faded. The initial shock may be a currency devaluation or a rise in commodity prices, or energy prices as happened in 2022. Wage-price spirals, or *second-round effects*, make inflation persistent.

We analyse long- and short-run relationships between inflation and wages in Argentina between 2004 and 2022. The variables involved are the consumer price index in its core or underlying version, the nominal exchange rate, wages, activity, amount of money, the interest rate for deposits in domestic currency, international energy prices, international food prices and the foreign producer price index (for details, see the Annex).

In the long run, almost 80% of the behaviour of prices is associated with nominal wages, while the remaining 20% depends on the nominal exchange rate (see equation (1) in the Annex). This long-run influence of money wages on prices is somewhat higher than in other Latin American countries: it is 72% in Brazil, 70% in Colombia and Uruguay, 60% in Mexico and 48% in Chile (García-Cicco et al (2022)). There is also a negative relationship between the real wage and the real exchange rate: persistent real depreciations have been associated with lower real wage levels on average, and vice versa.³ This is not found in other Latin American countries, and may help to explain why devaluations are an important source of "distributional conflict" in Argentina, because they lead to high wage demands to recompose the real wage, that end up feeding back into inflation.⁴

The other long-run relation links real money balances, economic activity, the interest rate and the exchange rate, and can be interpreted as the long-run transactional money demand (see equation (2) in the Annex). The influence of monetary aggregates on inflation through this channel is less direct. If the general price level were to rise to eliminate a potential excess of supply of money, this rise could be the result of "excess demand" in the goods market, due, for instance, to tighter labour market conditions. Since market economies usually work under conditions of less than full employment, and the elasticity of labour supply is quite high (for instance, it can be increased through immigration even when the domestic

³ Since the estimated coefficients sum to one, the long-run relation shows a necessary negative relationship between real wage and real exchange rate.

⁴ Historically, wage earners faced negative distributive shocks every time a discrete jump in the exchange rate occurred. Between 1930-2018 strong external crises occurred in 1931, 1948, 1971, 1975, 1981/82, 1989 and 2002 and 2018.

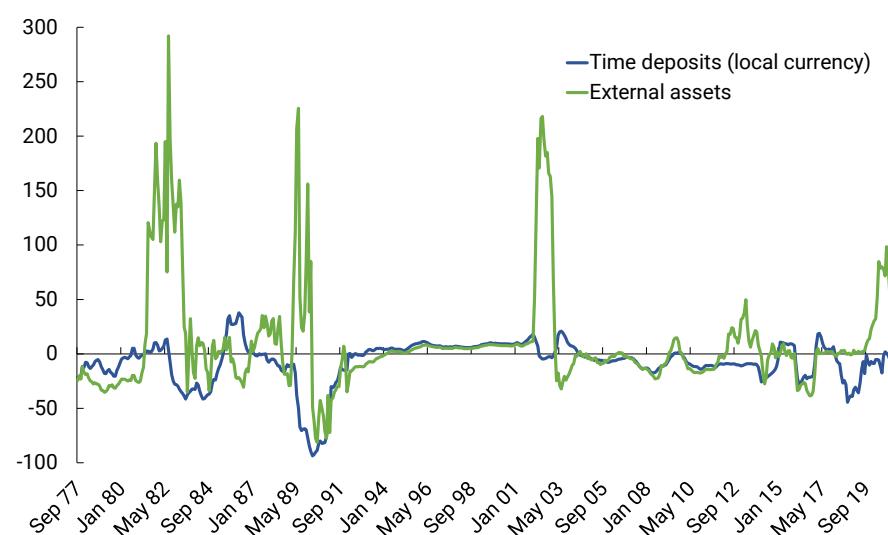
labour market is nearly full employment), the former does not seem to be a plausible mechanism for Argentina, except under very exceptional circumstances.

In any case, monetary aggregates can affect inflation through the effect of the exchange rate, a channel that seems more relevant for peripheral economies like Argentina, whose currency has lost its role as a store of value for domestic savers. Due to a long history of abrupt changes in exchange rate arrangements, with its negative effects on inflation, the private sector has developed adaptative mechanisms to preserve the real value of its financial wealth.⁵ Among them, even in normal times (*i.e.* when there are no objective reasons to believe that there will be a change in the exchange rate regime), and more intensively in periods of high uncertainty such as the pandemic or when inflation accelerates, as in the post pandemic, the private sector has tended to rebalance their portfolio currency composition, from domestic to foreign currency (Corso (2021)). Therefore, domestic private sector's dollar demand as store of value for precautionary reasons, creates further tensions on the balance of payments, additional to those traditionally caused by the real sector, and therefore on prices, thus validating the reasons for dollar demand in the first place, as a self-fulfilling prophecy.

Ex post annual real returns

Holding time in portfolio = 1 year; in per cent

Graph 5



Source: Corso (2021).

This defensive behaviour seems fully justified, *ex post*. In fact, over the last 40 years, not only the real return of peso denominated assets -time deposits- have usually been negative, but it has also been strictly dominated by the average return of dollar-denominated assets (in case of dollars, measured by the rate of domestic devaluation) (Graph 5). As documented in Corso (2021), between 1977 and 2020, the

⁵ As mentioned in the previous section, this long history of devaluations is not necessarily the outcome of "bad monetary policy". It has been an inevitable result of growth, in an economy with an incomplete input output matrix.

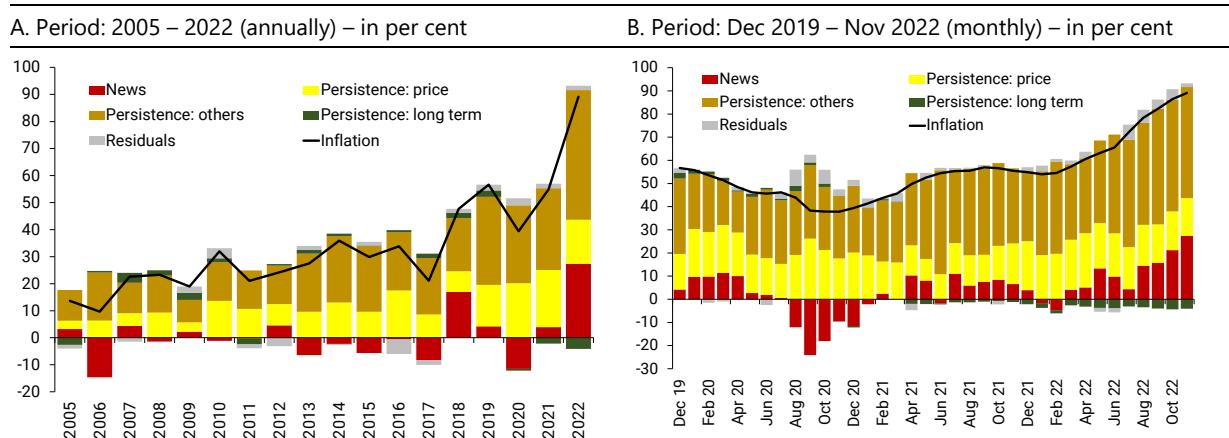
former had a negative return of 7.5% and the return of the letter was 9.1% positive in real terms. This is why, to revert this tendency, and with the support of the IMF, the Central Bank of Argentina is currently committed to ensure positive returns in peso denominated assets (see the Plans and Objectives of the bank 2023).

We go on to examine the short run, decomposing 12-month core inflation rate into a persistence and a contemporary component (see the Annex). In turn, inflation persistence is disaggregated into its own persistence and the persistence of the other determinants; and the contemporary component is also disaggregated into a “news” and a residual component. The different terms of the decomposition include: the nominal exchange rate, wages, activity, monetary (money balances and interest rate), external (international energy and food prices, and the foreign producer price index), the nominal exchange rate gap (the difference between the official exchange rate and the exchange rate that emerges in financial markets through the sale and purchase of bonds denominated in foreign currency) and, finally, deviations from the long-run relationship previously described.

The exercise shows that persistence (or inertia) has been a very significant determinant of core inflation since 2005. Moreover, relative to own persistence, the persistence of the rest of the explanatory variables has increased over time, reaching a contribution of 47 percentage points by the end of 2022 (Graph 6.A). In 2022, the news on inflation have gained momentum, growing to 27.4 percentage points of the accumulated inflation for 12 months (Graphs 6.A and 6.B).

Inflation: year-on-year decomposition

Graph 6



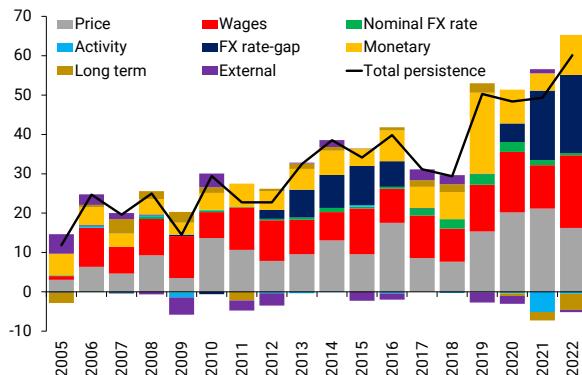
Source: BCRA.

During the last three years, inflation persistence itself (lagged inflation), and the persistence of wages and of the exchange rate gap are the most relevant factors for overall inflation persistence (Graph 7). Persistence due to money growth is relatively low (except in 2019 and certain months in 2020), and the role played by activity in inflation persistence is subdued. Recently, wages played a growing role in inflation persistence (18.5 percentage points). The persistence of the exchange rate gap has gained traction since mid-2021 (19.8 percentage points, Graph 7.B) while “own” inflation persistence has lost some share (16.2 percentage points) since June 2022.

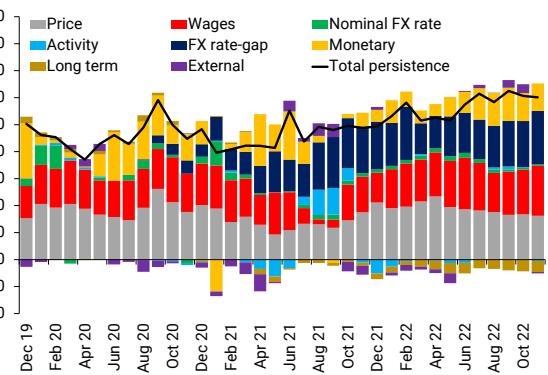
Inflation: persistence decomposition

Graph 7

A. Period: 2005 – 2022 (annually) – in per cent



B. Period: Dec 2019 – Nov 2022 (monthly) – in per cent



Source: BCRA.

Finally, the decomposition of the contemporary component shows that both economic activity and the nominal exchange rate contributed to lower core inflation in the last two years (in the sense that they moved below what their trend would have indicated). In turn, the role played by news about money wages on inflation dynamics over the whole period is revealing. Disinflationary episodes in the last 15 years went together with limited wage increases that facilitated this decline (Graph 8.A).⁶ The reverse effect (news on wages positively contributing to rising inflation) is less clear over the whole sample, but has gained ground in the last two years, since the recovery that followed the pandemic.

Wages played a disinflationary role during the pandemic and considerably reversed this trend since June 2021, becoming the main driver of the news component in 2022 (explaining 88.7% of the contemporary component in November). This has been the case even though news about the exchange rate exerted a deflationary role during this period. The influence of wage news on inflation is another feature of the macroeconomic situation in Argentina that differentiates it from the other Latin American countries (see BCRA (2020, 2022)).

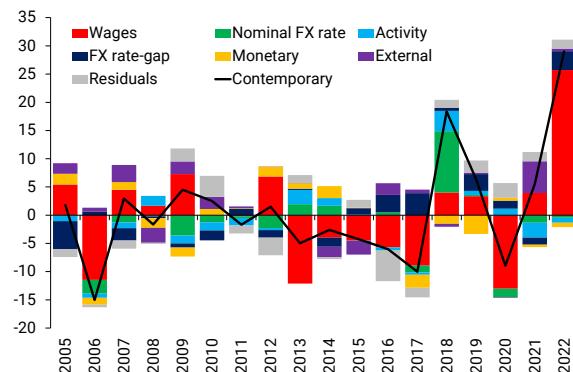
Additionally, external factors in 2021–22 added to contemporary inflation (including higher international prices after the outbreak of the war in Ukraine). Moreover, international prices are likely to have played a non-trivial role in domestic inflation indirectly, both through their effect on wages and on the residuals, given their possible link to higher inflationary expectations ("forward-looking elements"), not captured explicitly in the econometric exercise (Graph 8.B). As mentioned in the previous section, in a context of high inflation, expectations tend to be linked more strongly to exchange rate dynamics and the risks of a discrete devaluation. For that reason, post-pandemic monetary policy is committed to creating conditions that ensure positive real returns on domestic assets to anchor expectations and limit the portfolio dollarization.

⁶ In other words, when inflation was lower than persistence would have dictated (in 2006, 2013, 2015, 2017 and 2020), wages contributed by adjusting *below* what their own influence in the past indicated.

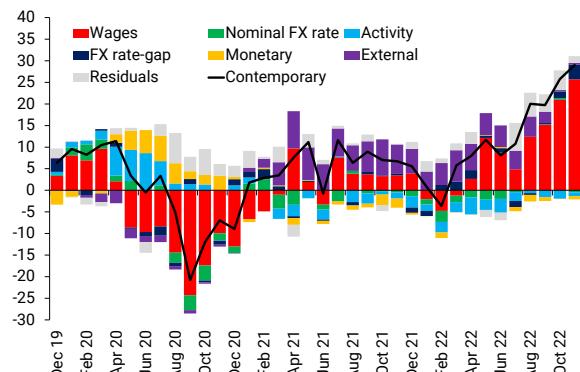
Inflation: contemporary component decomposition

Graph 8

A. Period: 2005 – 2022 (annually) – in per cent



B. Period: Dec 2019 – Nov 2022 (monthly) – in per cent



Source: BCRA.

Concluding remarks

Inflation in Argentina was high before the pandemic shock, with a labour market structure featuring strong unions and centralised negotiations aiming to protect the purchasing power of wages. This helps explain a high level of inflation inertia leading to the persistence of transitory shocks. To a large extent this is due to wage-price spirals (second-round effects). Also, the rise of inflation since the second quarter of 2022 has influenced the structure of wage bargaining, increasing the frequency of wage negotiations and heterogeneity in the magnitude of rises.

In the post pandemic, the combination of strong recovery along with the weakness of external conditions, contributed to put pressures on inflation and wage claims. Consequently, the official response was to move up the interest rates and hinder monetary expansion to anchor expectations and limit the private sector's portfolio dollarization.

Econometric analysis shows the relevance of wage dynamics for understanding the short- and long- term trends of inflation in Argentina. Their impact is either direct (through "news" or shocks on wages themselves) or indirect, as a reaction to changes in other variables that affect domestic prices, such as the nominal exchange rate or international prices. The reaction will be more intense, all things equal, the higher the downward real rigidity – a feature that, due to strong labour unions and their bearing on distributional conflict, seems to distinguish Argentina from the rest of the region (Trajtemberg and Valdecantos (2015), García-Cicco et al (2022)). Still, the analysis is relevant for other economies as it corroborates the role of wage-price spirals in driving inflation persistence. Indeed, as BIS (2022) points out, such processes distinguish low- from high- inflation regimes.

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Annex: Econometric methodology

To document the long-run relation, we perform a cointegration analysis using the system-based procedure of Johansen (1988), Johansen and Juselius (1990) and Juselius (2006). In addition to identifying these cointegrating relationships, an assessment of exogeneity or weak endogeneity is performed; analysing which of the system variables respond to deviations from the long-term relationship(s) (see Johansen (1992), Urbain (1992), Ericsson (1994) and Juselius (2006)).

The variables involved are the consumer price index in its core or underlying (IPC) version, nominal exchange rate (E), wages (W), activity (Y), amount of money (M), interest rate for deposits in domestic currency (i), international energy prices (energy), international food prices (food) and foreign producer price index (PPI). The long-run relations found for Argentina between 2004 and 2022 are:

$$IPC = 0.80 \times W + 0.20 \times E \quad [1]$$

$$M - IPC = 1.19 \times Y - 1.53 \times i + 0.31 \times E \quad [2]$$

The “weak exogeneity” tests indicate that IPC and wages respond to deviations from the long-run relationship of equation [1] and M-IPC and E respond in the case of equation [2].

To examine the short-run regularities, we decompose the cumulative inflation rate (π) over h periods (in this case 12 months) into a persistence (P) and a contemporary (C) component (see García-Cicco et al (2022) for a detailed methodological description).

$$\pi = P + C \quad [3]$$

Persistence (P) of inflation can be disaggregated into its own persistence (P_p) and the persistence of the rest of the determinants (P_o).

$$P = P_p + P_o \quad [4]$$

The contemporary component (C) is also disaggregated into the news (N) and residual (R) components.

$$C = N + R \quad [5]$$

The news refers to the part of the observed contemporary change in a variable that cannot be explained, neither by its own past, nor by the effect of the rest of the determinants considered. This would be the case when wages rise due to a change in labour market legislation. The residual component includes the effect of possible omitted variables (for example, assumptions about inflationary dynamics not explained by the past and present) and measurement errors, among others.

Again, we focus on core inflation and the different terms of the decomposition include: the nominal exchange rate, wages, activity, monetary (money balances and interest rate), external (international energy and food prices, and the foreign producer price index), the nominal exchange rate gap (the difference between the official exchange rate and the exchange rate that emerges in financial markets through the

sales and purchases of bonds denominated in foreign currency) and, finally, the deviations from the long-term relationship described by equation [1].⁷

The exercise is based on the analysis of three groups of graphs. The first two show a black line with the dynamics of inflation and a set of bars that indicate the contribution of each of the three components: persistence, news and residuals for the whole sample from 2005 to 2022 (Graph 6.A) and for the subperiod initiated by the pandemic (December 2019 – November 2022) (Graph 6.B). The second group of graphs examines the role exerted by the persistence of the different variables involved (Graphs 7.A and 7.B), while the third group measures the weights of news and residuals (Graph 8.A and 8.B).

⁷ The deviations from the long-run relationship described in equation (2) is not included in the exercise because, according to weak exogeneity tests, core inflation does not respond to correct those deviations (the adjustment coefficient of the corresponding equilibrium correction term is not significant).

Inflation and labour markets in the wake of the pandemic: the case of Brazil

Diogo Abry Guillén and Sergio Leão¹

Abstract

This paper examines the behavior of the Brazilian labour market in the aftermath of Covid-19 and explores the relationship between labour market slackness indicators and real wages in Brazil. We propose seven different tightness indices and show that all of them had reduced predictive power in relation to real wages after the pandemic outbreak. Despite a heated labour market, we document a significant drop in real wages following the pandemic outbreak, and we find that more educated workers' real wages fell the most after the pandemic outbreak and have showed a slower recovery afterwards. These findings suggest that working from home amenities may be playing a role in releasing wage pressure during the post-pandemic recovery.

JEL classification: E24, E31, J21, J3, J63.

Keywords: real wages, Covid-19, inflation, labour market.

¹ Central Bank of Brazil. Corresponding author: sergio.leao@bcb.gov.br. The views expressed herein are solely those of the authors and do not necessarily represent the views from the Central Bank of Brazil. We would like to thank Lilian Arquete, Pedro Calhman, Euler De Mello, Wagner Gaglianone, Andre Minella, Bruno Ottoni and Ricardo Sabbadini for their helpful comments. Of course, all remaining errors are our own.

1. Introduction

Most governments reacted to the Covid shock by adopting expansionary monetary and fiscal policies to prevent deep recessions in their local economies. It was a period of high correlation of expansionary policies both across countries, as well as within countries with the use of fiscal, prudential and monetary instruments. As the pandemic receded and there was a normalization of mobility, both inflation and economic activity rebounded faster than expected. This was due, in part, to stronger demand supported by expansionary policies. Core inflation reached record high levels across a wide array of countries and many countries faced the challenge of avoiding persistent and possibly entrenched inflation.

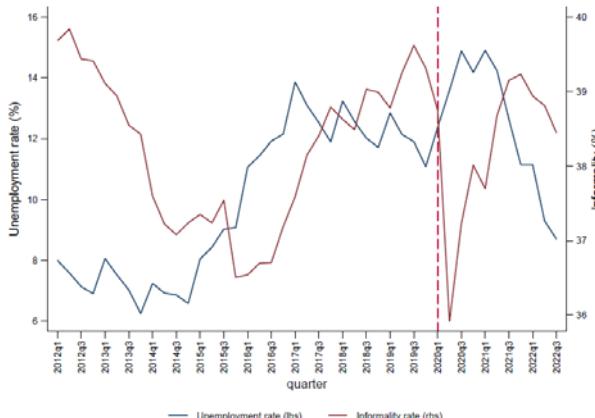
The Covid shock was very strong and complex in terms of its impact on the labour market. On the structural side, it had a large impact on how the labour market is organized, with relevant changes in participation rates and a sizable increase in contracts that provide for working from home (see Castro and Moreira (2021); Góes et al (2022)). On the cyclical side, understanding how slack in the labour market impacts inflation is paramount and is highly relevant for policymaking, especially in the wake of a large shock such as Covid-19.

Graph 1 provides a first view of the labour market in Brazil over the last 10 years. In a nutshell, Graph 1.A illustrates that the spike in unemployment after the Covid outbreak was completely reversed and the unemployment rate reached a level below the pre-Covid baseline by the end of 2022. Additionally, the large reduction in informality levels during the crisis period also reversed. Nonetheless, Graph 1.B shows that real wages reached their minimum by end-2021, when they started to recover. In the third quarter of 2022, real wages were still 4% below the level at the beginning of the pandemic, while the unemployment rate was more than 2 percentage points lower than prior to the pandemic. We start by examining how the labour market has behaved by looking at different dimensions: economic sectors, educational attainment, informality and occupation. Our measures show that the decrease in real wages is pervasive across different economic sectors, but quite heterogeneous across educational attainment. Moreover, the informal sector, which usually acts as a buffer in recessions, actually magnified the impact on the labour market during Covid. In respect of institutional changes, we discuss a labour market reform that was put in place before the pandemic. Finally, we discuss the role of inflation surprises when there is nominal stickiness.

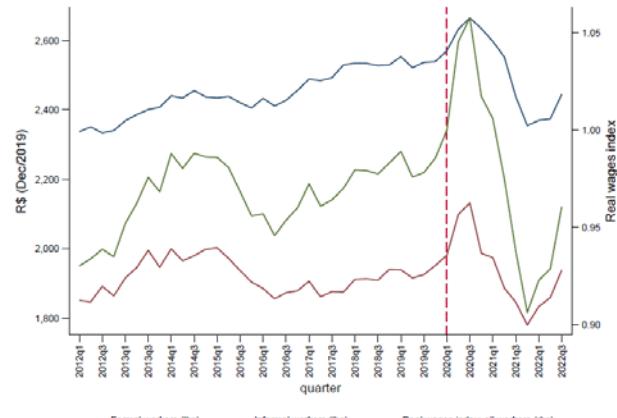
Unemployment and informality

Graph 1

A. Unemployment and informality



B. Real wages



Real wages are deflated by the Extended National Consumer Price Index (IPCA), provided by Instituto Brasileiro de Geografia e Estatística (IBGE).

Source: Continuous PNA – Continuous National Household Sample Survey, a survey conducted by IBGE.

After laying the groundwork, we evaluate a range of labour market indicators

and we construct new indices to assess the degree of tightness in the Brazilian labour market. As we discuss, each measure has its pros and cons that depend on its statistical quality, the dimension studied, as well as an assessment of structural changes in the labour market. We highlight three dimensions of the labour market: stocks, flows and expectations. Some of the measures are standard, such as the unemployment rate, while some were built in, such as the worker flow rate and quit-to-workers flow rate. The general profile that arises across these dimensions and measures is that the labour market is as tight or even tighter than before the pandemic although it has seen remarkable improvement following the pandemic.²

We then analyse the correlation of the labour market tightness to different measures of wage compensation from a time-series perspective. We find that (i) wage movements are less correlated with the labour market tightness than before the pandemic and (ii) the reduction of explanatory power is not due to a parametric change. We also examine the explanatory factors for such results. We discard the role of inflation surprises, productivity or institutional changes as major reasons for these results.

Our contribution to the literature is twofold. First, we show how educational attainment heterogeneity played an important role in determining labour market developments in the aftermath of the Covid shock in Brazil. The employment rate of college educated workers maintained its previous growth trend in the aftermath of the pandemic while experiencing the largest drop in real wages. This fact is suggestive of working from home amenities being offered as non-pecuniary benefits to the group of workers who are most likely to make use of them, according to the literature

² Unfortunately, we do not have data on vacancies to build the traditional vacancies-to-unemployment measure obtained from the matching model literature and championed as the best tightness measure by Barnichon et al (2022) and Furman and Powell III (2021). We construct alternative measures based on the variables that we have.

(eg Castro and Moreira (2021); Góes et al (2022)). Second, we organize, classify and propose different labour market tightness indicators and demonstrate a reduction of the explanatory power of labour market tightness on wages in the aftermath of the pandemic.

The remainder of the paper is organized as follows. In Section 2, we present an overview of the main dimensions of the Brazilian labour market, and show how employment and wages responded to the Covid-19 shock. We also discuss the institutional changes that were implemented during the period close to the pandemic. Section 3 presents our measures of labour market tightness. We show the evolution of the main labour market indicators during the last 10 years and present different labour market tightness indicators. In Section 4, we assess the relationship between our tightness indicators and real wages (subsection 4.1) and the role of other educational attainment heterogeneity in explaining real wage variation (subsection 4.2). In Section 5, we investigate and dismiss alternative explanations that could impact the relationship between wages and slackness, such as the labour market composition effect, inflation surprises and productivity changes. In Section 6, we sum up the main results.

2. Descriptive analysis of the Brazilian labour market

In this section we describe the evolution of employment and wages in recent years across economic sectors, educational attainment levels and occupations. We also discuss the response of the informal market during the pandemic.

2.1 Economic sectors

We first describe the response of the labour market to the pandemic across 19 economic sectors. Overall, almost all economic sectors underwent some loss of jobs after the onset of the pandemic, according to Graph 2. The exceptions were the human health sector, in which the demand for jobs increased as a response to the pandemic, and public administration, which maintained the same number of employees. The recovery after the pandemic was also widespread. Only the water supply and sewerage sector showed a persistent drop in employment. Of the remaining sectors, only three have reached levels of employment close to pre-pandemic levels (accommodation and food services, admin and support activities, and electricity). Meanwhile, all other sectors now have levels of employment well above pre-pandemic levels.

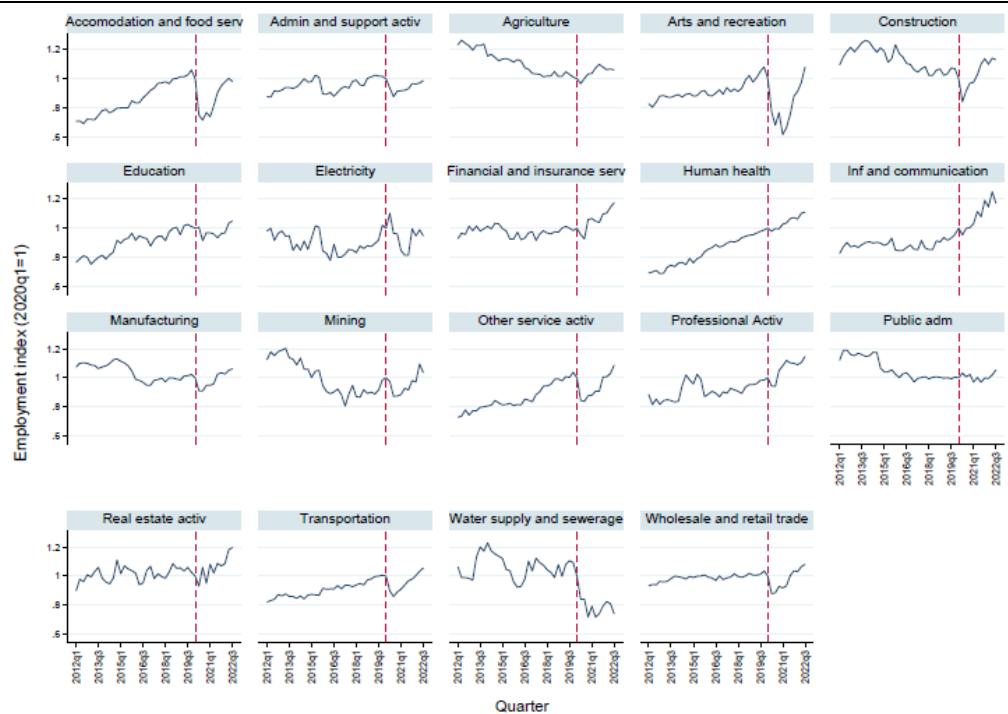
With regard to real wages, they provide a different perspective (Graph 3). When compared with pre-pandemic levels 13 economic sectors have lower average wages, but with a recovery at the margin. Only three economic sectors have higher wages than before the pandemic.³

Summarising our results, by the third quarter of 2022 the locus of stronger employment and lower wages than before the pandemic is pervasive across sectors.

³ We highlight the agriculture sector, which has reversed the previously declining employment trend with a significant recent rise in wages.

Jobs heterogeneity: economic sectors

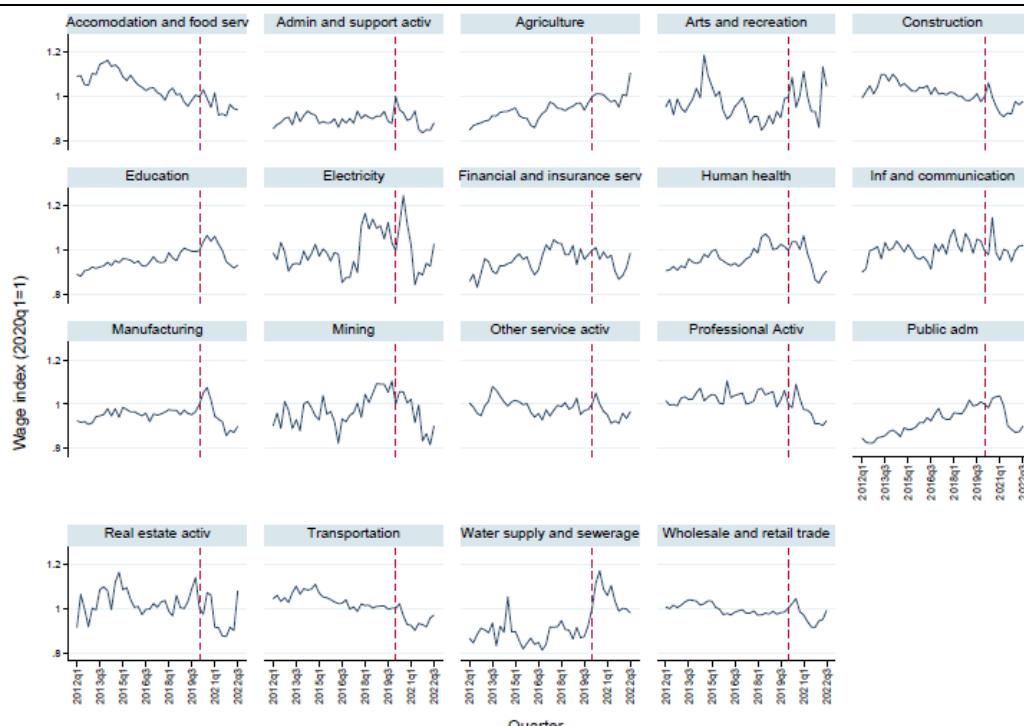
Graph 2



Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

Wage heterogeneity: economic sectors

Graph 3



Real wages are deflated by the Extended National Consumer Price Index (IPCA), provided by IBGE.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

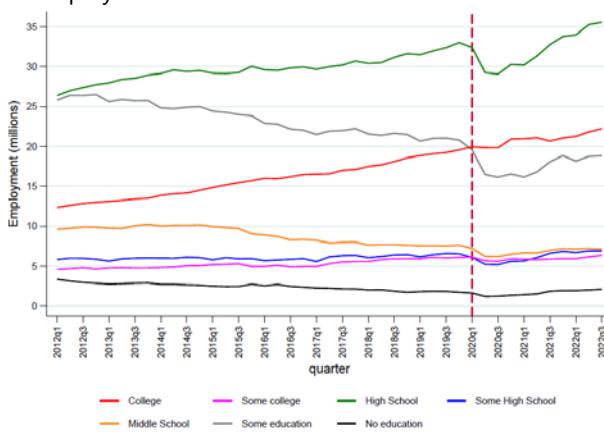
2.2 Educational attainment

In contrast to the more homogeneous response to the pandemic across different economic sectors, we observe an intriguing pattern related to educational attainment classification. According to Graph 4, more highly educated workers were less impacted in terms of employment, but underwent larger real wage losses. While the employment level of college degree workers was unaffected by the pandemic,⁴ high school workers experienced large losses in their jobs but had a fast recovery back to their pre-Covid trend. Nevertheless, workers with college degrees and those that had completed high school underwent the largest drops in real wages (Graph 4.B). The real wage losses of college educated workers reached 13% in the fourth quarter of 2021, compared with the pre-pandemic level.

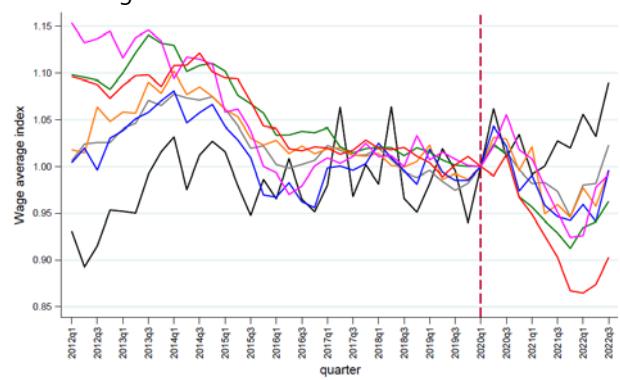
Pandemic response by educational attainment

Graph 4

A. Employment trends



B. Real wage trends



Real wages are deflated by the Extended National Consumer Price Index – IPCA, provided by IBGE.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

These results are quite interesting because they can be related to the joint shock of the pandemic comprised of (i) mobility restrictions and (ii) working from home. Mobility restrictions had less impact on college workers than other workers because their services were less affected by changes in labour demand. Moreover, on the supply side, college workers may have found that working from home arrangements provided them with more flexibility and they may have, therefore, not bargained as much on wages. In fact, Castro and Moreira (2021) and Góes et al (2022) show that more educated workers, particularly college educated workers, were more likely to work remotely in the aftermath of the pandemic. Hence, contracts allowing for working from home by college educated workers may have lowered wage pressure, as Barrero et al (2022) have found in surveys.

⁴ College educated workers are now the second largest category of workers when we break down data into educational attainments. As at the first quarter of 2020, college educated workers represented 21% of total employed workers.

2.3 Occupations

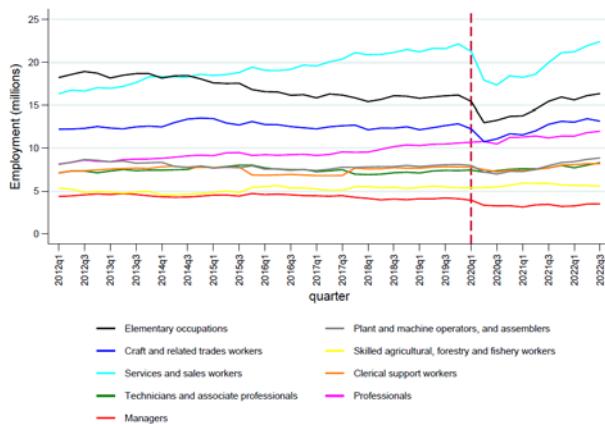
We now look into how employment and wages evolved by type of occupation. The three largest groups of workers by occupation type – services and sales workers, elementary occupations, and craft and related trades workers – experienced a large loss of jobs. On the other hand, professionals – around 80% of such workers have college degrees – continued on almost the same positive trend despite the negative economic shock. This corroborates the argument that more educated workers were less affected by mobility restrictions. We also notice a long-term decrease in elementary occupations, in line with the loss of importance of workers with no education previously shown. Moreover, we highlight the decrease in the number of managers in the aftermath of the pandemic, which remained stable during the recovery period.

Such results reinforce previous findings that college workers, or, more generally, workers that are more amenable to working from home arrangements, were less affected by the negative employment shock. However, they experienced lower wages during the pandemic.

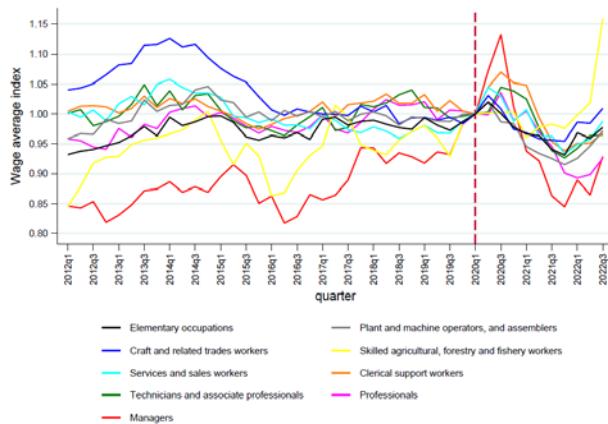
Pandemic response by occupation

Graph 5

A. Employment trends



B. Real wage trends



Real wages are deflated by the Extended National Consumer Price Index (IPCA), provided by IBGE.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

2.4 Informality

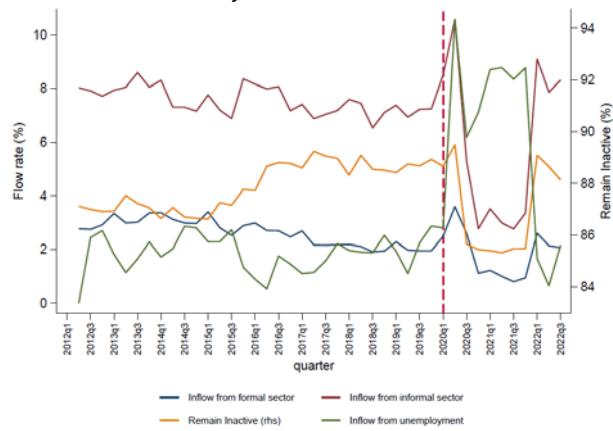
The Brazilian labour market, as observed in many countries, responded with a large increase in inactivity in the aftermath of the Covid outbreak. According to Graph A.1, the pandemic shock yielded a large decrease in the inflows to employment from inactivity as well as a large outflow from employment to inactivity. In addition to the direct effects from mobility restrictions, in this section we highlight the role played by the informal sector during the unfolding of the Covid pandemic. Graph 6 depicts the relevance of the informal sector when we analyse the transitions from and into inactivity. The inflow rates to inactivity from the informal sector varies from two to

four times the inflow rate from the formal sector during our sample period.⁵ At the onset of the pandemic, there was also an increase in the inflows from the informal sector to inactivity that was even larger than the observed inflow from the formal sector. When we look into the outflow rates from inactivity, we also note the prominence of the informal sector, with outflows to the informal sector outsizing the ones to the formal sector by a margin of three to five times. Due to more flexibility, and lower hiring and separation costs, the informal sector has always played a key role as an employment buffer during recessions, despite the earning loss for workers who move from formal to informal jobs (Gomes et al (2020)). During the Covid recession, the informal labour market had a different role, contributing to the propagation of the negative labour market shock, a feature first documented by Leyva and Urrutia (2022). Another way of putting it is that the Covid shock, ie mobility restrictions, had a much larger impact on the informal sector than on the formal sector. Graph 7 describes the inflows and outflows of the informal sector and allows us to compare the Brazilian recession of 2015–16 with the Covid crisis. While we observe an increase in the inflows to the informal sector from unemployment in the 2015–16 recession, the inflow from unemployment to the informal sector reduced in the aftermath of Covid.

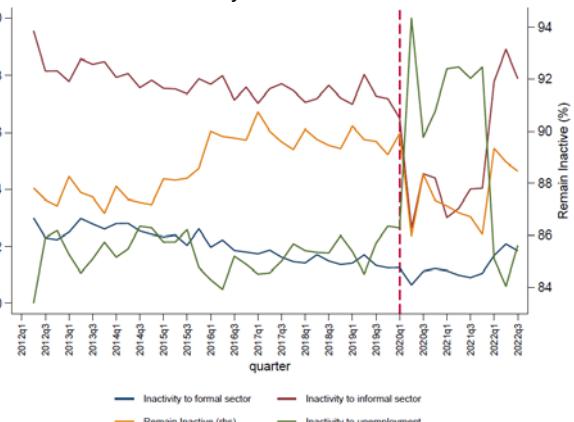
Inflows and outflows from inactivity

Graph 6

A. Inflows to inactivity



B. Outflows from inactivity



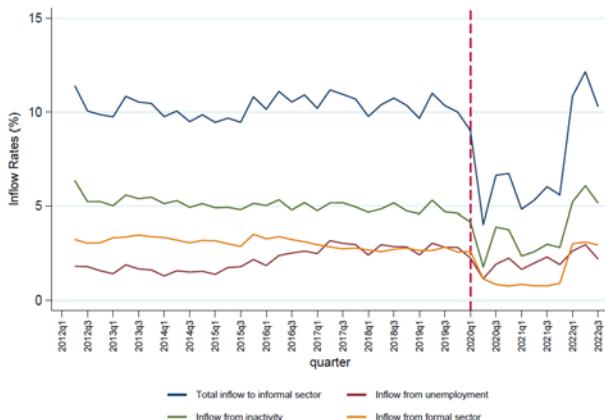
Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

⁵ In the year before the pandemic outbreak, the inflow rate to inactivity from the informal sector was more than three times the inflow rate from formal sector.

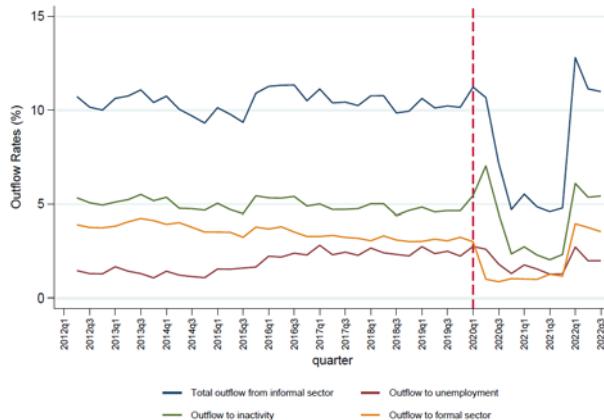
Inflows and outflows from the informal sector

Graph 7

A. Inflows to informal sector



B. Outflows from informal sector

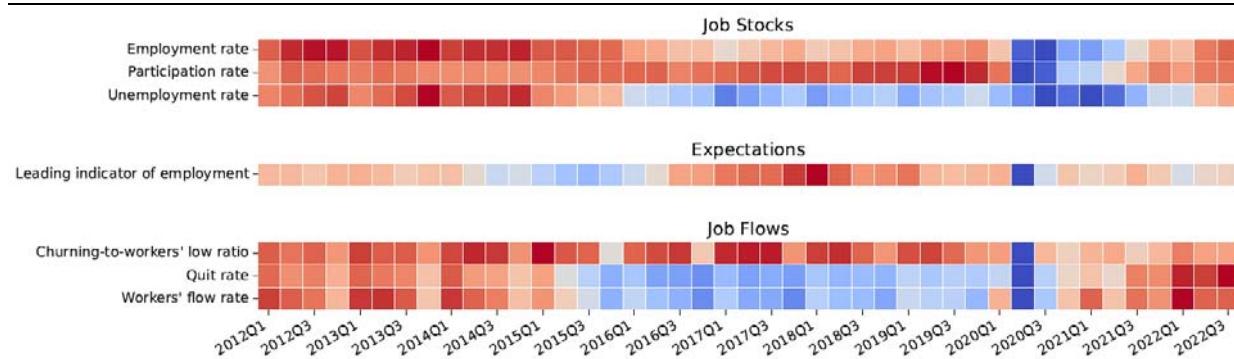


3. Labour market tightness indicators

In this section we split our analysis of the labour market into three dimensions: stocks, flows and expectations. For each dimension, we discuss the construction of the respective tightness indices and the pros and cons of each. We provide a concise overview of all these measures by using a heatmap (Graph 8) in which each row displays how tight the labour market is relative to the historical sample. We further dig into each dimension to discuss some specific points about the appropriateness of using a given dimension to assess the labour market in Brazil.⁶

Brazilian labour market indicators

Graph 8



In each quarter, the heatmap displays how tight each index is compared with its historical values, ie from the first quarter of 2012 to the third quarter of 2022. The darker red the point, the tighter the index. We classify the indices as stock measures (employment rate, participation rate and unemployment rate), expectation measure (leading indicator of employment) and flow measures (workers flow rate, quit rate and churning-to-workers flow ratio).

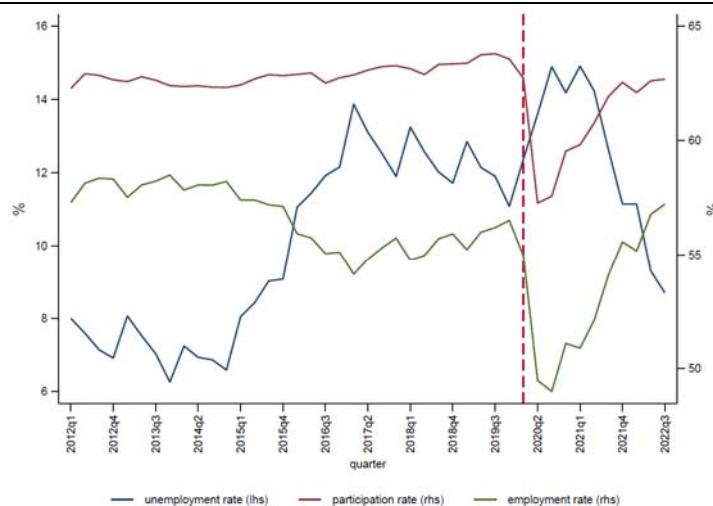
Source: LIEmp index (provided by IBRE-FGV); PNADC/IBGE (employment measures); CAGED/MTE (flow measures).

⁶ We refer to Central Bank of Brazil (2022) for other measures of tightness using a spider chart.

Job stocks. The most common dimension to assess the labour market tightness is based on rates or stocks of employed and unemployed workers. Following the traditional literature,⁷ we explore measures such as unemployment rate (the ratio of unemployed to the workforce), participation rate (the ratio of workforce to the working age population)⁸ and employment rate (the ratio of employed workers to the working age population). These measures are based on publicly available information and are internationally comparable.^{9,10} Additionally, most of them may be broken down among multiple dimensions such as economic sector, educational attainment, occupation and type of job (formal vs informal). The main concern is that these measures do not take into account structural changes of the non-accelerating inflation rate of unemployment (NAIRU). In the end, the appropriate measure of labour market tightness is the difference between the observed unemployment rate and the unobservable NAIRU. Graph 9 plots the three measures since 2012. By construction, the unemployment rate is negatively correlated with the other measures. All of them show a decrease in labour market tightness after the pandemic outbreak and also a subsequent recovery to pre-pandemic levels. While recent unemployment and employment rates indicate a tighter labour market in comparison with pre-pandemic levels, the participation rate still lies nearly 1 percentage point below its level in the fourth quarter of 2019.

Employment tightness measures

Graph 9



Unemployment rate is the ratio of unemployed to the workforce, participation rate is the ratio of workforce to the working age population (ie persons aged 15 years and older) and employment rate is the ratio of employed workers to the working age population.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC), a survey conducted by the Instituto Brasileiro de Geografia e Estatística (IBGE).

⁷ See, for instance, Blanchflower et al (2022) and Domash and Summers (2022).

⁸ Our definition of working age population is persons aged 15 years and older.

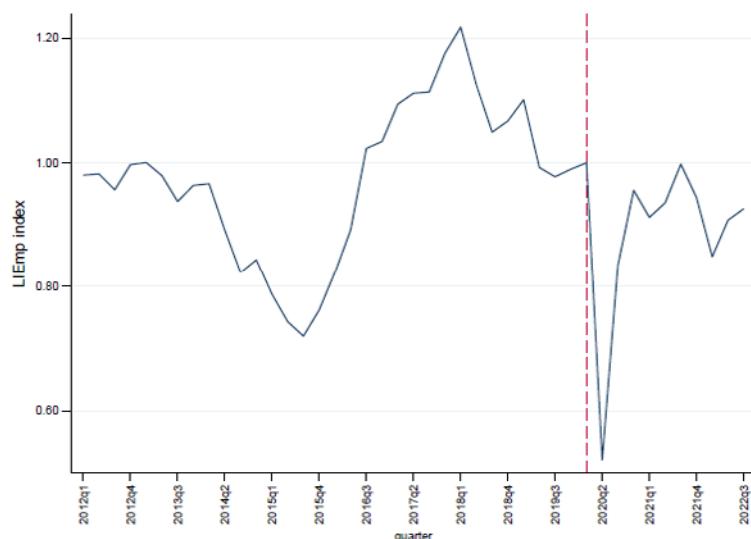
⁹ See Duval et al (2022) for a description of the main tightness measures employed in the literature.

¹⁰ Most countries faced problems in assessing the extent of the impact of mobility restrictions on labour markets due to the increase of non-response bias in household surveys (eg Dutz et al (2021); Rothbaum and Bee (2020)). In the Brazilian case, the household survey was impacted by pandemics, with a reduction in the response ratio and a wider discrepancy across different surveys (eg Central Bank of Brazil (2021); Corseuil and Russo (2021)).

Expectations. We employ the Leading Indicator of Employment (LIEmp) as our expectation measure for the labour market. LIEmp is an index based on data extracted from the Business and Consumer Surveys produced by FGV/IBRE. It measures consumer expectations for the labour market.¹¹ Such estimates could be leading indicators, but it should be borne in mind that they are based on soft data and perceptions. For instance, confounding effects, internal consistency issues and survey-based estimates make it harder to use it as a reliable measure for labour market tightness and compare it across time. Graph 10 shows the evolution of LIEmp. This measure shows a brisker response of the labour market to the pandemic than the previous tightness measures. After a deep drop in the second quarter of 2020, the index returned to a plateau below the pre-pandemic level in the following quarter and it has been fluctuating ever since.

Expectation tightness measures

Graph 10



Source: Business and Consumer Surveys conducted in seven Brazilian cities by IBRE/FGV.

Job flows. Our third set of tightness measures is based on job flows. We employ data from the General Registry of Employed and Unemployed (CAGED), an administrative database of the Ministry of Labour and Social Security (MTP). We rely on the traditional **quit rate**, defined as the share of workers who voluntarily leave their positions, and follow Burgess et al (2000) to build two other main measures from the job flows in the formal sector: (i) the **worker flow rate (WF)** measure, which comprises the ratio of the sum of hirings and separations to the employment level in a given quarter; and (ii) the **churning-to-workers flow** measure, which corresponds to the ratio of the excess of worker flows in a given quarter (churning)¹² to the total worker flow.

These measures of tightness that rely on job flow information share the same advantages as employment measures, such as the backing of publicly available information, and, for the quit rate, a widely known measure that is internationally

¹¹ See <https://portalibre.fgv.br/en/leading-indicator-employment> for more information.

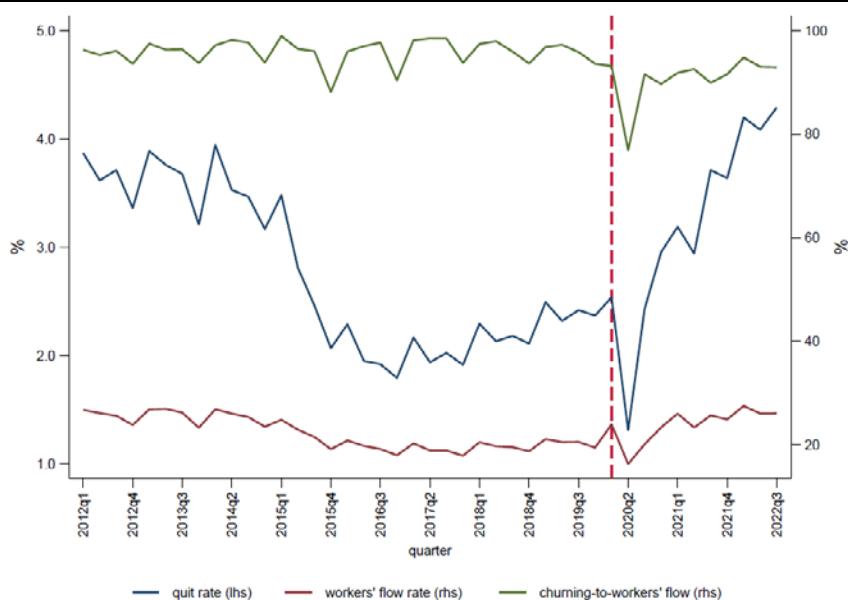
¹² Churning is computed as worker flows minus the absolute value of variation in the stock of jobs.

comparable (eg Domash and Summers (2022)). However, and possibly the biggest caveat for using labour flow data in Brazil, it only includes the formal sector and does not take into account the large share of informal workers. Apart from these data, the analysis of the labour market flows across time disregards the labour market reforms that have introduced more flexibility and, hence, possibly increased flows for any given slack in the labour market.

Graph 11 displays the evolution of the three job flow measures for labour market tightness. It is evident that quit rates show more variation in our sample and had a more intense response to the Covid shock. Workers flow rate and churning-to-workers flow responded in the same direction as quit rates, but with lower magnitude.

Flow tightness measures

Graph 11



We construct the measures of tightness based on job flow using data from the General Registry of Employed and Unemployed (CAGED), an administrative database of the Ministry of Labour and Social Security (MTP). This dataset comprises all formal workers registered in Brazil. Quit rates is the share of workers who voluntarily leave their positions. Workers flow rate is the sum of hirings and separations divided by the (lagged) employment stock. Churning-to-workers flow is the ratio of churning (workers flow minus the absolute value of the variation in the stock of jobs) to workers flow.

Source: CAGED data.

4. Empirical analysis

In this section, we empirically assess the extent to which different labour market tightness indicators are associated with changes in aggregate real wages. We also conduct a panel data analysis at economic sector level to evaluate whether variation in tightness and educational attainment are related to changes in real wages.

4.1 Labour market tightness and wage inflation

In this subsection, we assess whether our different measures were effective indicators of labour market tightness in Brazil. We are particularly interested in the correlation between changes in real wages and variation in different labour market tightness indicators. To assess this in a simple and coherent way across tightness indicators, we evaluate whether the explanatory power of a simple linear statistical model that relates real wage changes to labour market tightness indicators and their lags was impacted after the onset of the Covid pandemic. Our baseline model is:

$$\begin{aligned}\Delta \log(wage_t) = & \alpha + \Delta \log(wage_{t-1}) + \beta_1 \text{tightness}_{t-1} + \beta_2 \text{tightness}_{t-2} \\ & + \beta_3 \text{tightness}_{t-3} + \beta_4 \text{tightness}_{t-4} + u_t\end{aligned}\quad (1)$$

We report the estimated coefficients in the appendix (Tables A1–A6). As shown in column (1) of the regression tables, despite the small sample available (our data cover the period from the first quarter of 2012 to the third quarter of 2022), we find statistically significant relationships at standard level between the changes in real wages and the following tightness measures:¹³ employment rate and participation rate (employment tightness category), LIEmp (the expectation tightness measure) and churning to-workers flow (job flows tightness measures).

We then adjust the model to account for changes in the relationship between tightness measures and changes in real wages after the pandemic by adding interactions of a dummy indicator of post-Covid with the lag of the dependent variable and our tightness measures (and their lags). We report the results in columns (2) and (3) of Tables A1–A6. The more flexible form added some explanatory power to the previous model, except for quit rates and unemployment rate, as indicated by the Adjusted R^2 .

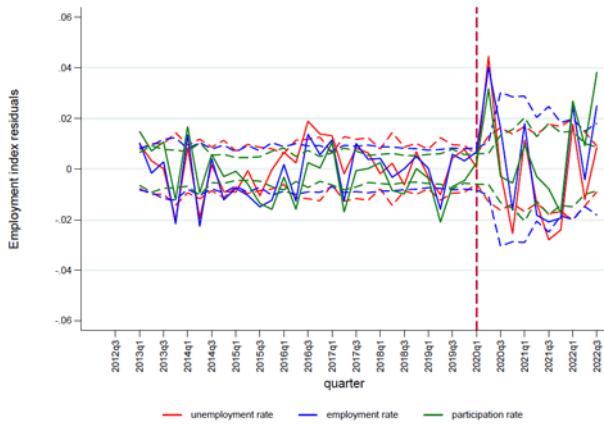
The residuals of both models with their 95% confidence intervals are plotted in Graphs 12–14. The graphs show that the residuals and their confidence intervals increased considerably at the outset of the pandemic. Despite the increase in Adjusted R^2 , the model with the post-Covid dummy interacted with the tightness measure did not succeed in reducing the residual dispersion after the first quarter of 2020 (Graphs 12B, 13B and 14B). Overall, these results indicate that: (i) the degree of labour market tightness is positively correlated with changes in real wages; (ii) there is no evidence of a change in the direction of this correlation after the pandemic outbreak; and (iii) other relevant aspects determined real wages at the outset of the pandemic. We investigate these other possible factors influencing real wages in the next sections.

¹³ We report the joint effect of the coefficients of the tightness measures and its respective p-value in each table. We name this joint effect, "total tightness".

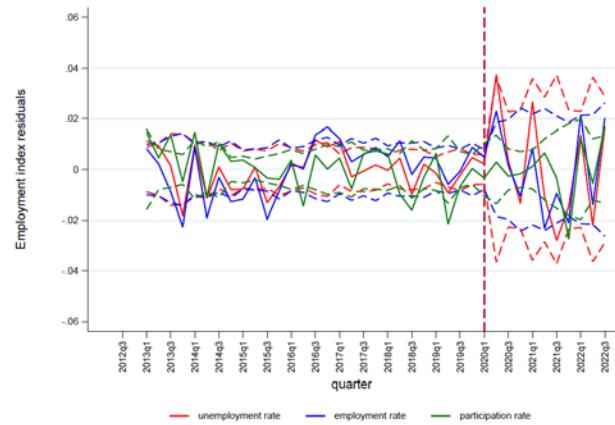
Relationship between employment tightness indexes and wages

Graph 12

A. No changes in model parameters



B. Allowing changes in model parameters

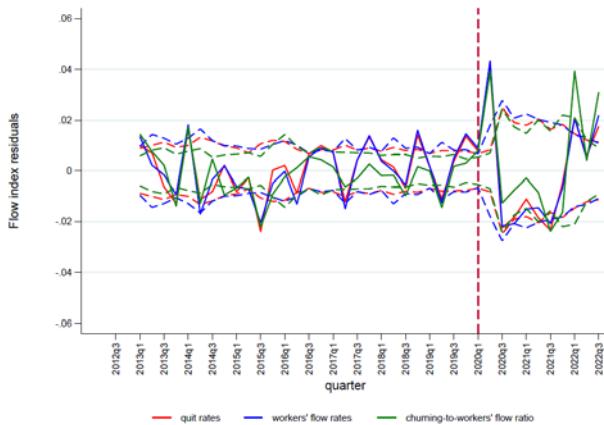


The continuous lines represent the residuals from the linear regression of the change in real wages on the respective tightness measure and its lags (until the 4th lag). The dashed lines delimit 95% confidence intervals for each measure. In Graph 12.B, we allow the parameters related to the tightness variables to change after the onset of Covid (in the first quarter of 2020).

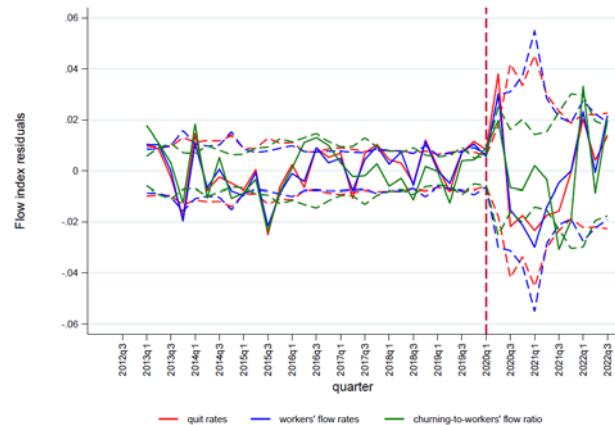
Relationship between flow tightness indexes and wages

Graph 13

A. No changes in model parameters



B. Allowing changes in model parameters

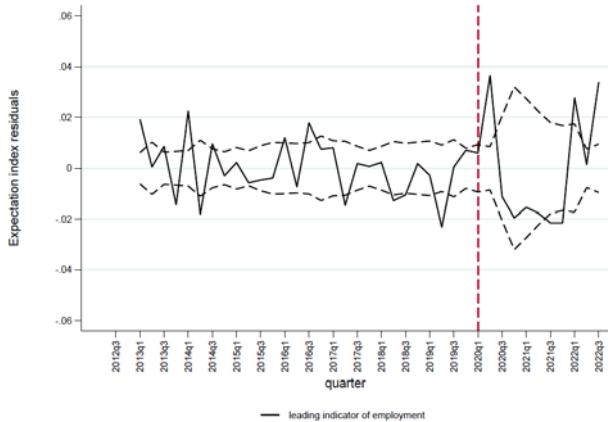


The continuous lines represent the residuals from the linear regression of the change in real wages on the respective tightness measure and its lags (until the 4th lag). The dashed lines delimit 95% confidence intervals for each measure. In Graph 13.B, we allow the parameters related to the tightness variables to change after the onset of Covid (in the first quarter of 2020).

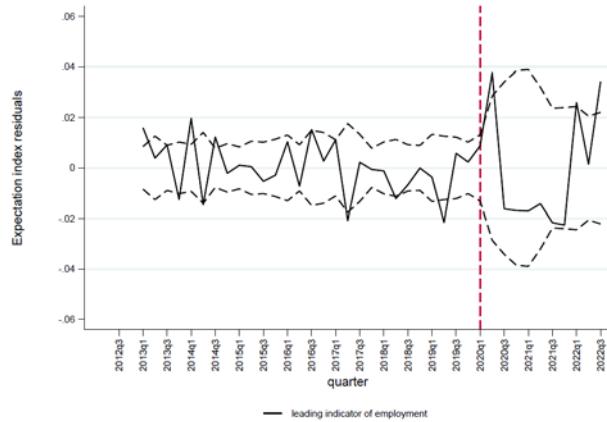
Relationship between expectation tightness index and wages

Graph 14

A. No changes in model parameters



B. Allowing changes in model parameters



The continuous line represents the residuals from the linear regression of the change in real wages on the respective tightness measure and its lags (until the 4th lag). The dashed lines delimit 95% confidence intervals for each measure. In Graph 14.B, we allow the parameters related to the tightness variables to change after the onset of Covid (in the first quarter of 2020).

4.2 Panel analysis by economic sector

In this subsection, we aggregate data by economic sector and investigate the extent to which the degree of tightness and heterogeneity of educational attainment levels are associated with changes in real wages. First, we employ quit rates as our tightness measure and assess whether real wages are negatively related to quit rates.¹⁴ In order to do so, we estimate the following model for sector i and quarter t :

$$\Delta \log(wage_{it}) = \alpha + \beta_1 \Delta \log(wage_{it-1}) + \beta_2 quit rate_{it-1} + u_{it} \quad (2)$$

Table 1 shows that there is a positive relationship between quit rates and real wages. The measured effect is economically relevant: an increase of one standard deviation in quit rates¹⁵ is associated with an increase of real wage growth from 5.9 to 10.9 basis points (bp), which represents between 31% and 57% of the average quarterly aggregate real wage growth before the pandemic.¹⁶ The result is statistically significant at standard levels and robust among all specifications.

Following the heterogeneity in wages graphically observed for educational attainment in our descriptive analysis, we also assess whether changes in real wages are associated with the share of college educated workers at the economic sector level. In order to do so, we estimate the following model:

¹⁴ We chose quit rates as they are based on the administrative dataset (CAGED), which allows us to aggregate data at sector level. Moreover, quit rates are one of the best tightness measures for the labour market according to Domash and Summers (2022) and Furman and Powell III (2021), among others.

¹⁵ The standard deviation is equal to 8.36 percentage points in our sample.

¹⁶ From the first quarter of 2012 to the fourth quarter of 2010, the quarterly real aggregate wage growth measured by the Continuous PNAD was 19 basis points on average.

$$\Delta \log(wage_{it}) = \alpha + \beta_1 \Delta \log(wage_{it-1}) + \beta_2 pandemic_t + \beta_3 college_{it-1} + \beta_4 college_{it-1}pandemic_t + u_{it} \quad (3)$$

where the *pandemic* is a dummy variable equal to 1 after the first quarter of 2020 and 0 otherwise, and *college_{it-1}* indicates the share of workers with college degree in the economic sector *i* in the previous quarter (*t-1*).

Relationship between $\Delta \log(wage)$ and labour market tightness at economic sector level

Table 1

	(1)	(2)	(3)	(4)	(5)
$\Delta \log(wage_{t-1})$		-0.274*** (0.051)	-0.345*** (0.038)	-0.279*** (0.052)	-0.345*** (0.038)
<i>quit rate_{t-1}</i>	0.007*** (0.002)	0.013*** (0.002)	0.011*** (0.003)	0.008*** (0.003)	0.009*** (0.003)
<i>pandemics</i>			-0.647** (0.239)	-1.427** (0.581)	-1.380** (0.580)
$\Delta \log(wage_{t-1}) \times pandemics$			0.154 (0.098)		0.153 (0.100)
<i>quit rate_{t-1} \times pandemics</i>				0.270 (0.201)	0.265 (0.194)
Constant	0.060 (0.054)	0.012 (0.066)	0.213** (0.083)	0.212** (0.078)	0.223** (0.082)
<i>quit rate_{t-1} (1 + pandemics)</i>				0.278	0.274
P-value				0.182	0.174
Observations	840	820	820	820	820
Adjusted R ²	-0.001	0.071	0.079	0.075	0.080

This table shows the results of the estimation of equation 2, using data from the first quarter of 2012 to the third quarter of 2022. Heteroskedasticity-robust standard errors clustered at the economic sector level are shown in parentheses. The symbols *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

We report the results in Table 2. We first notice that the negative effect of the pandemic on real wages measured by the coefficient on the dummy pandemic in columns (1) and (2) loses its sign and statistical significance when we include the share of educated workers in the regression in column (3). This suggests that the negative change in the real wage level during the pandemic was driven by this category of workers. Before the pandemic, a larger share of college educated workers was associated with an increase in real wages. In that period, an increase of one standard deviation in college share (20.1 percentage points) was associated with an increase in wage growth of 18–20 bp, which represents 100% of the average quarterly real wage growth before pandemic. However, after the pandemic, the overall effect of college educated workers on wage growth was reversed. According to column (3), an increase

of one standard deviation in the share of college educated workers is then associated with a decrease of 40 bp in wage growth. One could argue that sectors with more college educated workers would show greater labour market slack (ie lower labour tightness indicators), which would result in less pressure to adjust wages in the aftermath of the pandemic. In column (4), we add quit rate measures to assess whether the effect of college educated workers is related to the tightness level of the economic sector. The college share is robust to the inclusion of the tightness variable.

Relationship between $\Delta \log(wage)$ and college educated workers share at economic sector level

Table 2

	(1)	(2)	(3)	(4)
$\Delta \log(wage_{t-1})$	-0.279*** (0.051)	-0.345*** (0.038)	-0.346*** (0.038)	-0.347*** (0.038)
$college share_{t-1}$			0.009** (0.003)	0.010*** (0.003)
$pandemics$	-0.691** (0.246)	-0.657** (0.238)	0.134 (0.286)	-0.478 (0.754)
$\Delta \log(wage_{t-1}) \times pandemics$		0.153 (0.098)	0.152 (0.097)	0.153 (0.099)
$college share_{t-1} \times pandemics$			-0.028*** (0.008)	-0.026*** (0.009)
$quit rate_{t-1}$				0.013*** (0.002)
$quit rate_{t-1} \times pandemics$				0.201 (0.202)
Constant	0.241*** (0.071)	0.254*** (0.075)	0.049 (0.109)	-0.032 (0.110)
$college share_{t-1} (1 + pandemics)$			-0.020	-0.016
P-value			0.016	0.097
Observations	820	820	820	820
Adjusted R ²	0.075	0.080	0.081	0.080

This table shows the results of the estimation of equation 3, using data from the first quarter of 2012 to the third quarter of 2022. Heteroskedasticity-robust standard errors clustered at the economic sector level are shown in parentheses. The symbols *, ** and *** indicate statistical significance at 10%, 5% and 1% levels, respectively.

These results are in line with the findings from the survey conducted by Barrero et al (2022) that identified that the amenity value of working remotely would explain the absence of a bigger wage catchup effect when the labour market recovered after the Covid outbreak. According to Gottlieb et al (2021), educational attainment is one of the major determinants for the probability of working from home in developing countries following the outbreak of Covid. Castro and Moreira (2021) and Góes et al

(2022) highlight the particular relevance of college education for access to remote working during the pandemic in Brazil. Therefore, one possible explanation for the lower wage-growth pressure during the recent economic recovery is that more educated workers, who have a greater chance of working remotely, have accepted lower nominal wage growth in exchange for the amenity value of increased job flexibility.

Graph 15 shows how real wages vary across two periods in our sample, and how this change relates to working from home adoption by educational attainment group. We computed the working from home share based on information from PNAD Covid, a survey conducted by IBGE between May 2020 and November 2020.¹⁷ Graph 15.A shows the period from December 2019 to December 2021 when aggregated real wages reached their nadir, while Graph 15.B portrays the period from September 2021 to September 2022 when real wages started their recovery. The graphs illustrate the magnitude of the difference in adoption rates of working from home amongst college educated workers compared with other segments. Additionally, college educated workers experienced a larger real wage drop when aggregated wages fell and remained practically constant during the recovery period.

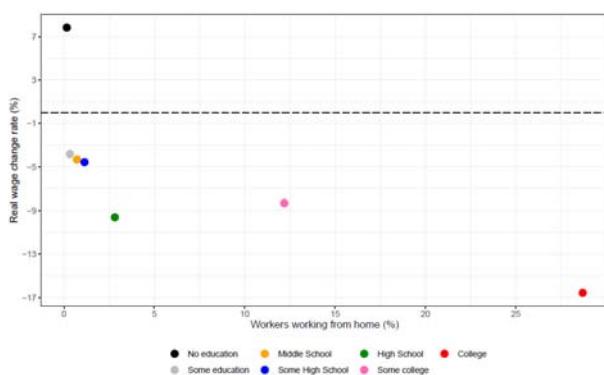
5. Alternative explanations

In this section we assess whether the response of wages to labour market tightness in the aftermath of the pandemic might be driven by changes in the composition of employment, inflation surprises, institutional changes or changes in firms' productivity.

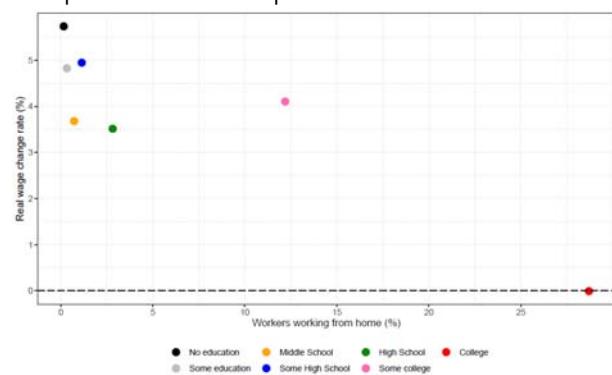
Real wage variation and working from home adoption

Graph 15

A. December 2019 to December 2021



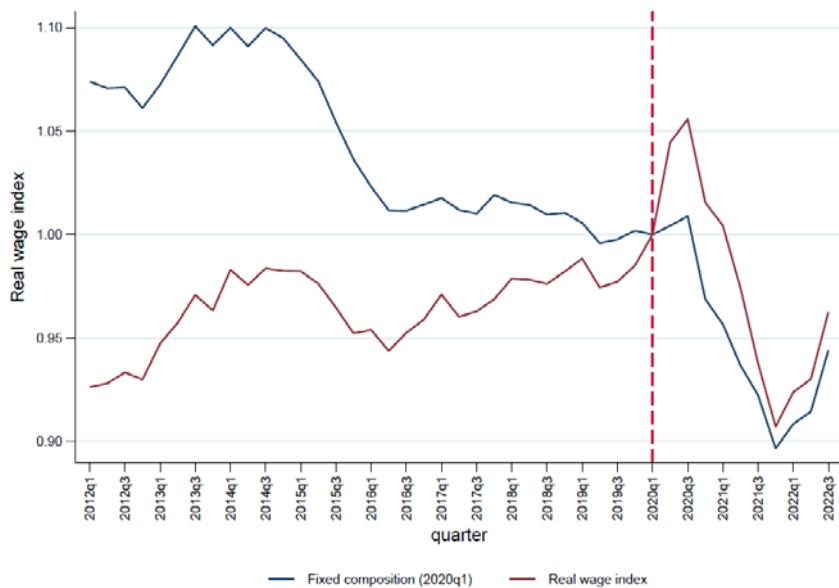
B. September 2021 to September 2022



We compare the responses to the PNAD Covid survey related to working from home adoption in November 2020 with the variation in real wages by educational attainment. Graph 15.A displays the heterogeneity in wage variation during the fall in real wages, while Graph 15.B portrays the wage recovery. The PNAD Covid survey was conducted by telephone monthly from May 2020 to November 2020 with the sample of households interviewed by Continuous PNAD survey in the first quarter of 2019. This is the only survey conducted by IBGE with the working from home question.

Source: PNAD Covid survey data (November 2020).

¹⁷ During this time, non-response bias was a major concern regarding the Continuous PNAD. Therefore, IBGE conducted a complementary survey with the sample of households that was interviewed in the first quarter of 2019 and that provided a telephone number.



5.1 Composition effect

As the previous analysis has shown that the impact of the outbreak of the pandemic on employment in Brazil was not homogeneous across economic sectors, educational attainment and occupations, we now assess whether the significant fall in real wages following the outbreak of the pandemic is mainly associated with changes in the composition of the pool of workers in our sample. Therefore, we compare actual real wages with the real wages that one would have observed if economic sector, informality and educational attainment levels were fixed as of the first quarter of 2020.¹⁸ According to Graph 16, the composition effect was relevant in explaining wage changes at the beginning of the period (from 2012 to 2015). From 2016 until the pandemic outbreak, the composition effect was less relevant. After the outbreak of the pandemic, we observe similar behavior: average wages would be lower if we were to freeze the job composition as of the first quarter of 2020.

5.2 Inflation surprises

Another relevant concern when analyzing the fall in real wages following the pandemic is that the observed loss in workers' purchasing power is due to inflationary surprises. In this case, workers who have already agreed to a wage will have to wait until the next union convention for a wage reset. Therefore, if realised inflation was larger than expected during the period following the outbreak of the pandemic, a fall in real wages would be a mechanical response to this expectation error and not the result of a change in the labour market equilibrium. This would, in the end, entail the

¹⁸ We have undertaken the same exercise with occupation segment instead of informality rate with similar results.

observation that nominal wage rigidity may be even larger than price rigidity and real wages are affected by inflationary surprises.

Comparing average stock wages (PNAD measure) with newly hired wages (CAGED)

Graph 17



Real wages are deflated by the Extended National Consumer Price Index (IPCA), provided by IBGE.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

We address the effect of inflationary surprises by comparing the response of wages for new workers¹⁹ with the average wage of the pool of formal workers. New workers would not be affected by the impact of an acceleration of inflation on workers with a wage fixed by a job contract agreed some time ago. After all, reset wages, by their nature, are flexible. Graph 17 shows that, although changes in the wages of newly hired workers were different from the average wage of all formal workers, the fall in wages observed for newly hired workers following the outbreak of the pandemic are similar (particularly during the economic recovery) to other employed workers. Therefore, in the aftermath of the pandemic, real wages were depressed both for workers who were already employed and for recently hired ones.

5.3 Institutional changes

It is important to notice that the Brazilian labour market underwent two relevant reforms in the last decade. The first labour reform was implemented in 2015 and aimed at reducing incentives to labour turnover by increasing the requirements for dismissed workers to enroll in the unemployment insurance (UI) programme.²⁰ According to Carvalho et al (2018), the adoption of stricter rules for UI eligibility led

¹⁹ This information for formal workers is in the CAGED database.

²⁰ The law was enacted by Provisional Measure 665/2014, converted into Law 13.134/2015. See Carvalho et al (2018) and Van Doornik et al (2023) for more details about the change in the law and its impact on the labour market.

to a reduction of total layoffs of workers affected by the reform (ie those eligible for UI before the reform) of between 11 and 13%. Van Doornik et al (2023) suggest that before the change in the law, most workers were exploiting the UI system to extract rents. About 94% of the layoffs that were reduced by the reform were related to transitions from the formal to informal sector. The second relevant Labour reform took place in 2017. In March 2017, more outsourcing activities were permitted by Law 13.429/2017 and in July 2017 a series of measures that reduced the costs of labour litigation for firms were enacted (Law 13.467/2017).²¹ Corbi et al (2022) found that firms' litigation costs have a negative impact on their hiring and wage decisions, as well as their likelihood of experiencing financial distress and survival rates. Additionally, based on a search-matching-bargaining model, the authors simulate the impact of the labour reform and estimate a reduction of 1.7 percentage points in the NAIRU due to a reduction in litigation costs.

Estimating and identifying the impact of a reform is always challenging, especially when it comes to an unobservable variable such as the non-accelerating inflation rate of unemployment. However, it is worth noting that this estimate aligns with the recent reduction in unemployment rates, without an increase in real wages, as the labour market recovers from the pandemic.

5.4 Productivity

We finally face the hypothesis that changes in firms' productivity induced by the pandemic explains the disconnection between wages and employment during the recovery from the pandemic. However, previous results show that the fall in real wages was not driven by changes in the composition of the sector, education, or informality. Therefore, one could argue that if it was a composition effect or an educational one, then it would have to be something observable on the firm level that affected productivity. But the firms' response to mobility restrictions was to implement the automation of tasks and increase the adoption of working from home schemes, both of which are associated with an increase in productivity (Barrero et al (2021)). However, any discussion of productivity during this period should be approached with caution as any productivity index, especially during the pandemic, may be heavily influenced by measurement errors.

6. Final remarks

This paper provides an overview of the Brazilian labour market, highlighting how different sectors and workers with different educational attainments were affected by the pandemic shock. We found that, besides a recovery of employment levels and wages overall remaining below pandemic levels, the real wages of college educated workers fell the most. A possible reason for that result is that the pandemic changed the labour market and allowed for more flexible working conditions. According to

²¹ Corbi et al (2022) describes three channels through which they expect a reduction in firms' litigation costs: "(i) by increasing the set of employment practices deemed legal; (ii) by removing from procedural labour law its most noticeable incentives for excessive and groundless litigation; and (iii) by reducing the discretion of judges to decide in accordance to their views when these are in conflict with the law."

Barrero et al (2022), this new environment benefited more educated workers who would accept lower wages in exchange for more flexible working conditions. Therefore, our next step in this research consists of investigating the extent to which this hypothesis reconciles empirical results relating to the Covid-19 pandemic period with the wage-price literature.

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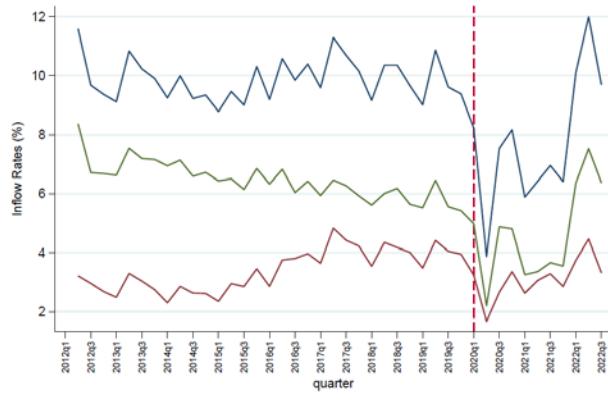
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A Additional results

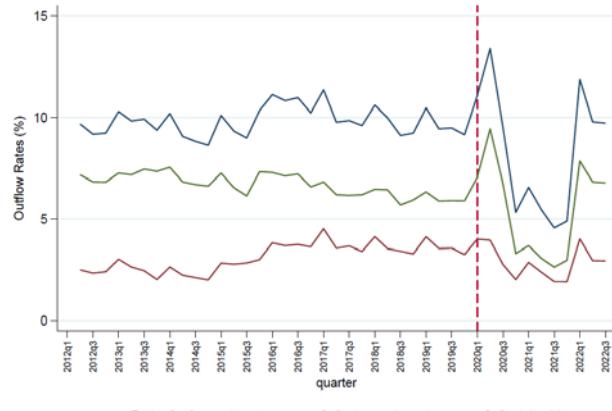
Job flows among employment, unemployment and inactivity

Graph A1

A. Inflows to employment



B. Outflows from employment



Employment in the above graphs comprises both formal and informal labour market.

Source: Continuous PNAD – Continuous National Household Sample Survey (PNADC).

Dependent variable: $\Delta \log(wage)$

Table A1

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.484** (0.183)	-0.025 (0.296)	0.074 (0.248)
$unemployment\ rate_{t-1}$	-0.008** (0.003)	-0.008*** (0.003)	-0.007*** (0.002)
$unemployment\ rate_{t-2}$	0.005 (0.004)	0.003 (0.005)	0.006* (0.003)
$unemployment\ rate_{t-3}$	-0.002 (0.004)	0.000 (0.004)	-0.001 (0.003)
$unemployment\ rate_{t-4}$	0.004 (0.003)	0.003 (0.003)	0.002 (0.002)
$\Delta \log(wage_{t-1}) \times pandemics$			
$unemployment\ rate_{t-1} \times pandemics$			
$unemployment\ rate_{t-2} \times pandemics$	(0.238)	(0.286)	(0.754)
	0.153	0.152	0.153
$unemployment\ rate_{t-3} \times pandemics$	(0.098)	(0.097)	(0.099)
		-0.028***	-0.026***
$unemployment\ rate_{t-4} \times pandemics$		(0.008)	(0.009)
			0.013***
Constant	0.014 (0.009)	0.014* (0.008)	0.008 (0.008)
$\Delta \log(wage)_{t-1} (1 + pandemics)$		0.646	0.474
P-value		0.008	0.425
Total tightness	-0.001	-0.001	-0.000
P-value	0.201	0.225	0.539
Total tightness pandemic			-0.001
P-value			0.212
Observations	39	39	39
Adjusted R ²	0.284	0.332	0.309

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A2

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.397 (0.260)	-0.084 (0.269)	0.202 (0.267)
$employment rate_{t-1}$	0.004 (0.004)	0.007* (0.003)	0.012*** (0.004)
$employment rate_{t-2}$	0.001 (0.005)	-0.000 (0.005)	-0.010** (0.005)
$employment rate_{t-3}$	-0.001 (0.004)	-0.005 (0.004)	0.004 (0.005)
$employment rate_{t-4}$	-0.001 (0.003)	0.001 (0.003)	-0.002 (0.004)
$\Delta \log(wage_{t-1}) \times pandemics$		1.009** (0.418)	0.635 (0.601)
$employment rate_{t-1} \times pandemics$			-0.007 (0.006)
$employment rate_{t-2} \times pandemics$			0.013* (0.007)
$employment rate_{t-3} \times pandemics$			-0.012 (0.007)
$employment rate_{t-4} \times pandemics$			0.006 (0.005)
Constant	-0.145* (0.073)	-0.103 (0.076)	-0.243* (0.121)
$\Delta \log(wage)_{t-1} (1 + pandemics)$		0.925	0.837
P-value		0.018	0.121
Total tightness	0.003	0.002	0.004
P-value	0.050	0.172	0.053
Total tightness pandemic			0.005
P-value			0.051
Observations	39	39	39
Adjusted R ²	0.203	0.305	0.360

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A3

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	-0.024 (0.247)	-0.145 (0.223)	-0.325 (0.263)
$participationrate_{t-1}$	-0.002 (0.003)	-0.000 (0.005)	-0.015 (0.013)
$participationrate_{t-2}$	0.009*** (0.003)	0.008* (0.004)	-0.001 (0.011)
$participationrate_{t-3}$	-0.003 (0.003)	-0.004 (0.003)	0.021 (0.014)
$participationrate_{t-4}$	0.004* (0.002)	0.004* (0.002)	0.011 (0.014)
$\Delta \log(wage_{t-1}) \times pandemics$		0.320 (0.533)	0.637 (0.489)
$participationrate_{t-1} \times pandemics$			0.022 (0.014)
$participationrate_{t-2} \times pandemics$			0.008 (0.012)
$participationrate_{t-3} \times pandemics$			-0.026* (0.014)
$participationrate_{t-4} \times pandemics$			-0.003 (0.014)
Constant	-0.546*** (0.089)	-0.501*** (0.118)	-1.036*** (0.142)
$\Delta \log(wage)_{t-1} (1 + pandemics)$		0.175	0.312
P-value		0.736	0.482
Total tightness	0.009	0.008	0.017
P-value	0.000	0.000	0.000
Total tightness pandemic			0.017
P-value			0.000
Observations	39	39	39
Adjusted R ²	0.347	0.338	0.616

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A4

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.521*** (0.186)	0.269 (0.267)	0.220 (0.318)
$quit rate_{t-1}$	-0.007 (0.007)	-0.003 (0.009)	-0.007 (0.012)
$quit rate_{t-2}$	0.021** (0.009)	0.019* (0.010)	0.016 (0.012)
$quit rate_{t-3}$	-0.021*** (0.007)	-0.022*** (0.007)	-0.008 (0.007)
$quit rate_{t-4}$	0.010 (0.007)	0.010 (0.007)	0.003 (0.006)
$\Delta \log(wage_{t-1}) \times pandemics$		0.362 (0.436)	0.582 (0.396)
$quit rate_{t-1} \times pandemics$			0.011 (0.020)
$quit rate_{t-2} \times pandemics$			0.005 (0.018)
$quit rate_{t-3} \times pandemics$			-0.029 (0.020)
$quit rate_{t-4} \times pandemics$			0.012 (0.015)
Constant	-0.009 (0.009)	-0.010 (0.009)	-0.009 (0.009)
$\Delta \log(wage)_{t-1} (1 + pandemics)$		0.631	0.802
P-value		0.026	0.005
Total tightness	0.003	0.004	0.004
P-value	0.265	0.190	0.259
Total tightness pandemic			0.003
P-value			0.394
Observations	39	39	39
Adjusted R ²	0.304	0.299	0.275

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A5

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.459** (0.186)	0.151 (0.294)	0.388 (0.271)
$workers' flowrate_{t-1}$	-0.001 (0.002)	-0.000 (0.002)	-0.003** (0.001)
$workers' flowrate_{t-2}$	0.002 (0.002)	0.001 (0.002)	0.004** (0.002)
$workers' flowrate_{t-3}$	-0.003** (0.001)	-0.003** (0.002)	-0.001 (0.001)
$workers' flowrate_{t-4}$	0.003** (0.001)	0.003** (0.001)	0.001 (0.002)
$\Delta \log(wage_{t-1}) \times pandemics$		0.420 (0.460)	0.309 (0.361)
$workers' flowrate_{t-1} \times pandemics$			0.005 (0.003)
$workers' flowrate_{t-2} \times pandemics$			-0.004 (0.003)
$workers' flowrate_{t-3} \times pandemics$			-0.004 (0.003)
$workers' flowrate_{t-4} \times pandemics$			0.004 (0.003)
Constant	-0.016 (0.017)	-0.019 (0.017)	-0.019 (0.017)
$\Delta \log(wage)_{t-1} (1 + pandemics)$		0.571	0.697
P-value		0.038	0.009
Total tightness	0.001	0.001	0.001
P-value	0.343	0.244	0.255
Total tightness pandemic			0.001
P-value			0.250
Observations	39	39	39
Adjusted R ²	0.246	0.248	0.317

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A6

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.374 (0.247)	0.185 (0.216)	0.179 (0.269)
<i>churning-to-workers' flow</i> _{t-1}	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
<i>churning-to-workers' flow</i> _{t-2}	0.002*** (0.001)	0.002*** (0.001)	0.003*** (0.001)
<i>churning-to-workers' flow</i> _{t-3}	-0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)
<i>churning-to-workers' flow</i> _{t-4}	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
$\Delta \log(wage_{t-1}) \times \text{pandemics}$		0.257 (0.323)	0.327 (0.481)
<i>churning-to-workers' flow</i> _{t-1} $\times \text{pandemics}$			0.001 (0.001)
<i>churning-to-workers' flow</i> _{t-2} $\times \text{pandemic}$			-0.000 (0.001)
<i>churning-to-workers' flow</i> _{t-3} $\times \text{pandemic}$			-0.001 (0.001)
<i>churning-to-workers' flow</i> _{t-4} $\times \text{pandemic}$			0.000 (0.001)
Constant	-0.162** (0.075)	-0.158* (0.079)	-0.481** (0.187)
$\Delta \log(wage)_{t-1} (1 + \text{pandemics})$		0.442	0.507
P-value		0.167	0.222
Total tightness	0.002	0.002	0.005
P-value	0.035	0.050	0.016
Total tightness pandemic			0.005
P-value			0.018
Observations	39	39	39
Adjusted R ²	0.276	0.265	0.294

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Dependent variable: $\Delta \log(wage)$

Table A7

	(1)	(2)	(3)
$\Delta \log(wage_{t-1})$	0.3653 (0.2282)	-0.3232 (0.2289)	-0.3341 (0.2313)
$Iaemp_{t-1}$	-0.0001 (0.0002)	0.0003 (0.0003)	0.0007* (0.0004)
$Iaemp_{t-2}$	0.0006 (0.0004)	0.0006 (0.0004)	-0.0004 (0.0006)
$Iaemp_{t-3}$	-0.0005 (0.0004)	-0.0007** (0.0004)	0.0001 (0.0007)
$Iaemp_{t-4}$	0.0004 (0.0003)	0.0004 (0.0002)	0.0002 (0.0005)
$\Delta \log(wage_{t-1}) \times \text{pandemics}$		1.0376** (0.4542)	1.1762* (0.5857)
$Iaemp_{t-1} \times \text{pandemics}$			-0.0003 (0.0008)
$Iaemp_{t-2} \times \text{pandemics}$			0.0011 (0.0007)
$Iaemp_{t-3} \times \text{pandemics}$			-0.0011 (0.0010)
$Iaemp_{t-4} \times \text{pandemics}$			0.0002 (0.0007)
Constant	-0.0320* (0.0166)	-0.0452** (0.0170)	-0.0508** (0.0190)
$\Delta \log(wage)_{t-1} (1 + \text{pandemics})$		0.7145	0.8422
P-value		0.0466	0.1305
Total tightness	0.0003	0.0005	0.0005
P-value	0.0526	0.0097	0.0105
Total tightness pandemic			0.0006
P-value			0.0189
Observations	39	39	39
Adjusted R ²	0.144	0.266	0.214

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Inflation and labour markets in the wake of the pandemic: the case of Chile¹

Lissette Briones, Guillermo Carlomagno and Pablo García

Abstract

The COVID-19 crisis resulted in a negative supply shock on labour markets worldwide. This, along with the follow-up of fiscal support measures, caused repercussions that persist to this day on the behaviour of labour markets and inflation. This document revisits the case of Chile throughout the period and examines the consequences on wages, employment, and inflation. The Chilean case constitutes a special one in that, on top of fiscal support measures that were also adopted in other countries, Congress approved pension fund withdrawals equivalent to roughly 19% of GDP that, together with other fiscal measures in year 2020 and 2021, resulted in a liquidity injection into household's balance sheets of close to 33% of GDP. As a consequence of these measures, along with restrictions to mobility and fear of contagion, internal demand and inflation surged, and the labour market tightened significantly. In recent quarters, as the shock to internal demand started to give in and economic activity slowed down, we argue that the labour market acted as a shock absorber, allowing for lower real wages and more resilient employment than expected. Apart from recent developments, we also review some structural features of the Chilean labour market and wage formation mechanisms and their possible future dynamics. Finally, the last section describes the use of labour market information in the monetary policy process.

Keywords: inflation, labour market.

JEL classification: E31, J21.

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Main drivers of inflation dynamics in Chile since the pandemic

Given the nature of the inflation process in a small open economy such as Chile, gauging the relative relevance of supply versus demand shocks, as well as domestic and external shocks, is key to properly calibrate the monetary policy stance and its forward guidance. For forecasting and policy analysis, the Central Bank of Chile (CBC) runs a suite of models, of which the workhorse DSGE (X-MAS)² is widely used for structural analysis. According to this analysis, approximately two thirds of the increase in inflation accumulated since the beginning of 2021 can be explained by internal factors and the other third by external ones (CBC, 2022c). Among the former, the rise in private consumption stands out, driven by the strong liquidity injection to households due to the implementation of fiscal stimulus measures during the pandemic and three partial pension fund withdrawals. Also, the depreciation of the CLP, triggered by the increase in local uncertainty, was a contributing factor. Furthermore, cost pressures along with inflationary persistence, explained by second-round and indexation effects, also played a relevant role. With regards to external factors, these were mainly supply-driven, e.g. higher commodity prices, transport costs, and supply chain disruptions.

These findings are robust to significant changes to the estimation strategy. For instance, the same conclusions derived from the structural macro model using aggregated macro data can be obtained when using highly disaggregated consumer price index (CPI) series to identify demand and supply shocks at the micro level. In particular, we still find that approximately two thirds of the rise of non-volatile goods inflation was driven by demand shocks (CBC (2022c)).

Over the course of 2022, domestic imbalances associated with excessive aggregate demand are being solved. Therefore, in the absence of new shocks, local inflationary pressures will continue to ease over the next quarters. Private consumption is falling to sustainable levels within its long-term trend, fiscal consolidation is underway, and local institutional and political agreements are driving uncertainty down.

Against this backdrop, the primary sources of uncertainty for the Chilean economy have changed from domestic to external. In this scenario, the future path of monetary policy and the risk of a deep recession in developed economies, the evolution of the war in Ukraine, and the resolution of imbalances in the euro area and China stand out as some of the main sources of uncertainties.

Regarding the role of fiscal measures in relieving external price pressures, the government has applied several changes to its fuel price stabilisation mechanism (MEPCO). This instrument allows the Ministry of Finance (MoF) to avoid a direct pass-through from international price fluctuations to consumers, through weekly changes to a specific fuel tax. Since its initiation in 2014, the mechanism has been allowed to accumulate lost revenues of, at most, USD 500 million (0.16% of annual GDP). In early 2022, this threshold was reached and expanded to USD 750 million. Then, when the new threshold was reached, it was again expanded to USD 1.5 billion, and then in

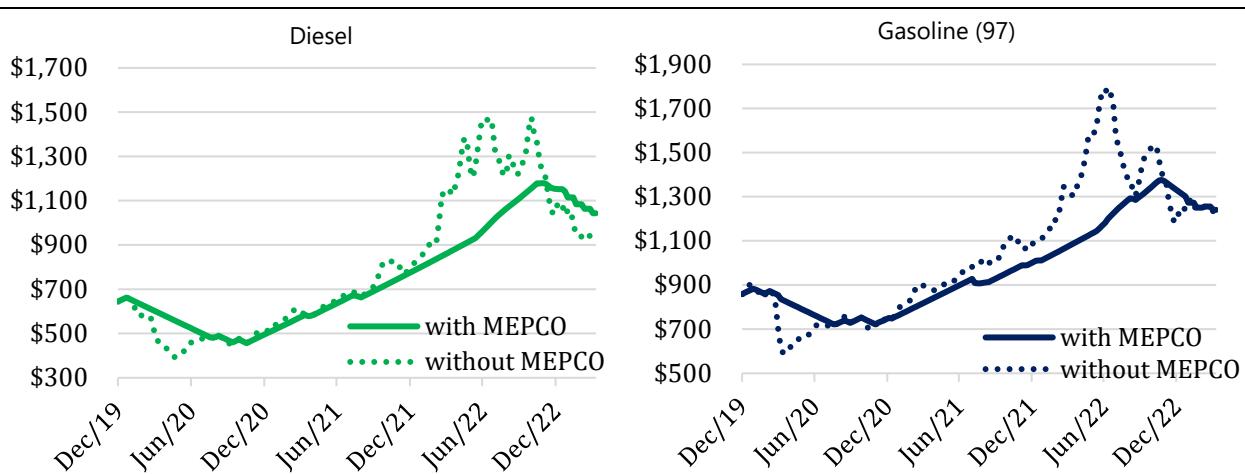
² Central Bank of Chile, 2020, "Use of macroeconomic models at the Central Bank of Chile".

mid-2022 to the current level of USD 3 billion (1% of GDP). In addition, throughout 2022, greater resources were provided to stabilise paraffin, public transport, electricity and natural gas prices to deal with the external turmoil observed in global energy markets. Finally, as of December 2022, the MoF introduced a new project to Congress that aims to stabilise fuel prices for up to three weeks in a row (ie consumer prices will change only once every three weeks), including special measures to avoid significant changes in diesel fuel prices until April 2023.

Although MEPCO's goal is smoothing fuel price fluctuations, not reducing their level, successive increases in its threshold have caused relevant effects on price levels. Considering a counterfactual scenario without the mechanism, the price of petrol would have been, on average, 5% lower in 2020, and 7% and 17% higher in 2021 and 2022, respectively.³ Taking into account first-round effects only, in this scenario, average inflation would have been 0.2% lower in 2020, and 0.2% and 0.6% higher in 2021 and 2022, respectively.

Fuel prices with and without MEPCO (CLP)

Figure 1



Sample: Dec/30/2019 - April/10/2023, weekly.

Source: Based on data from the Ministry of Finance and Bloomberg.

Recent Dynamics in Chile's Labour Market

The labour market in Chile appears less tight than in some advanced economies, and with wage indexation that appears to be somewhat more muted over the last year (see Andalaft et al., 2022). The ratio of available vacancies to the number of unemployed workers has reduced in the second half of 2022, and this was accompanied by lower real wages during the past year. In addition, based on administrative records for 2021–22, the authors show that the indexation of nominal

³ The price of diesel would have been 8% lower in 2020, and 4% and 22% higher in 2021 and 2022, respectively.

wages to above inflation has been 50% lower compared with the pre-pandemic period, which helps to explain the drop in real wages.

There is also evidence that the wages of workers who voluntarily change jobs are higher compared with previous periods, although they are decreasing in both real and nominal terms. This imposes a degree of caution on the overall assessment of a loose labour market.

In the future, our central monetary policy rate (MPR) scenario assumes that nominal wages will return to growth rates in line with usual indexation patterns. This implies that a recovery in real wages is expected. Additionally, the main drivers of employment will continue to deteriorate in view of the decline of vacancies, and firms' pessimistic expectations.

At the beginning of the pandemic, both labour demand and supply decreased significantly due to mobility restrictions and fear of contagion. Since mid-2020, labour demand, as measured by the internet job advertisement index constructed by the central bank, showed a substantial recovery that was not accompanied by a commensurate increase in labour participation rates. This opened a significant demand-supply gap that continued to widen until late 2021. In fact, according to a business perceptions report published by the central bank, in February 2022 (CBC (2022a)), 88% of the firms surveyed were experiencing difficulties in finding workers.

Currently, although participation rates have not fully recovered compared with pre-pandemic levels, labour market tightness has substantially eased as economic activity has normalised and labour demand has moderated.

By age classification, participation rates of men and women between 25 and 54 years old have recovered almost completely. In contrast, people younger than 25 and older than 54 have had a slower recovery and show stagnation in participation levels (around 4 and 6 percentage points, respectively, below the pre-pandemic period).

As for economic activity, retail, communal services (including teaching, health, hospitality and others) and construction have recovered to pre-pandemic levels. Agricultural employment is still lagging.

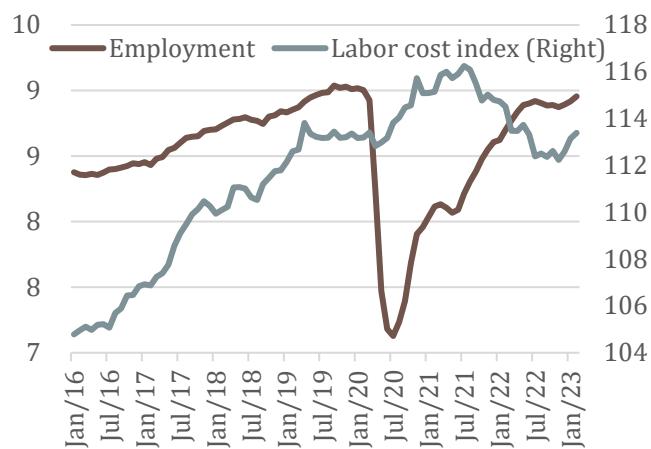
Between the formal and informal sectors, differences are still observed. While formal employment has recovered to pre-pandemic levels, the informal sector has flattened approximately 6% lower than 2019 levels.

Regarding real wages, these are still falling, although with some heterogeneity across sectors. Whereas construction, retail and communal services are the main laggards, the manufacturing sector has shown a slight decrease in the last two quarters. Mining, on the other hand, had a significant increase in that period.

Employment and Real wages

(million people; index 2018=100; seasonally adjusted)

Figure 2



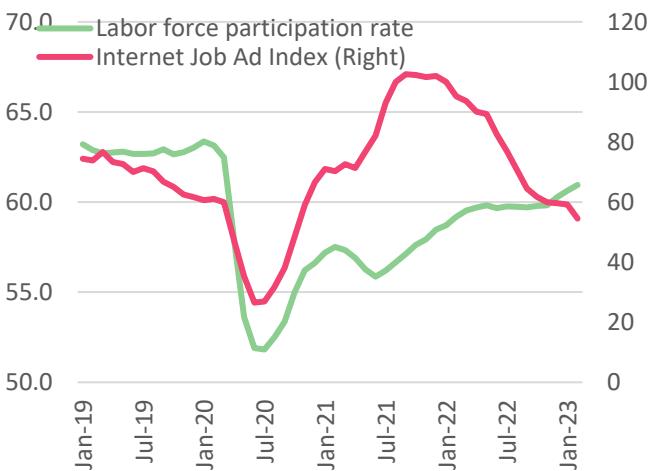
Note: Wages adjusted by CPI. Sample: Jan/2016 - Feb/2023.

Source: Instituto Nacional de Estadísticas and Central Bank of Chile.

Labour force participation and vacancies

(percentage; index January.15=100)

Figure 3



Sample: Jan/2019 - Feb/2023.

Source: Instituto Nacional de Estadísticas and Central Bank of Chile.

Structural aspects of labour markets in Chile

Main structural factors on wage formation

Some of the structural features that influence wage formation in the Chilean labour market are: (i) the fall in labour productivity and high mobility across firms; (ii) flexibility; and (iii) human capital characteristics (CBC (2018b)).

Recent estimates of trend GDP have revised productivity downwards (CBC (2021, 2022d)). This is based on a decreasing trend that began in the early 1990s, that was only temporarily reversed during the commodity price boom during the second half of the 2000s. Thus, although the mean (median) of total factor productivity (TFP) annual growth rate between 1997 and 2019 was +0.7% (+0.5%), it falls to minus 0.4% (minus 0.3%) when considering the 2011–19 period. Using data at the firm level, the decline in productivity is confirmed as well. Moreover, this analysis shows that reallocation as a dynamic driver of productivity has declined.

On the other hand, an empirical study on the Chilean labour market shows that mobility is high compared with other countries (CBC (2018b)). As an example, the average duration of employment in Chile is 42 months (INE⁴ 2018) while Brazil and Portugal show 84 and 136 months, respectively (OECD (2018)). Despite the above, 49% of the transitions in Chile are not related to a salary increase. Therefore, high rotation is correlated with lower earnings, lower returns from transitions and lower incomes compared with workers that transition less frequently.

With respect to flexibility in the labour market, even though higher mobility may be correlated with lower-quality jobs, a higher degree of flexibility allows for the absorption of macro shocks more easily. Our current scenario could be a good example of how the labour market is absorbing a negative macro shock. Inflation is showing signals of stabilisation, the level of private consumption is decreasing and a significant fiscal adjustment is underway. In this context, employment has shown a higher degree of resilience than was expected six months ago, but real wages have evolved below our projections. An internal structural VAR model that tries to identify demand and supply shocks in the labour market shows that a supply shock is operating: workers are seeking jobs more intensely than firms are offering positions, which pressures real wages downwards. In a more rigid labour market, real wages would go up, hindering inflation convergence coupled with higher unemployment.

Human capital also influences wage formation. Returns to experience in Chile are low in an international context, with high heterogeneity among workers (CBC (2018b)). Compared with OECD countries, the coverage and quality of education are low: (i) the share of the population between 25 and 64 years old with a university degree in Chile reached 31% in 2020 (compared with an OECD average of 39%) (OECD (2020)); and (ii) it has the lowest scores in PIAAC⁵ tests both in numeracy and literacy (PIAAC (2015a, 2015b)). These differences are directly correlated with salary increases throughout the working life cycle. Lagakos et al (2018) conducted an international

⁴ National Statistical Office.

⁵ Programme for the International Assessment of Adult Competencies or also known as Survey of Adult Skills.

study on returns to experience, showing that Chile's profile is flatter compared with more developed countries, and there is a higher dispersion at each educational level. This is evidence of significant heterogeneity in the level of education among Chilean workers.

Demographic and social trends

Demographic transitions, cultural changes and policy reforms impact labour dynamics and productivity, and this affects wages heterogeneously. In a historical comparison, women's participation has increased in line with reforms to parental leave and changes in cultural values (Contreras and Plaza (2010)). According to OECD statistics, the gender wage gap in Chile indicates that men earn, on average, 8.6% more than women (OECD (2021)). In addition, empirical research that controls for the level of education finds a bigger gap, especially at the top of the distribution, providing evidence of a glass ceiling effect (Siravegna (2021); Nopo (2006)). Therefore, greater participation of women in the labour market should pressure aggregate wages downwards, but a reduction in the raw gender gap would pressure wages upwards for women who are already participating.

Younger cohorts have reduced their participation, driven by an increase in educational coverage. This would push wages up since higher educational levels exhibit higher returns. On the contrary, returns from tertiary education are decreasing overall (CBC (2018b)), putting less pressure on wages. In addition, other policies, such as minimum wage adjustments, have also contributed to increasing labour participation (Castex and Sepúlveda (2014)) and could have inflationary effects on wages in the short term, although our estimates have found it to be small.

Migration has also affected the labour market in recent years. Research from the Central Bank of Chile shows two transmission channels of migration shocks (CBC (2018a)). First, an increase in the population increases aggregate demand for the consumption of goods and services, pressuring inflation upwards. Additionally, the higher labour supply holds back salaries and pushes real wages down, pressuring inflation downwards. Overall, a general equilibrium model for the Chilean economy suggests that the greatest effect would have been demand pushing prices upwards.

Informality

Currently, 29% of employment in Chile is classified as informal, a figure that is much higher than the median in OECD countries (12%). In 2017, salaried workers comprised 72% of total employment, below the median among OECD countries (84%), but higher than the median in Latin America (63%). Within salaried workers, 17% are informal, far above the OECD median (4%). In contrast, self-employed workers are mostly informal (65% in Chile compared with a median figure of 60% in OECD countries).

Using data covering the period between 2010 and 2017, Marcel and Naudon (2016) classify work transitions for four cohorts: formally employed, informally employed, unemployed and inactive. Their findings show that formal employment has a high degree of persistence: a large majority of formal employees remained in

the same category one quarter later (87%), and of those that left this status, more than half moved to the informal sector.

Informal employment is less persistent (63% were in the same category one quarter later), and those with this status are more likely to move into inactivity than into a formal job. On the other hand, informal employment is the main gateway for new hires. It receives 55% of the transitions from unemployment to employment, and 73% of the transitions from inactivity. These results suggest that the informal sector includes, to a greater extent than formal employment, those workers who occasionally participate in the labour market, going in and out depending on the macroeconomic conditions. Therefore, informality may function as an automatic smoother of the macro cycle, increasing the labour force when real wage growth is high and reducing it when it is low.

Informality is associated with greater wage dispersion and lower income levels. However, it can also serve as an adjustment mechanism for more disadvantaged workers during a contractionary stage of the macro cycle (Loayza and Rigolini (2011); Maurizio (2016)). For Chile, Contreras et al (2008) find that the probability of working in the formal sector increases with years of education and work experience. Contreras et al (2007) and Contreras et al (2017) find similar results, showing that greater educational attainment is associated with a lower likelihood of self-employed status. Barrero et al (2018) show how workers in the informal sector, apart from being on average less educated, receive lower salaries than those observed in formal employment, even after adjusting for educational attainment.

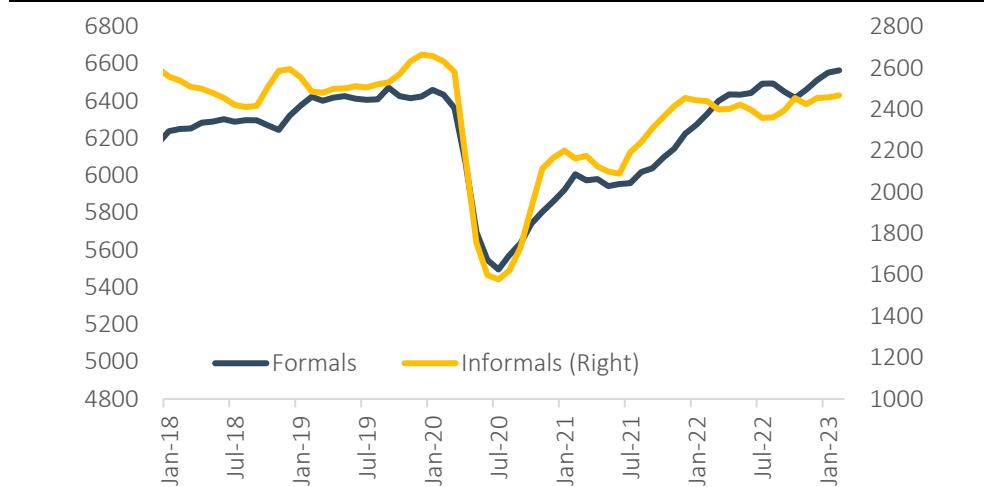
Hence, the informal sector in Chile seems to operate as a shock absorber, helping to stabilise employment and wages along the macro cycle. Still, the quality of informal jobs is far lower than that of formal ones in every relevant dimension, so that the policy challenge is to reduce the informal sector without introducing too much rigidity in the labour market.

Importantly, the shock absorbing mechanism did not work during the pandemic, when the informal sector was even more affected than the formal one. For instance, in July 2020, informal employment decreased 37% year on year, in contrast to a decrease of 14% in the formal sector. Mobility restrictions and fear of contagion are probably the main reasons that prevented the normal functioning of the informal sector.

Informality

(thousand people)

Figure 4



Sample: Jan/2018 - Feb/2023.

Source: Instituto Nacional de Estadísticas.

Collective bargaining and wage indexation

Centralisation of the bargaining process is relatively limited in Chile. Typically, wages are negotiated at the firm level, with some exceptions in which workers are grouped in federations or sectoral unions, such as the unions of teachers and doctors.

Before 1973, the bargaining process was driven by unions across economic sectors and companies (Cox (2017)), labour conflict and strikes were common, averaging 1,000 strikes annually between 1961 and 1969 (Armstrong and Aguila (2006)). During the first years of the dictatorship, unions and strikes were forbidden, and in 1979 new legislation allowed unions at the firm level, setting out the basis for the current framework, yet, with several restrictions that were subsequently eliminated, such as a 60-day limit for strikes and a prohibition on establishing unions at the industry level. Wages were fully indexed to the CPI during this period, until the national banking crisis of 1982–83, when mandatory indexation was eliminated. With the return to democracy in 1991, the prohibition on intercompany unions was lifted, and strikes were allowed to take place without a limited duration.

Subsequent reforms increased incentives to join unions and increased costs for anti-union behaviour by companies and the replacement of strikers. Since 1990, the number of unionised workers has represented between 9 and 13% of the labour force (Government of Chile (2021); INE (2022a)).

Overall, unionisation rates and centralisation of the bargaining process do not seem to be relevant hindrances to the goal of controlling inflation in Chile, as they are relatively low. The current situation may be a good example of how the labour market is not hindering inflation convergence. Inflation continues at high levels, but

real wages are shrinking, partly because of low indexation rates during the Covid pandemic (CBC (2022d)).

According to ENCLA (2019), which covers formal employment only, 80.7% of companies, representing 89.7% of formal workers, say that they have adjusted wages in some way according to CPI. Considering that 73% of workers are formal, at least 65% would have received a wage adjustment either for implicit or explicit wage indexation mechanisms. Informal workers may also have received some inflation adjustment, but this information is not available.

By contrast, empirical estimates based on administrative records suggest that formal wages, either according to the terms of contracts or as a result of ad hoc negotiations, were almost fully indexed until the Covid-19 crisis. Since 2020, indexation has fallen by 50% with respect to previous levels, in a context of diminishing labour market tightness (Andalaft et al (2022)).

During 2022, public employment represented 17% of total employment. Wages from the public sector are subject to specific governmental adjustments, which are negotiated and approved by the parliament on an annual basis. Changes during 2021 and 2022 reached 6.1% and 12% in nominal terms, respectively, or a drop of 1.1% and 0.8%⁶ in real terms, respectively.

In addition, the government sets the evolution of the minimum wage. The proportion of workers who earn the minimum wage was close to 10% in 2022. Since 2016, the minimum wage is typically adjusted twice a year by specific laws (before 2016, adjustments took place once a year). Between 2010 and 2022, it was raised from CLP 172,000 to CLP 400,000. This represents average annual real growth of around 4% per year.

The effect of minimum wage increases on inflation is typically low. For instance, the last raise from CLP 350,000 to CLP 400,000 (+14%) in August 2022 would have generated an increase of around 0.2% on the headline inflation figure.

Recent migration trends

In recent years, Chile has experienced a significant migratory flow. According to INE and the Department of Immigration (INE (2022b); Department of Immigration (2022)), between 2015 and 2019, over one million immigrants entered the country. Accordingly, the foreign-born resident population increased from 2.3% to 7.6% of the total population. This figure places Chile near the OECD average (7.7%).

Previously, Chile exhibited a low migration rate compared with international standards. The percentages of the foreign population in 1992 and 2002 were only 0.8% and 1.3%, respectively (Figure 5).

During 2021, according to population projections from the 2017 Census, data from INE and the Department of Immigration (INE (2022b); Department of Immigration (2022)), immigrants are characterised as being younger than Chileans. The segments between 25 and 49 years old correspond to 38% of Chileans, whereas

⁶ Using effective data until November 2022 and forecasted inflation for December 2022 from Central Bank of Chile (2022d).

among foreigners, this group comprises 65%. For the population over 65 years old, the share reaches 3% among immigrants (13% for Chileans). In addition, consistent with international evidence (Peri (2016)), immigrant workers have a higher labour participation rate than locals.

Nevertheless, immigration in Chile exhibits differences from what is typically observed abroad. In contrast to the evidence summarised in Dustmann et al (2016), immigration has not been concentrated among those with the lowest levels of education. In fact, the educational level of immigrant workers is, on average, somewhat higher than that of Chileans, although there is significant heterogeneity in the distribution of education depending on the country of origin. In 2017, the percentage of immigrants with tertiary education reached 34%, compared with 29% for Chileans. Despite this, immigrants are, in general, employed in jobs below the level of their qualifications. The international evidence suggests that this is common for immigrants when they have recently migrated, and that they move into high-skilled jobs over time (Lubotsky (2007)). By industry, it highlights a greater weight of immigrant workers in the domestic services sector, particularly women.

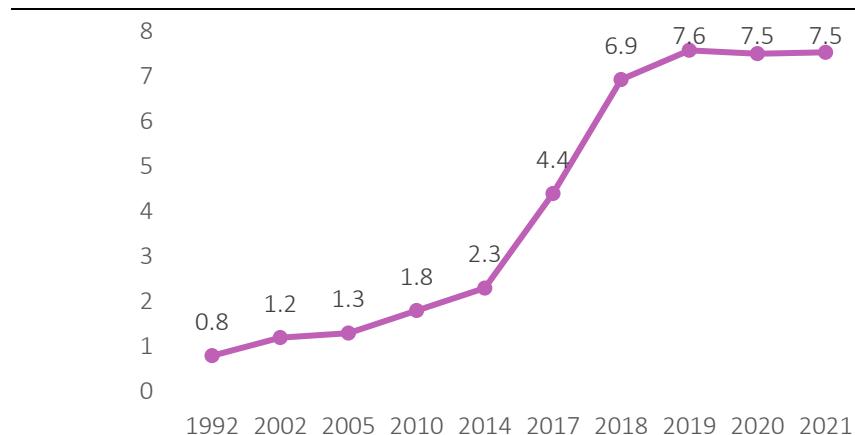
In the short run, the entry of young workers into low-skilled jobs would push aggregate wages downwards. Similarly, from an aggregate perspective, the impact of the migration shock implied a sudden increase in the working age population (CBC (2018a)). This supply shock holds back salaries and pushes real wages down. In the long run, according to the literature, immigrants should move to higher-productivity jobs which would push aggregate productivity and wages upwards.

According to the 2017 Census (INE (2018)), the average unemployment rate for immigrants was 7.5%, compared with 7.0% for Chileans. However, when controlling for the year of arrival to the country, significant differences emerge. The unemployment rate among immigrants who arrived after 2016 is almost triple that of foreigners who entered before that date. This suggests that an adjustment period takes place between the arrival of an immigrant into the country and their ability to find a job. Therefore, in the short run a migration wave pushes the unemployment rate upwards (CBC (2018a)).

Immigration

(percentage of the total population)

Figure 5



Note: Until 2002 the data comes from Census, afterwards are estimations. Sample: 1992 - 2021.

Source: Instituto Nacional de Estadísticas and Department of Immigration

The Persistence of the Pandemic and Technology Shocks on the Labour Market

The pandemic and the measures adopted to curb it implied a significant negative labour supply shock in Chile and a reduction of labour participation. In respect of the young and the elderly, there has still not been a full recovery. At the beginning of the pandemic, the fear of infection, mobility restrictions and early retirement negatively affected the labour market. Later, the amounts of fiscal transfers and pension fund withdrawals explained part of the delay in returning to the workplace. This would particularly affect low-skilled workers, and within this group the elderly and women were especially impacted (CBC (2022b) and Bertinatto et al (2022)).

However, the effects appear to be more persistent with respect to the participation of the young and elderly (Figure 6), the rates for which are still approximately 4 and 6 percentage points below their pre-pandemic levels, respectively. Older workers may have retired earlier due to greater exposure to the pandemic, and some may not return to the labour force.

A possible explanation for young workers is that the pandemic may have caused a change in their preferences in favour of remote work and more flexible schedules. This could generate a mismatch between what companies are looking for and what workers are willing to do. While there is evidence suggesting a change in workers' preferences (Duval et al (2022)), there is no robust support for the contention that this explains for the disconnect between the post-pandemic economic recovery and current levels of youngsters' participation rates in Chile.

Finally, the boost of automation during the pandemic could have long-lasting effects in the labour market, affecting employment in the short run as companies replace workers with machines or software. Long-run effects will depend on how flexible the market is in relocating the lost positions.

As a first signal of structural change towards more automation, the demand for business services – including online sales platforms, externalisation and engineering, among others – has been booming, even in sectors which have stagnated or are in decline (mining, retail and manufacturing).

The unemployment rate in Chile presents persistent differences by age group. In the last 30 years, unemployment among those under 25 years old (18.4% on average) has doubled the total unemployment rate (7.7%) and is almost five times higher than that among those over 55 years old (3.8%). On the other hand, although women have a higher average unemployment rate than men, this difference has decreased in recent years.

Labour force participation rate by group

(percentage)

Figure 6



Sample: Mar/2010 - Feb/2023.

Source: Based on data from Instituto Nacional de Estadísticas

To understand the impact of demographic factors on the unemployment rate, we estimated the unemployment rate that we would have observed had the composition of the labour force in 1992 remained constant, both among men and women, and among different age groups (CBC (2018)). Results show that the unemployment rate would have been approximately 1.5 percentage points higher, suggesting that the change in the composition between young and older workers implies a relevant decrease in the unemployment rate.

Regarding the increase in female labour participation (Figure 6), there are two opposite effects: (i) women have a higher unemployment rate, in average, than men and therefore an increase in female labour participation should increase the overall unemployment rate; and (ii) women also present a downward trend in their unemployment rate, which tends to reduce the aggregate unemployment rate. The evidence shows that both effects cancel each other out, such that changes in female participation have not had a significant impact on aggregate unemployment.

With respect to innovation and automation, we expect a negative impact on employment in the short run, as the highly skilled positions generated by the automation process are significantly fewer than the lower skilled ones that are destroyed. In a general equilibrium setting for Chile, Rivera (2019) finds that a 1% decrease in the international price of robots would have a short-run negative impact of between 0.05 and 0.25% in employment and wages. Frey and Osborne (2017) estimate that with new developments, 57% of jobs across OECD countries are susceptible to automation. How this would affect average wages and employment, in the long run, is not evident, since it will depend on whether lost positions are reallocated and at which wage rate.

Use of labour market indicators in the policy process

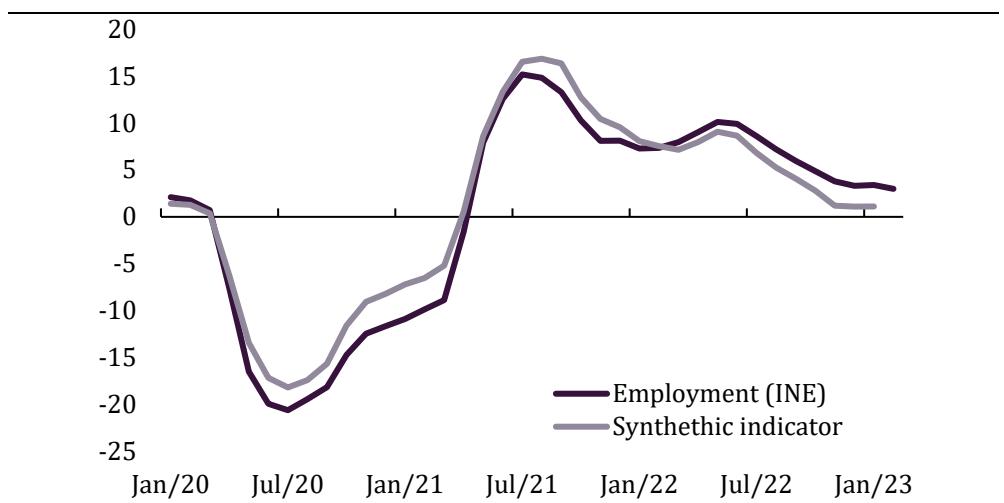
The key indicators are wages, employment and the unemployment rate. Recently, we have added the monitoring of administrative data not only for empirical research but also for the purpose of short-run analysis of the labour market. Microdata is also analysed monthly and regularly presented to the board. Additional analysis is exhibited in board members' presentations, reports and working papers.

Because of the difficulty of collecting labour market data with traditional surveys, administrative data were especially useful during the pandemic. In fact, the recovery of formal employment appeared in official figures several months later than in administrative records. Hence, for short-run analysis, we monitored what we called a "synthetic employment indicator", which combines formal dependent employees from administrative records with official data for non-dependent or informal employment (Figure 7).

Employment

(annual growth rate)

Figure 7



Note: Synthetic indicator uses formal dependent employment from SP and other categories of work from INE.

Sample: Jan/2020 - Jan/2022 (employment INE: Feb/2023).

Source: Instituto Nacional de Estadísticas, Superintendencia de Pensiones (SP) and Central Bank of Chile.

For short-run forecasting, we use cointegrated VAR models that include employment, wages and other relevant macro variables. These models are used to forecast two quarters ahead. For medium-run forecasts, we use structural models.

Labour market variables are introduced in the structural model, incorporating search and matching frictions following the seminal work by Mortensen and Pissarides (1994). In this specification, firms publish vacancies to hire workers, and the unemployed seek employment. In addition, pairings are allowed to be broken both endogenously, as they respond to economic shocks, and exogenously. For simplicity, it is assumed that an agent negotiates a single contract, on behalf of workers, based on average productivity. In this context, all workers receive the same salary and work the same number of hours. The evolution of employment, on the other hand, depends

on the number of employees who lose their jobs and on new pairings. The latter depends on the number of unemployed people and the number of vacancies that companies decide to open. The greater the number of workers looking for work and the greater the number of vacancies available, the greater the creation of new jobs.

Disaggregated data are key for heterogeneity analysis in the labour market. Microdata are available from the monthly labour market survey conducted by INE, which allows for analysing trends within age, gender, migrants, education, geographical region and other characteristics. Additionally, supplementary information from administrative records has become quite relevant. These data sources are used to complement survey data and are merged with other economic data sets whenever possible.

These statistics are useful for a broader examination of the labour market and to better understand the broad signals coming from key aggregated indicators such as the unemployment rate, where averages may mask potential risks from a specific group of workers or consumers.

Furthermore, empirical researchers on medium- and long-term trends of the labour market, as well as firm productivity, use these datasets, and the results are then used for short-term analysis (eg Albagli et al (2019)).

The MPR and press releases after the monetary policy meeting refer to labour market evolution as part of the domestic economic analysis, focusing on key indicators such as the unemployment and employment rates, job creation expectations and wages. It has also focused on participation rates, among other matters, depending on whether they were considered key to the monetary policy analysis.

Additional research or analysis related to specific issues that are considered in the decisions are published as boxes and reports that complement a central paragraph – some recent topics include female participation, migration trends and indexation pressures on wages. When additional research is required, working papers and special documents are cited in the MPR.

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Labour market and inflation: the case of China

30 April 2023

Abstract

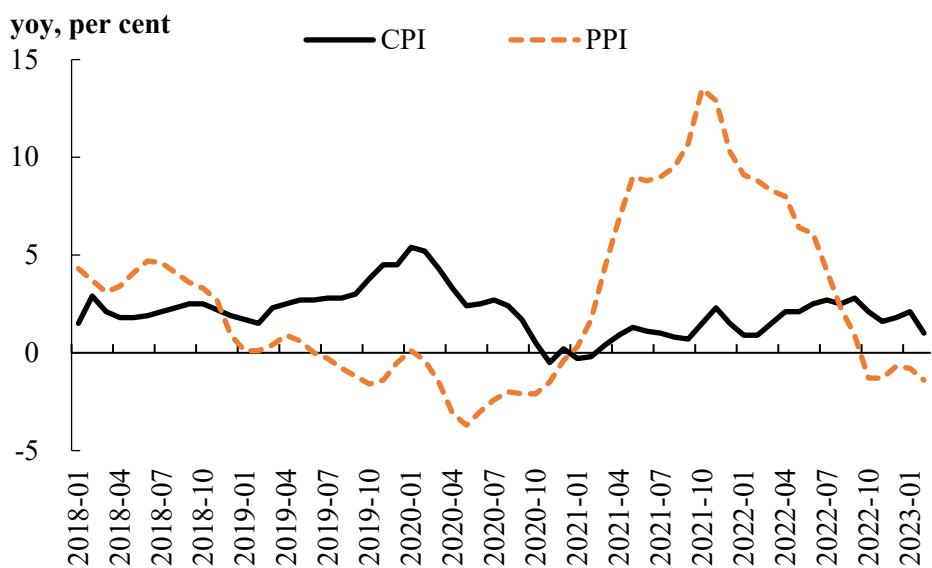
China's labour market has limited short-run but notable long-run impacts on inflation. In the short run, China's inflation is expected to remain mild given the moderate aggregate demand. Data show that the epidemic has not changed China's labour market structure, and the employment pattern has not changed significantly. So far, changes in the labour market have not been the main factor affecting China's inflation trend. In the medium term, due to increased labour migration between urban and rural areas, as well as among industries and regions, the relationship between inflation, economic growth and the urban unemployment rate in China is not stable. As a result, the trend and short-term changes to labour migration in China are closely related to macroeconomic cycles, while the link between the labour market and inflation is relatively weak. In the long run, with a shrinking population and labour force, and moderating urbanisation process, population growth and structural changes will have a greater impact on inflation.

1. Recent inflation developments

In 2022, China's economy was hit by many unexpected factors at home and abroad, and GDP grew by 3%, the lowest level for more than 30 years. Nevertheless, the urban unemployment rate had dropped to 5.5% by the end of the year, and the consumer price index (CPI) rose by 2%.

1.1 Inflation stable

In February 2023, China's CPI rose by 1.0% year on year, and the cumulative year-on-year increase from January to February was 1.5%. Food prices rose 2.6% year on year, and non-food prices rose 0.6% year on year. The producer price index (PPI) saw year-on-year drops of 1.4% and 1.1% in January and February, respectively. The price of subsistence means rose 1.1% year on year, and the price of capital goods fell 2.0% year on year. On the whole, short-term inflation is generally moderate. The trend of CPI growth is mainly affected by factors such as the fall of consumer demand after the Spring Festival and sufficient market supply. The change in the PPI growth rate is mainly restricted by the acceleration of industrial enterprises' production recovery, the improvement of market demand and the relatively high base effect in the same period of last year (Graph 1).



Source: National Bureau of Statistics.

1.2 Stable market expectations

According to the Caixin Media survey of 14 institutions¹, the average market forecast for CPI growth in February 2023 is 1.8% year on year, down 0.3 percentage points from the previous month. The average forecast range is between 1.2 and 2.2%, with most institutions expecting slower year-on-year CPI growth. In terms of causes, the fall in food prices and the base effect brought about by the Spring Festival are the main factors dragging down CPI. With regard to food products, weaker demand and relatively ample supply after the Spring Festival were the main reasons for the drop in pork and egg prices. In terms of non-food products, the retail prices of refined oil products were stable. Core inflation will continue to be driven by the recovery of services demand after the pandemic peak.

The respondents' average forecast for February's year-on-year PPI growth was -1.2%, widening by 0.4 percentage points from the previous month, with forecasts ranging between -1.5 and -0.9%, with all respondents expecting the year-on-year decline to widen. According to Caixin Media's survey, China's economy is gradually recovering and inflation is generally stable, and will not pose a constraint on macro policy.

¹ Available at <https://economy.caixin.com/2023-03-09/102006258.html>

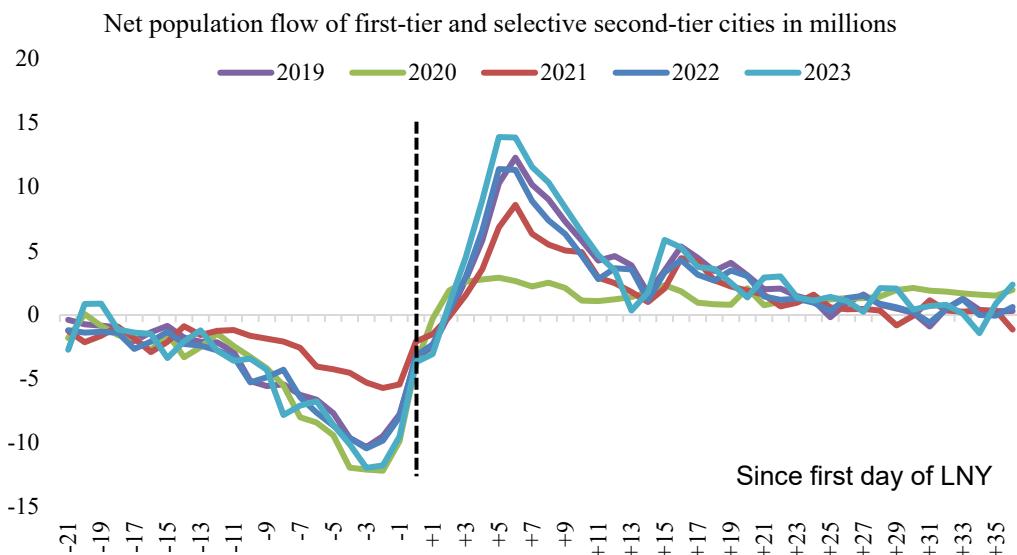
1.3 Macroeconomic targets for 2023

The *Report on the Work of the Government for 2023*² has set out the main targets for China's economic development this year: GDP growth of approximately 5.5%; more than 11 million new urban jobs; a surveyed urban unemployment rate of no more than 5.5%; CPI increase of approximately 3%; growth in personal income that is basically in line with economic growth; steady increases in both the volume and quality of imports and exports; a basic equilibrium in the balance of payments; grain output of more than 650 million metric tons; further improvements to the environment; and continued reduction in the discharge of major pollutants. Looking ahead to 2023, China's economy is expected to pick up, the economic cycle will become smoother, inflation will remain moderate on the whole and the fundamentals of long-run economic growth will remain unchanged.

2. China's labour market is recovering fast

In 2022, China's labour market was generally stable. A total of 11.06 million new jobs were created, exceeding the annual target of 11 million which was set at the beginning of the year. The surveyed urban unemployment rate has risen in some months due to the Covid-19 pandemic and other factors, reaching an average of 5.6% for the whole year. The employment situation of key groups improved, with 295.62 million migrant workers, an increase of 3.11 million over the previous year. The surveyed youth unemployment rate has been falling steadily since the third quarter, to 16.7% in December, down 3.2 percentage points from the July level. High-frequency data show that China's labour market has recovered rapidly since the adjustment to the epidemic prevention and control policy. In the short run, the epidemic has not exerted a significant structural impact on China's labour market.

² Report on the Work of the Government, http://english.www.gov.cn/news/topnews/202303/15/content_WS64110ba2c6d0f528699db479.html.



Sources: Baidu; Morgan Stanley research.

2.1 Population migration has increased and interregional labour migration has recovered rapidly

The data on population movement show that the impact of the epidemic prevention and control policy has dissipated. Intracity and intercity population mobility, as well as the transport volume of domestic flights and high-speed railways, have returned to levels before the outbreak of the Covid-19 pandemic. The Baidu migration index³ shows that after the Spring Festival in 2023, the net population inflow of first-tier cities is stronger than that in 2019 and 2022 (Graph 2). This may reflect not only the rapid recovery of labour demand but also the significant improvement of employment expectations from the perspective of workers (especially those who return to cities to look for jobs).

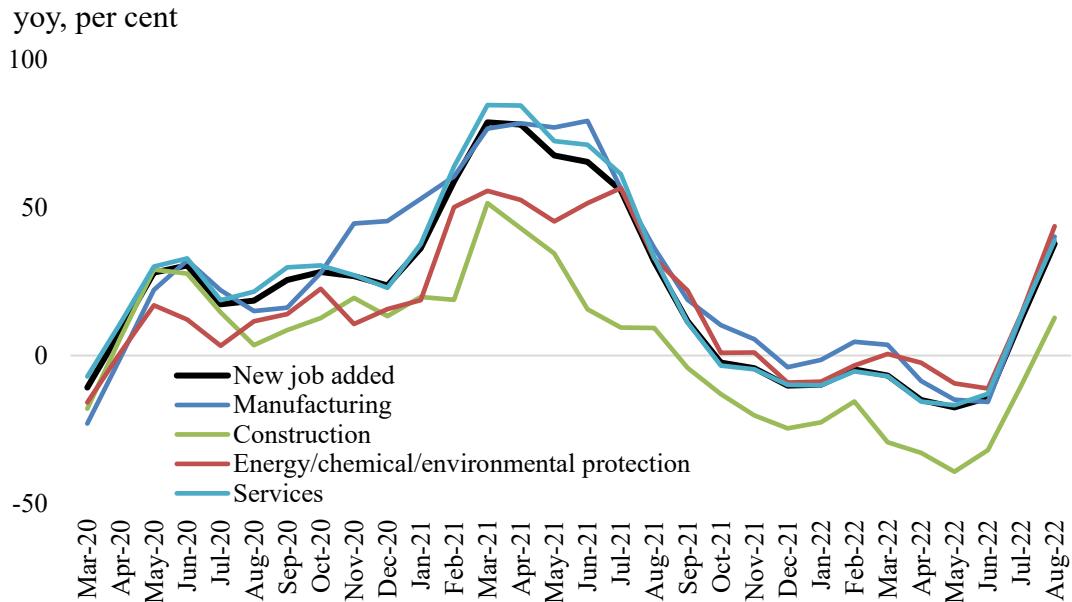
2.2 The relationship between supply and demand in the labour market has improved, and the demand for employment in the manufacturing sector has increased

Combined with data from China's major recruitment platforms such as Zhaopin.com, 51job and Boss Zhipin, the number of new jobs has increased rapidly since the fourth quarter of 2022. Jobs in manufacturing, energy, and green and low-carbon industries grew faster (Graph 3).

³ The Baidu migration index is calculated and analysed based on the geographic location service, Baidu Map Open Platform. The project adopts an innovative visual presentation method by Baidu Map, which can track and show the characteristics of population migration before and after the epidemic in China in a holistic, dynamic, real-time and intuitive way.

New jobs added

Graph 3

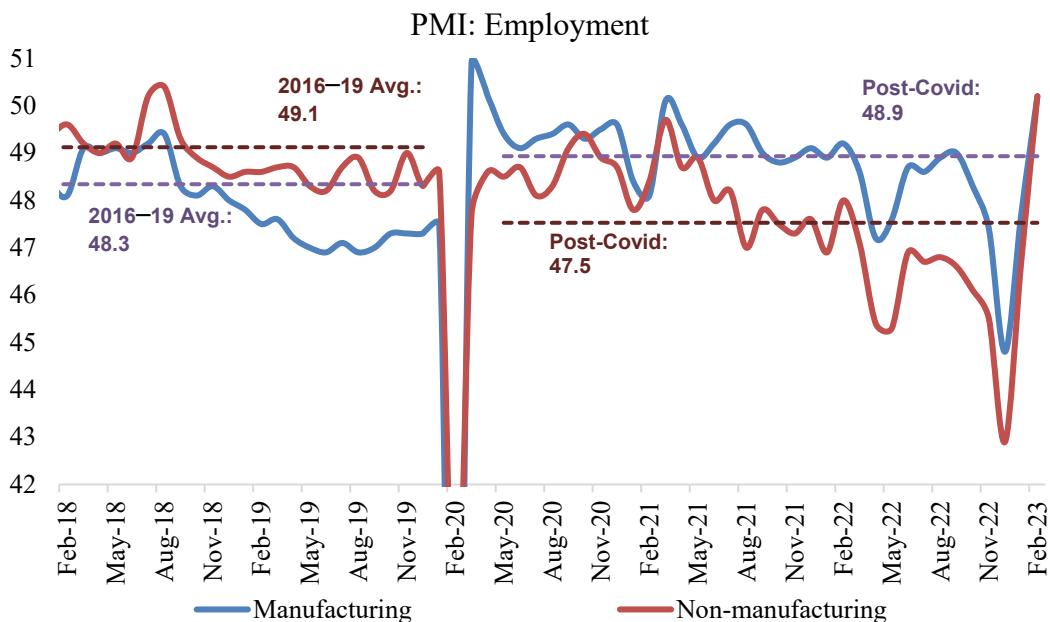


Sources: Boss Zhipin; 51job; Zhaopin; Liepin; Morgan Stanley research.

According to the purchasing managers' index (PMI) of the National Bureau of Statistics, employment levels in Chinese enterprises has increased rapidly since the beginning of the year and the employment level of manufacturing enterprises recovered earlier and faster (Graph 4).

Manufacturing and non-manufacturing PMI

Graph 4



Sources: CEIC; NBS; Morgan Stanley research.

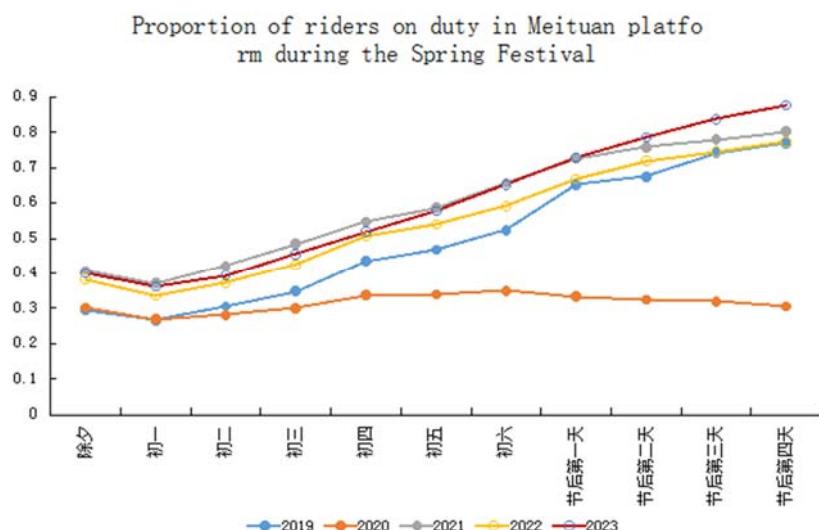
2.3 Labour-intensive employment such as logistics and catering grow steadily

Taking Meituan Delivery⁴ data as an example, in the Spring Festival of 2023, the proportion of daily on-duty riders on Meituan's platform was approximately 48%, which was on a par with that in 2021, and much higher than the same period in 2019, 2020 and 2022. Four days after the Spring Festival, the proportion of on-duty riders recovered to 87.7% of the last day of 2022, higher than in previous years (Graph 5). During the 2023 Spring Festival, the number of newly registered riders in Meituan increased by 31.6% year on year, 60.2% higher than the same period in 2019.

Overall, labour mobility, increasing recruitment demand and new job openings suggest that the pandemic has not had a significant structural impact on China's labour market. Employment patterns and labour flow have not changed significantly, and labour market supply and demand have not become the main factor affecting inflation.

Proportion of riders on duty on the Meituan platform during the Spring Festival

Graph 5



Source: Meituan platform data.

⁴ Meituan Delivery is the instant logistics platform of Meituan, which has a powerful real-time distribution network to meet various needs of merchants and consumers. At present, Meituan has completed more than 40 million orders in a single day, and the average delivery time of each order is only 30 minutes. It has connected 6.3 million merchants, 460 million consumers, nearly four million riders and various ecological partners. Meituan Delivery gradually established the highest coverage density and the most extensive real-time distribution network. Meituan Delivery has covered 2,800 cities and counties across the country, with more than 10,000 distribution sites. It can provide customised logistics solutions and all-round efficient distribution services for merchants of different sizes and formats according to different scenarios.

3. Labour markets, economic growth and inflation: lessons from China

In terms of theory, the relationship between inflation and employment was first proposed by Phillips (1958). After Lipsey (1960), Samuelson and Solow (1960), Friedman (1968), Phelps (1968), Lucas (1973) and other extensions and criticisms, a Phillips curve with expectations was gradually formed. That is:

$$\pi_t - \pi_t^e = -\alpha(u_t - u_n), \alpha > 0 \quad (1)$$

where π_t is the current inflation rate, π_t^e is inflation expectations, u_t is the real unemployment rate and u_n is the natural rate of unemployment. Output growth is commonly used to replace the unemployment rate to determine the Phillips curve in mainstream models, which is mainly based on Okun's law⁵ to describe the relationship between economic growth and employment. That is:

$$u_t - u_n = -\beta(g_t - g_n), \beta > 0 \quad (2)$$

where g_t is real growth, g_n is potential output growth, u_t is the real unemployment rate and u_n is the natural rate of unemployment.

Okun's law can be combined with the Phillips curve to explain the relationship between output fluctuations, inflation changes and labour market changes, and is widely used by central banks in macro policy analysis. However, both the Phillips curve and Okun's law are empirical rules based on countries with a mature market economy. The experience of emerging markets is quite different from that of Europe and the United States, and other developed economies. Especially in China, there are disparities between regions and industries. There is a labour surplus in the agricultural sector and underdeveloped areas, and workers have migrated in large numbers between regions, sectors and industries. Agenor and Aizenman (1999) demonstrated that, in a general equilibrium framework, due to spillover effects between sectors, such as the situation in which unemployed workers in the formal sector can seek employment opportunities in the informal sector, the stable relationship between changes in output and changes in unemployment (the usual Okun's law) would not exist.

Studies by Riveros (1990), Turnham (1993), Horton et al (1994) and Agenor (1996)⁶ show that such a spillover effect is indeed widespread in developing countries. Although there are few studies on the Phillips curve in a dual economy, the spillover effect should be understandable. If the expansion of formal sector demand causes formal sector wages to rise, it may not cause urban unemployment to fall by attracting more workers into the urban or formal sector (Harris and Todaro (1970)), so the Phillips curve may not apply.

⁵ American economist Okun (1962) conducted empirical research on the relationship between economic growth and employment, and obtained the famous Okun's law in macroeconomics.

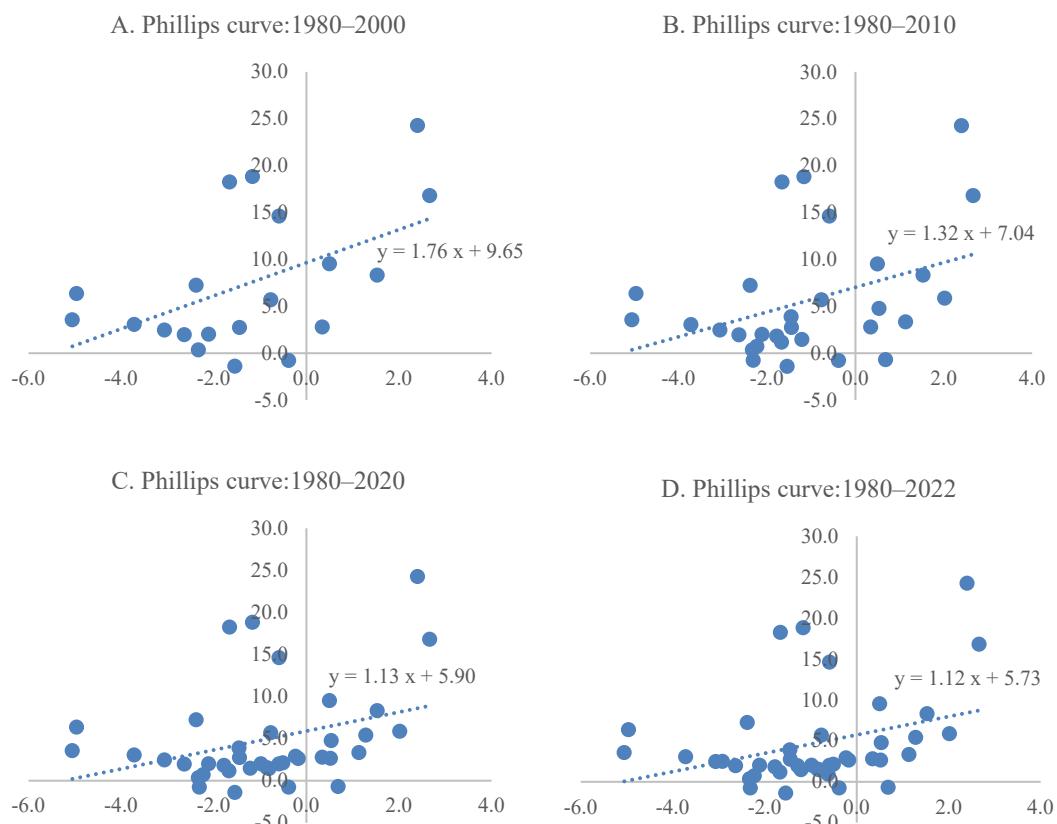
⁶ Riveros, L."Recession, adjustment and the Performance of Urban Labor Markets in Latin America." Canadian Journal of Development Studies 11, 1990, pp.34 – 59.

3.1 China's inflation, growth and employment

Chinese scholars have conducted a lot of research on whether the Phillips curve and Okun's law apply in China.⁷ The results show that China's inflation and economic growth have a significant positive correlation, but labour market indicators such as unemployment or employment rate have a weak relationship with growth.

Relationship between China's inflation and growth

Graph 6



Sources: CEIC; China Statistical Yearbook; China National Bureau of Statistics.

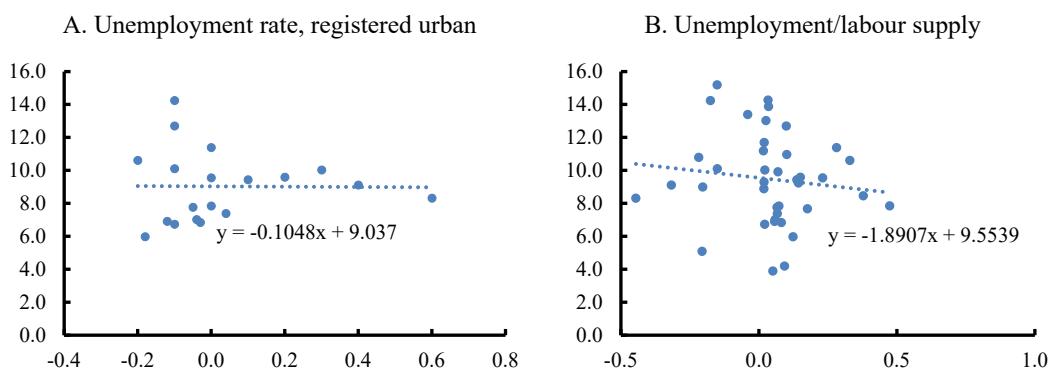
Graphs 6.A–6.D describe, respectively, the relationship between inflation and growth in China. The horizontal axis is the output gap and the vertical axis is the inflation rate. Taking each decade as a sample interval, we show the relationship between inflation and growth from 1980 to 2000, 2010 and 2020, respectively. To reflect the impact of the Covid-19 pandemic, we also present the period from 1980 to 2022. It can be seen that there is a significant positive correlation between the change in China's output growth rate and inflation, indicating that China's inflation is significantly affected by economic growth, and that the Phillips curve holds. It is worth noting that the slope of the Phillips curve decreases as the time interval lengthens.

⁷ Such as Li (2005, 2009), Lu (2015), Liu (1997) and Fan (2000).

Similarly, we can use output and unemployment data to describe the relationship between growth and employment in China, as shown in Figures 7.A and 7.B. The horizontal axis is the change in the unemployment rate and the vertical axis is the growth rate of GDP. Since China began to publish the registered urban unemployment rate around 2000, and the data fluctuated less, we have made small adjustments to the registered unemployment rate based on the reported economically active population and employment data. The results show that the relationship between China's GDP growth rate and the unemployment rate under different calibres is weak.

Okun's law

Graph 7

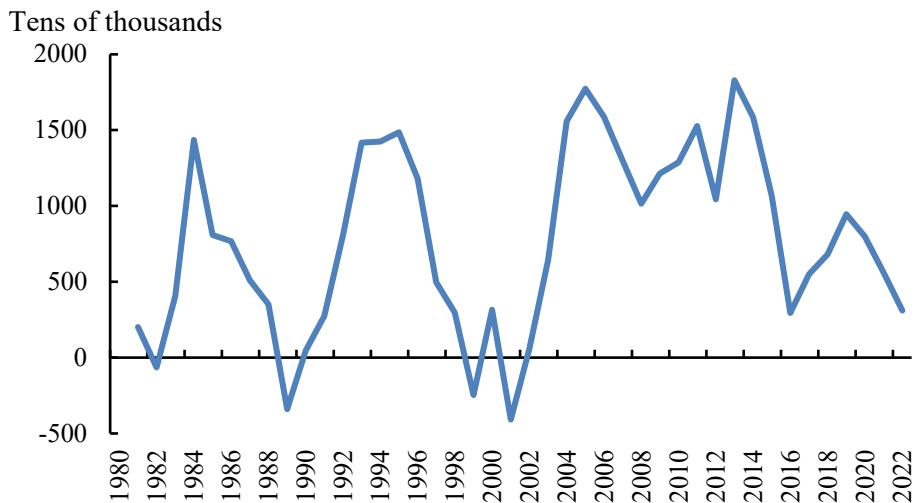


Sources: China Statistical Yearbook; China National Bureau of Statistics.

Based on the empirical observation of the correlation between China's labour market and macroeconomic cycle fluctuations, we propose a discussion of Okun's relationship based on China's experience. As an economy undergoing rapid transformation of economic and growth patterns, China has seen a large-scale and sustained labour force transfer from the agricultural sector to non-agricultural sectors and across regions, so fluctuations in the macroeconomic cycle are closely related to the speed of agricultural labour force transfer. The transfer of the agricultural labour force to the non-agricultural sector and the transfer of the labour force from underdeveloped to developed regions affects economic growth through changes in the non-agricultural sector and increased employment in developed areas. Conversely, the fluctuations of economic growth will restrict the scale and pace of labour transfer in agriculture and underdeveloped areas through changes in labour demand in non-agricultural and developed areas.

3.2 Agricultural labour force migration

Consistent with international experiences, the proportion of the agricultural labour force in a country tends to decline as the economy develops. Based on the estimation method of Lu and Yang (2012), we estimate the annual increase and transfer of the agricultural labour force in China, and the results are shown in the graph below.



Sources: China Statistical Yearbook; Lu and Yang (2012).

3.3 Okun's law with labour transfer

We derive a more general Okun's law with labour transfer and derive a generalised Okun model including labour transfer and change of unemployment rate. That is:

$$g_t = \beta_0 + \beta_1 m_t + \beta_2 (u_t - u_n) \quad (3)$$

where g_t is real growth, m_t is the share of new labour force transfers in total employment, u_t is the real unemployment rate, u_n is the natural rate of unemployment. β_0 can be interpreted as economic growth in the absence of labour transfer and changes in unemployment. Equation (3) can be expressed in the form of gaps:

$$g_t - g_n = \beta_1 (m_t - m_n) + \beta_2 (u_t - u_n) \quad (4)$$

The above Okun's law indicates that labour transfer should be included in the description of the relationship between the macroeconomic cycle of the economy and the labour market, that is, the labour transfer rate and the change in the unemployment rate should be introduced and would jointly affect the economic growth rate.

As the largest developing country, China's economy is in a special situation. In the medium term, due to a large number of labour transfers between urban and rural areas, between industries, and between regions, the trend and short-term changes in labour transfer in China are significantly related to the fluctuations of the macroeconomic cycle, and the relationship between China's inflation, economic growth and urban unemployment rate is unstable, resulting in a small impact of labour market changes on the transmission of inflation in the short run.

4. Long-run analysis of demographic changes and inflation

In the long run, as the process of labour transfer continues, the proportion of the agricultural labour force in China will gradually decline to the level of developed economies. At the same time, with the advancement of reforms in related fields, structural factors such as labour market segmentation will gradually disappear, and the link between changes in China's unemployment rate and macroeconomic fluctuations will become closer. China's Okun relationship should ultimately follow the normal form namely, long-run trends and structural changes in the population will then matter more for inflation.

4.1 Theoretically, demography has an important effect on inflation

The Phillips curve with population shows that population is an important factor in inflation. We consider population and build a dynamic stochastic general model based on the new Keynesian general equilibrium theory. Phillips curve with population can be obtained through theoretical derivation as follows:

$$\hat{\pi}_t = a_1 \hat{\pi}_{t-1} + a_2 E_t \hat{\pi}_{t+1} + a_r [(1 - e) \hat{w}_t + e r_t^k - (1 - e) \hat{a}_t] - a_y \hat{n}_t^y$$

According to the Phillips curve, in addition to the impact of historical inflation ($\hat{\pi}_{t-1}$) and inflation expectations ($E_t \hat{\pi}_{t+1}$), current inflation ($\hat{\pi}_t$) is also affected by the total population (affecting wage levels \hat{w}_t and return on capital r_t^k), population structure (\hat{n}_t^y) and labour productivity (\hat{a}_t).

The quantity, structure and quality of the population have varying degrees of influence on inflation. Through the analysis of the theoretical model, it is found that the quantity, structure and quality of the population could impact inflation through multiple channels. In terms of aggregate demand, a shrinking labour force will increase the demand for labour and raise wages, thus raising prices. The aging population leads to a decrease in household utility, an increase in marginal costs and an increase in prices. At the same time, higher labour productivity will reduce marginal costs, easing inflationary pressures from a shrinking workforce and an aging population. In terms of aggregate supply, both a declining labour force and an aging population will reduce aggregate output, thereby reducing the return on capital and lowering the price level. At the same time, higher labour productivity will raise output and the return on capital, easing market downturns and lowering inflation caused by the labour force shrinking and the aging population.

The low inflation caused by demographic factors has attracted wide attention from scholars. In recent years, the global economy has entered a new normal of low growth, low inflation and low interest rates. In the context of sustained low inflation in the world, the decline in the labour force and the aging population may bring about low inflation, which has attracted wide attention from scholars. For example, using the IMF's GIMF model, Anderson et al (2014) found that aging may reduce inflation. Yoon et al (2014), based on data from 30 OECD economies from 1960 to 2013, found that an increase in the share of senior people (over 65 years of age) was highly correlated with low inflation. Some scholars also believe that the influence of age structure on inflation is complex. For example, Aksoy et al (2015), Goodhart and Pradhan (2017), and Juselius and Takáts (2018) concluded that an

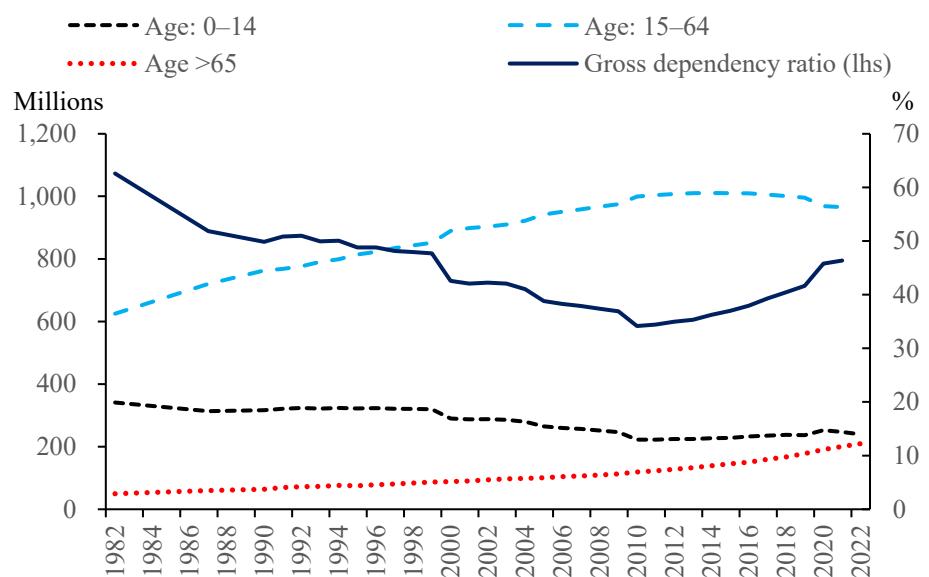
increase in the number of young and old people will raise the level of inflation, while a decrease in the working age population will lower the level of inflation. Accordingly, an aging population alone cannot explain low inflation, which is also influenced by a shrinking working age population.

4.2 China case: population affects inflation via output

Since 2010, China has gradually moved from the “demographic dividend” to a period of aging and negative population growth. In the early period of reform and opening up, the “demographic dividend” is one of the important driving forces of China’s rapid economic growth. It is found (Graph 9) that during the period 1982–2010, China’s working age population aged 15–64 grew at an average annual rate of 1.7%, while the growth rate of the non-working age population was –0.5%, which resulted in a significant decrease in the population dependency ratio (the ratio of the non-working age population to the working age population), and China was in the period of “demographic dividend”. The population dependency ratio entered an inflection point in 2010, and the demographic dividend gradually disappeared. On the one hand, the growth rate of the working age population (aged 15–64) declined, reached its peak in 2013, and turned negative, with an average growth rate of –0.3 during the period 2010–22. On the other hand, there is a significant aging trend, with the population aged 65 and above increasing rapidly, with an average growth rate of 4.8% from 2010 to 2022. In 2022, China’s total population recorded negative growth for the first time in 61 years.

Demographic changes in China

Graph 9



Source: China National Bureau of Statistics.

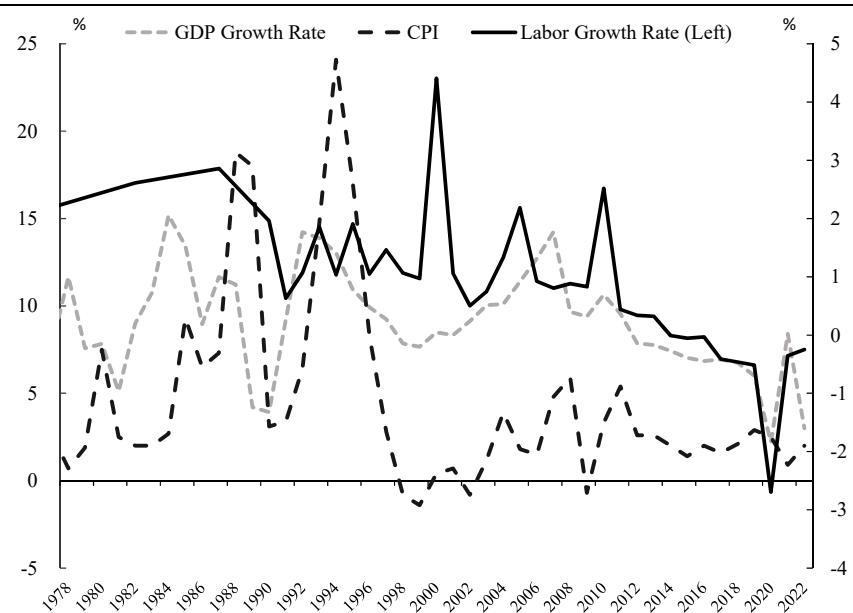
The population has some effect on inflation but the relationship is not significant, it is more closely related to output. Observing the changes in labour growth, output growth and inflation after 1990 (Graph 10), it is found that there is a

significant correlation between labour growth and output (correlation coefficient is 0.494, p-value = 0.004), while there is no significant correlation between labour growth and inflation (correlation coefficient is 0.174, p-value = 0.332). There is a significant relationship between inflation and output (correlation coefficient is 0.472, p-value = 0.006). Especially after 2010, the growth rate of the labour force has a closer relationship with output (correlation coefficient is 0.813, p-value = 0.001), while the growth rate of the labour force is still not close to inflation (correlation coefficient is 0.298, p-value = 0.323).

Controlling for output, there is no correlation between population and inflation. If output is controlled for, the partial correlation coefficient between labour growth and inflation is close to zero (partial correlation coefficient = -0.077, p-value = 0.677). This shows that inflation is mainly influenced by output, and the population influences inflation by affecting the output. This result is different from the empirical studies in developed economies, partly because the economic system and structure in China have changed significantly in the process of reform and opening up. The standard economic model is not necessarily applicable to our situation, so analysing and predicting the inflation level of China with the traditional empirical method may be inaccurate. For example, the shape of China's Phillips curve is not robust (Zheng (2010)), and the assumption of constant returns to scale of the production function is difficult to establish in China (Li et al (2021)).

Demographics, inflation and growth in China

Graph 10



Source: China National Bureau of Statistics, UN World Population Prospects 2022

4.3 The negative impact of a shrinking labour force on China's economy is limited

In the early stage of reform and opening up, the "demographic dividend" promoted economic growth. After the reform and opening up, China's economy has developed rapidly in terms of size and quality, and the "demographic dividend" is one of the important driving forces for rapid economic growth (Wang and Mason (2008)). Calculations show that the contribution rate of a "demographic dividend" to China's economic growth from 1982 to 2000 was 26.8% (Cai and Wang (2005)). According to the growth accounting results of the Conference Board's Total Economy Database⁸ (abbreviated as TED), from 1990 to 2000, the total labour force contributed 12.5% to economic growth, driving up output by 0.9 percentage points. From 2001 to 2010, the contribution of the total labour force to economic growth had dropped to 6.1%, driving up output by 0.6% (Graph 11).

With the disappearance of the "demographic dividend", China's economy has shifted to medium-high growth. With the gradual disappearance of the "demographic dividend" around 2010, China's economic growth has shown a trend decline. Since 2012, China's economy has gradually shifted to a stage of high-quality development characterised by medium-high growth. Population size and age structure are the key variables affecting the output (Lu and Cai (2014); Bai and Zhang (2017)). According to TED's calculation, the total labour force contributed -8.6% to economic growth from 2011 to 2022, driving down output by 0.3%.

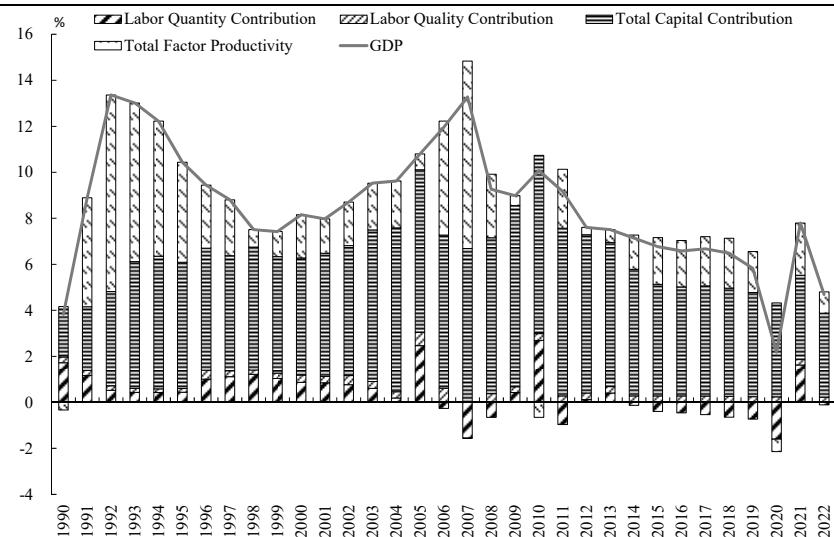
The negative impact of a shrinking labour force on China's economy is limited. According to the endogenous growth theory, the output can be decomposed into four factors: quantity of labour force, quality of labour force, capital and technological progress. The quantity of the labour force has a limited impact on the economy. On the one hand, the contribution of labour quality to the economy has gradually increased in recent years. While the labour force is shrinking, labour force quality, such as education level, has gradually improved in recent years. According to TED's estimates, the contribution rate of labour quality to economic growth was 2.8% from 1990 to 2000, 3.4% from 2001 to 2010 and 4.5% from 2011 to 2022. China's economy, on the other hand, is more influenced by capital factors.

According to TED's calculation, since 1990, China's average economic growth rate has been 8.5%, in which the contribution rate of labour (including quantity and quality) factors is 7.5%, the capital factor is 63.9% and technological progress is 28.6%. It can be seen that compared with the labour factor, the capital factor has a greater impact on China's economy. In 2022, China entered a period of negative population growth. However, it is necessary to see that the improvement in labour quality and the increase of capital input support economic growth to a large extent, and the negative impact of labour force reduction on the economy is limited.

⁸ Available at <https://www.conference-board.org/data/economy%20database/>

Demographic contribution to output in China

Graph 11



Source: China National Bureau of Statistics. UN World Population Prospects 2022

5. Conclusion

Changes in China's labour market have a limited short-run impact on inflation, but an obvious long-run effect. In the short run, China's economy is expected to pick up in 2023 and inflation will remain moderate. The high-frequency data show that the epidemic has not exerted a structural impact on China's labour market, the employment pattern has not changed greatly, and wages and employment have not become the main factors affecting the change of inflation. In the medium term, the trend and short-run changes in labour transfer in China are significantly related to the fluctuations of macroeconomic cycles. Due to a large number of labour transfers between urban and rural areas, among industries, and among regions, the relationship between China's inflation, economic growth and the urban unemployment rate is not stable, which directly results in a small impact of the labour market on inflation. In the long run, the impact of changes in the labour market on inflation will gradually increase as both the total population and the working age population experience negative growth and urbanisation slows.

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The labour market in Colombia: trends, cyclical patterns and the role of wages in the recent inflationary surge

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In this note we discuss some structural aspects of the Colombian labour market and its condition in the aftermath of the pandemic. We also describe the wage-setting process in Colombia, highlighting the long-run relationship between wages, prices and labour productivity. We divide this note into four sections. The first one describes the long-run trends and the cyclical properties of key labour market indicators. We also survey the main impacts of the Covid-19 pandemic on the Colombian labour market, as documented in the literature. The second section focuses on wages and their role in the recent inflationary escalation. We describe the main drivers of inflation in the wake of the pandemic, some features of the wage-setting process in Colombia, and the long-run relationship between wages, prices and labour productivity. The latter exercise provides a measure of inflationary pressure from the labour market in the short run. Given the prominent role of the legal minimum wage (MW) in the wage-setting process, the third section summarises the main findings of a comprehensive study on the impacts of the MW in Colombia, recently published by the Central Bank of Colombia. Finally, the fourth section concludes.

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1. The labour market in Colombia

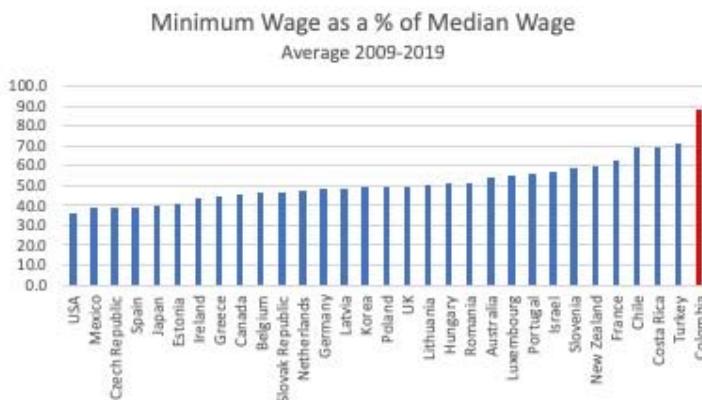
In this section we describe some features of the labour market in Colombia and provide an overview of its evolution during the Covid-19 pandemic. We first summarise the long-run trends of key labour market indicators. Next, we characterise the properties of those indicators in relation to the business cycle. Finally, we survey the main mechanisms of adjustment of the Colombian labour market during the pandemic, according to the recent literature.

1.1 Labour market trends before the pandemic

As in other developing countries, the labour market in Colombia is characterised by a high incidence of informal labour relationships, defined as those performed outside the scope of domestic regulation. Just before the pandemic broke out, informal workers accounted for almost half of the labour force.² Among the reasons for this informality is a relatively high MW coupled with high hiring/firing costs and payroll surcharges (Arango and Florez (2020a)). The MW as a percentage of the median wage in Colombia was the highest in a sample of OECD advanced and emerging economies in 2021 (Graph 1), while non-wage labour cost surcharges represent 50% of wages (Graph 2).

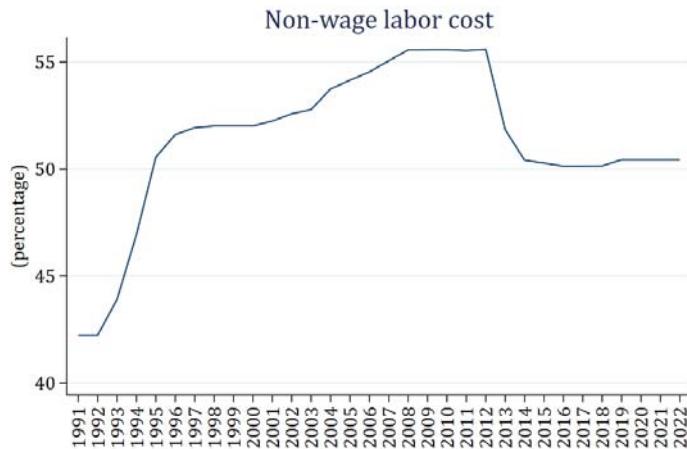
Minimum Wage as a % of Median Wage

Graph 1



Sources: OECD.stat; authors' calculations.

² Here, we use a definition of informality that categorises workers as informal if they are either salaried employees working in firms with fewer than five employees or self-employed individuals without higher educational qualifications. This was the prevailing official definition before the pandemic. More recently, the definition of informality has evolved to encompass additional criteria such as whether firms are registered with the Chamber of Commerce. However, during the period in which both definitions overlap, the two definitions result in data that show very similar levels of informal work.



Non-wage labour costs are defined as the expenses that employers must bear in addition to an employee's salary or wages. In Colombia, it includes employers' contributions to social security (health insurance, pension and occupational hazards), payroll taxes (including payments to Family Welfare Funds (Cajas de Compensación) and different public agencies – SENA, ICBF – depending on the year, severance payments and paid leave).

Sources: DANE; authors' calculations

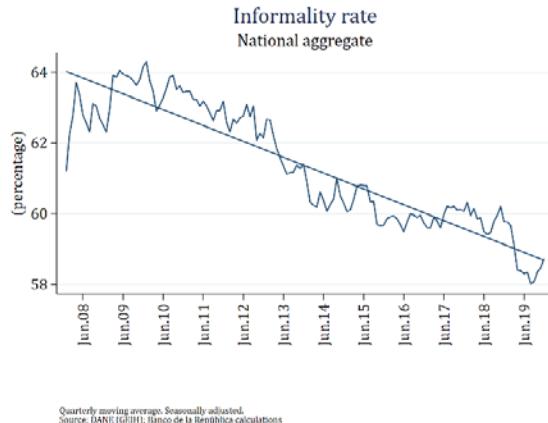
Nevertheless, in the decade before the Covid-19 crisis, the Colombian labour market showed an increasing trend in favour of salaried employment, resulting in a trend of decreasing informality. The ratio of salaried workers to working age population increased by 3 percentage points until 2016, while the informal working rate dropped 5 percentage points from 2009 to 2019 (Graphs 3 and 4). The drop in informal working resulted in an improvement in the average quality of jobs in the Colombian economy. Rising labour productivity, supported by physical and human capital accumulation in a period of high commodity prices and an improved business investment climate (tax incentives and better security conditions), seem to be at the root of this trend (Graphs 5 and 6).³ The increased demand for labour resulted in a declining share of workers whose earnings are less than the minimum wage between 2010 and 2017 (Graph 7).

³ In Appendix A we show, through the lens of a stylized model of a segmented labour market with a binding minimum wage, how increases in formal labour productivity growth, which may be associated with expanding human or physical capital, unambiguously decrease the informality rate. However, their effects on unemployment are ambiguous (please refer to footnote 6 for a detailed explanation of the effects on unemployment) and depend non-linearly upon the level of the MW relative to the unconstrained market wage.

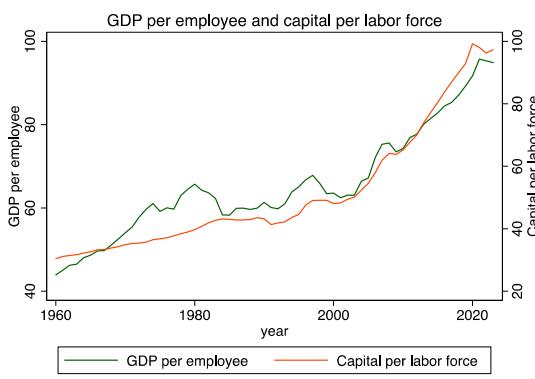
Graph 3



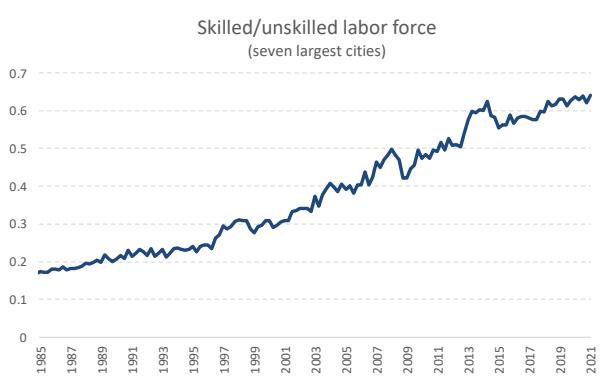
Graph 4

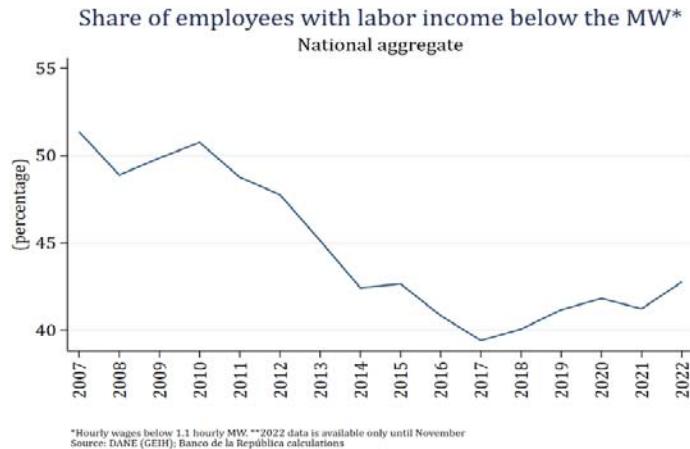


Graph 5



Graph 6



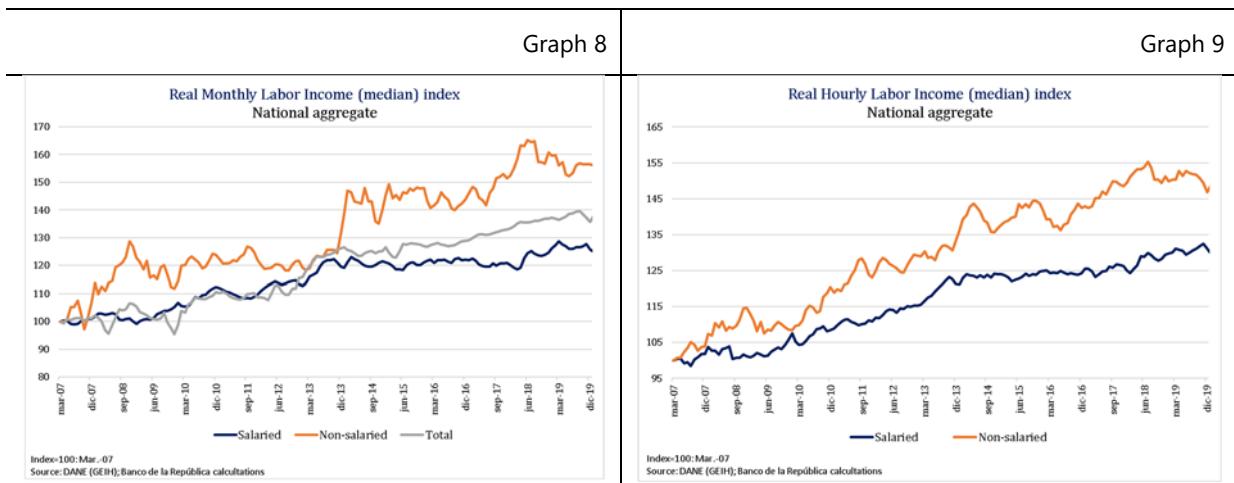


Moreover, there is also ample evidence that the formalisation process has been bolstered by multiple reforms reducing payroll taxes. One such reform, that has been extensively documented, is a reduction in payroll taxes by 13.5 percentage points in 2013, which explains the large drop in non-wage costs shown in Graph 2. Several studies have found that this reform increased formal employment and reduced the rate of informal working. The magnitude of the fall in the rate of informal working varies between 2.3 and 3.6% depending on the study (see Fernández and Villar (2017); Morales and Medina (2017); Osorio (2016)).⁴

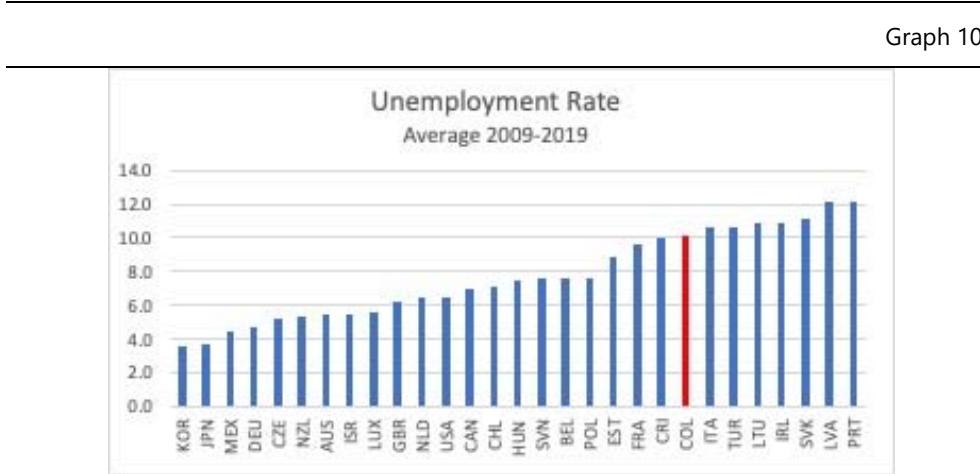
Worker earning dynamics are consistent with the above-mentioned trend of formalisation. As the share of employees with labour incomes below the MW decreased (Graph 7), non-salaried workers' unit labour income rose faster than wages, an indication of increasing absorption of workers by the formal sector. We focus here on the trends of median wages for the salaried segment and median labour income for informal workers. Graph 8 shows their evolution in real terms before the pandemic.⁵ The accumulated growth rate of median monthly income between 2007 and 2019 was 27% for salaried workers and 55% for non-salaried ones. The heterogeneous behaviour of earnings is more noticeable since 2013, and it is present even when accounting for differences in the median worked hours (Graph 9).

⁴ The latter studies complement Kugler and Kugler (2009), who evaluate how the rise in payroll tax rates over the 1980s and 1990s affected the labour market. Their study finds that a 10% increase in payroll taxes lowered formal employment by between 4 and 5%.

⁵ The graph shows their indices. Of course, there is a significant income premium between the formal and informal sectors that is present even when controlling for the composition of the workforce. For example, in a Mincerian regression controlling for the usual workers' observable characteristics (such as gender, work experience, years of education and location), the premium for working in the formal sector is around 0.33 logarithm points (or 39%) on average in the period 2009–19; while controlling in addition for the composition of the workforce across industries or occupations, the within-industry premium is around 0.27 logarithm points (31%).



An additional structural feature of the Colombian labour market is a persistently high unemployment rate. The average unemployment rate since the 1980s has been 10.7% nationally (10.4% excluding the pandemic) and 12.1% in urban areas (11.8% excluding the pandemic). During the last three decades, the unemployment rate has fluctuated over the business cycle, but its levels have never dropped below 8%. These levels are high relative to those of other advanced and emerging economies (Graph 10), a feature that is also consistent with the combination of a relatively high MW and large payroll surcharges in the formal sector (Arango and Florez (2020b); Arango et al (2022)).⁶

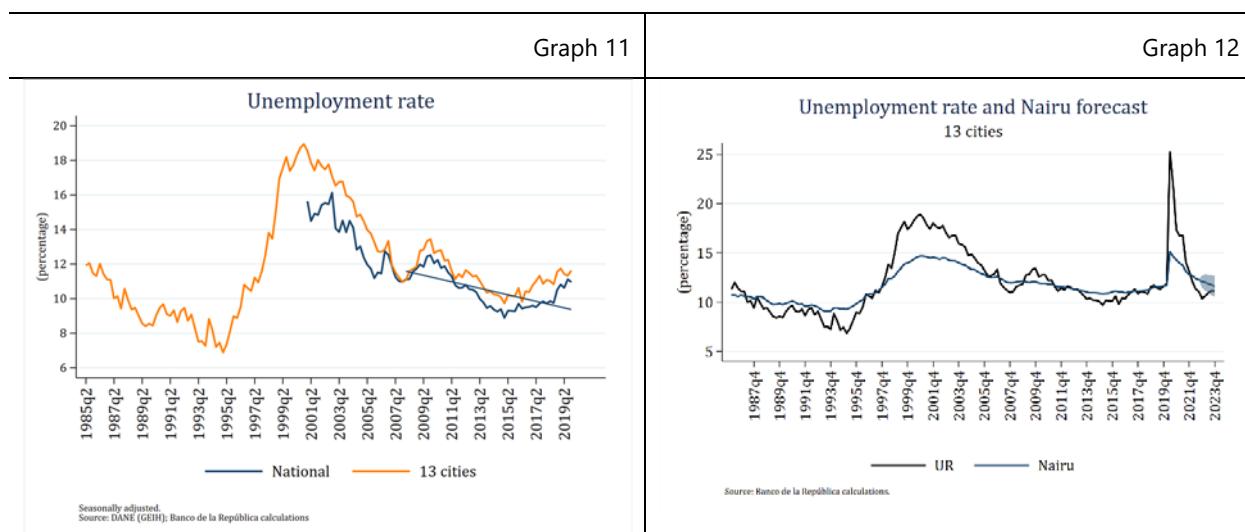


Source: OECD data; authors' calculations.

⁶ According to Arango and Florez (2020b) and Arango et al (2022, p 16), there is a negative effect of the MW on structural unemployment. However, this effect seems to have decreased recently, while other studies reported by Arango et al (2022) do not find a statistically significant response of structural unemployment to the MW. A stylized model shown in Appendix A illustrates how increases in the MW reduce formality but have ambiguous effects on unemployment. This happens because a MW rise has two opposing impacts. On the one hand, it lowers *formal* labor demand and employment (increasing unemployment). On the other hand, decreasing formal employment reduces the perceived probability of getting a formal job and, thereby, diminishes the households' incentives to supply labour in the formal market (reducing unemployment). For the same reasons, formal labour productivity growth associated with expanding human or physical capital decreases informality but has ambiguous effects on unemployment.

The unemployment rate rose sharply in the 1990s along with a hike in hiring costs (Graph 2) and the severe recession and financial crisis that the country went through at the end of the decade (Graph 11). It then came down, as the economy recovered from the crisis and a period of rapid physical and human capital accumulation took place. As in the case of the rate of informal working, the reduction of the payroll burden may have also contributed to the downward trend of unemployment until 2015. Unemployment increased after the pronounced drop in oil prices, a deterioration in the terms of trade of the country during the period 2014–16 and an ensuing slowdown of the economy.

The incidence of unemployment is higher among women, young workers, less educated individuals and household members other than those who receive the primary income. Further, persistently high unemployment levels, even during periods of economic expansion, imply that structural unemployment rates usually remain at high levels. For instance, different models to compute the non-accelerating unemployment rate (NAIRU), estimated by central bank staff, show a NAIRU that has fluctuated between 10 and 15% during the last 30 years (Graph 12).



Finally, one of the main factors that has shaped recent labour market trends in Colombia is the massive immigration from Venezuela that started in 2015 due to the neighbouring country's economic crisis. Before the migration wave, immigrants from Venezuela as a share of the working age population in Colombia were roughly 0.2%, and this share rose to 7% by 2022. Given the demographic profile of immigrants – mainly working age people – the massive inflow of migrants helped to slow down the population aging process in Colombia. Further, the migratory wave, particularly since 2018, modified the decreasing trend in population growth due to a secular drop in the birth rate. Interestingly, these immigration flows were not reflected in rising rates of informal working between 2007 and 2019 (Graph 4). Several studies on the impact of migration from Venezuela on the Colombian labour market show relatively minor displacement effects in terms of employment for native workers, and adverse hourly wage effects concentrated on the less educated (see Tribin et al (2020) and Lebow (2022) for comprehensive discussions). In addition, it is also documented that Venezuelan immigrants face more frictions in the labour market, producing a greater misallocation of this workforce across occupations (Pulido and Varón (2020)). It is

estimated that by removing the additional frictions that immigrants face, Colombian aggregate labour productivity could permanently increase by up to 0.4%.

1.2 The cyclical behaviour of the labour market

We now focus on the cyclical properties of the key market labour variables – occupation, participation, unemployment and informal working rates,⁷ and median labour income of both the salaried and non-salaried segments. We extract the cyclical components of the quarterly series of these indicators for the period 1984–2023 using standard Hodrick-Prescott filters. Next, we compute the cross-correlogram of each series with respect to the cyclical component of the GDP. Table 1 shows the value of the highest correlation (in absolute values) found, its sign and the number of quarters that each series leads or lags the cyclical component of GDP. The full correlation matrix is shown in Table A1 in Appendix B.

Table 1

Order	Variable	Maximum correlation	Sign	Order of lag (–) or lead (+)
1	Unemployment rate	0.85***	–	0
2	Employment rate	0.73***	+	0
3	Non-salaried labour income (median)	0.58***	+	1
4	Informal working rate (as non-salaried share)	0.36***	–	1
5	Labour force participation rate	0.31***	+	0
6	Salaried wage (median)	0.25***	+	–1

Significance levels: *** p<0.01, ** p<0.05, * p<0.10.

As expected, the most synchronised labour indicator with the business cycle is the unemployment rate (maximum correlation of 0.85, significant at a 99% confidence level). The unemployment rate is countercyclical and contemporaneous to the GDP at the quarterly frequency, in contrast to the usual view that depicts unemployment responding to economic activity with a lag. Graph A1 in Appendix A shows the levels of the unemployment rate and marks recession periods identified by a standard chronology of the business cycle in Colombia (Alfonso et al (2013)).⁸ Unemployment increases in all contractionary periods of the Colombian economy and its turning points are quite concordant with those suggested by the business cycle chronology.

The employment rate is the second most synchronised indicator with the business cycle (maximum correlation of 0.73, significant at a 99% confidence level). As expected, this rate is procyclical and contemporaneous. Graph A1 shows that the employment rate always decreases in identified recessions, but there are also periods in which it falls even when the economy is expanding (for instance, during the period

⁷ Given the unavailability of a long series of informality rates, we approach this indicator with the share of non-salaried workers in the total number of employees. Further, only urban series are considered.

⁸ We have updated the chronology to include the economic contraction induced by the Covid-19 pandemic.

2015–18). Regarding the formal/informal segmentation of employment, the share of informal workers is, as expected, countercyclical. The rate of informal working has a maximum correlation that is low (-0.36), although statistically significant, and responds with a one quarter lag. Graph A1 shows that recessions usually trigger increases in the rate of informal working, but the persistence of this rise is variable across the different contractionary periods.

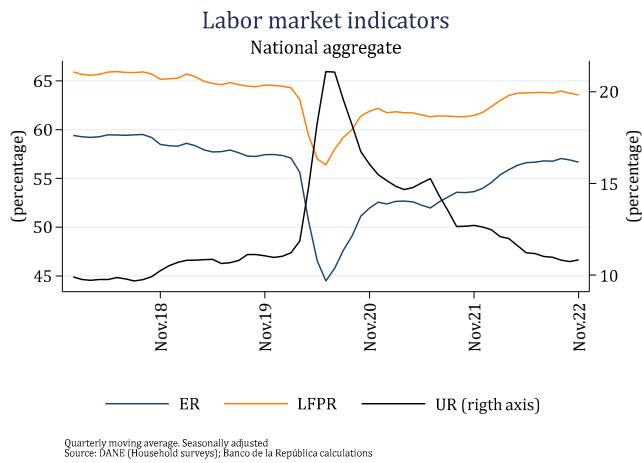
With respect to labour income, wages in the salaried segment are almost acyclical, with the maximum correlation at barely 0.25 (but statistically significant), leading the GDP by one quarter. As discussed in Section 2, this is the result of a significant degree of stickiness of formal wages in Colombia, given that their adjustments occur regularly (usually once a year) and are downwardly rigid (firms usually do not make wage cuts). By contrast, the labour income in the non-salaried segment is procyclical (maximum correlation of 0.58, significant at a 99% confidence level) but lagged one quarter relative to economic activity. This points towards greater flexibility in the informal labour market than in the formal one.

Finally, regarding labour participation, it has a maximum correlation of only 0.31; that is contemporaneous and statistically significant. The fact that this indicator has a low degree of procyclicality is not at odds with economic theory, which predicts that two opposite forces influence participation decisions over the business cycle: in recessions, current jobseekers are discouraged, but, at the same time, additional members of a household enter the job market to compensate for the income losses of a family's primary earner. Therefore, it seems that there is no clear force dominating the other, and the movements of the participation rate respond more to structural factors (demographic change, the entry of women into the labour force etc).

1.3 The labour market in the wake of the pandemic

In March 2020, as in many other countries, the Colombian government declared the Covid-19 pandemic a public health emergency and imposed a national lockdown that excluded some essential economic activities. This had abrupt, substantial short-term impacts on the labour market. The employment rate (ER) contracted by approximately 12 percentage points between February and May 2020, while the labour force participation rate (LFPR) decreased from 63.1% to 55.4% (Graph 13). Moreover, despite the significant contraction in labour supply, unemployment peaked at 20.6% in May 2020. After May 2020, the labour market began to gradually recover, albeit at a slower rate than the recovery of economic activity. It was not until the end of 2022 that key labour market indicators exhibited levels comparable to those observed before the onset of the pandemic.

Graph 13



The sectoral restrictions imposed by the national government between March and August 2020 partly explain the sudden labour market deterioration. Taking advantage of sectoral variation implied by the sectors excluded from the restrictions, Morales et al (2022a) estimate that the effect of the sectoral restrictions on employment accounted for approximately a quarter of job losses. Other aggregate factors explain the rest of the fall, such as the general lockdown or the contraction of aggregate demand. Moreover, it is also documented that in the short term, the most significant job losses occurred in small- and medium-sized companies belonging to sectors with fewer teleworking possibilities and more physical proximity between workers (Central Bank of Colombia (2020); Morales et al (2022b)). Likewise, firm-level estimates based on administrative records show that the pandemic led to the exit of numerous small- and medium-sized firms. While there were few bankruptcies among large companies, significant payroll cuts were observed in this segment. These staff cuts were substantial in companies with lower productivity, liquidity and profit margins before the pandemic (Central Bank of Colombia (2021c)).

On the labour supply side, the drop in labour participation was considerably more prominent for women and low-skilled workers. Remarkably, the differential effect on women was mainly driven by those belonging to households with children (Central Bank of Colombia (2021a)). The latter findings reflect that women were particularly affected by the school closures, which were considerably prolonged in Colombia. With the reopening of schools by the beginning of 2022, the labour force participation rate significantly recovered. However, even in 2022, there was still a non-negligible difference in participation by gender relative to the pre-pandemic period. The gender gap in participation at the end of 2022 was around 0.8 percentage points higher than before the pandemic.

Interestingly, the rate of informal working did not significantly increase during the pandemic (Graph A1 in Appendix B), in contrast with the empirical regularity reported previously regarding its countercyclical nature. This could be the result of mobility restrictions and social distancing measures, adopted to prevent contagion, that discouraged informal activities that tend to be contact-intensive. Afterwards, the

strong recovery of the economy pushed formal labour demand up and reinforced the declining trend of the informal working rate.

Another effect of the pandemic that has been documented by the literature is the differential behaviour of labour demand across occupations. For example, once the lockdowns were eased, it was observed that there was faster growth in vacancies for occupations with high skills and low potential for automation – such as professional and technical workers – compared with those that are more prone to automation – such as elementary occupations, clerical support and sales work, among others (Bonilla et al (2022)). This could be a structural shift in labour demand in a country with high levels of informal work and unemployment, and could imply the rise of structural mismatches between current workers' skills and those required by the labour market, with potential effects on long-term informal work and unemployment rates, and the location of the Beveridge curve (Central Bank of Colombia (2021b)).

Finally, there is evidence that policy measures designed to reduce job losses and compensate for income reductions due to the pandemic had mixed impacts on labour market outcomes. On the supply side, the government notably increased the coverage and number of direct subsidies granted to the most vulnerable households: subsidies grew from 0.3% of GDP in 2019 to 1.3% in 2021. The available literature found that there were no persistent changes in labour participation in the groups most likely to receive additional subsidies during the pandemic (Central Bank of Colombia (2022); Gallego et al (2021)) and that there were positive (albeit modest) effects on measures of households' well-being, such as access to food or financial inclusion (Londoño-Vélez and Querubín (2022); Gallego et al (2021)). On the demand side, the government introduced a programme for employment protection including a number of payroll subsidies to the most affected firms during the pandemic. Recent impact assessments show positive, sizable and persistent effects among firms eligible for the subsidy (Central Bank of Colombia (2023)). The average effect for eligible firms was an increase in employment of 4 percentage points compared with non-eligible firms.⁹

2. The contribution of wages in the recent inflationary surge

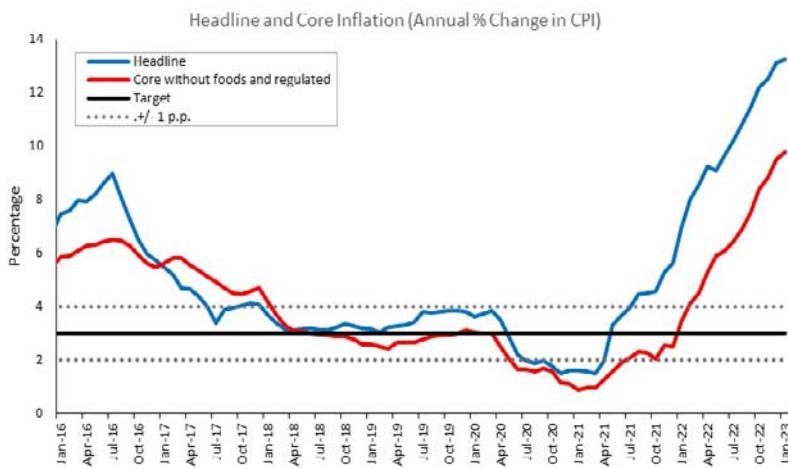
In this section, we focus on the wage-setting process in Colombia and the role of wages in the recent inflationary escalation. We first summarise the main drivers of inflation in the aftermath of the pandemic. Next, we describe the major features of the wage-setting process in Colombia, highlighting the critical incidence of the MW both in the distribution of wages and in its annual adjustments. Finally, we estimate the long-run relationship between wages, prices and productivity. This exercise allows us to gauge the current and prospective inflationary pressures stemming from the labour market.

⁹ To achieve this impact, the policy cost COP 715 billion, equivalent to 0.1% of the GDP.

2.1 Main drivers of the current inflation escalation

Inflation in Colombia fell below the 3% target during the pandemic in 2020 and 2021, and it bottomed out at 1.51% in March 2021, its second lowest level in history. In the second quarter of 2021, inflation started to increase and in January 2023 both headline and core inflation reached their highest points (13.1% and 9.8%, respectively) since 1999, and, unlike in other countries, they have not peaked (Graph 14).

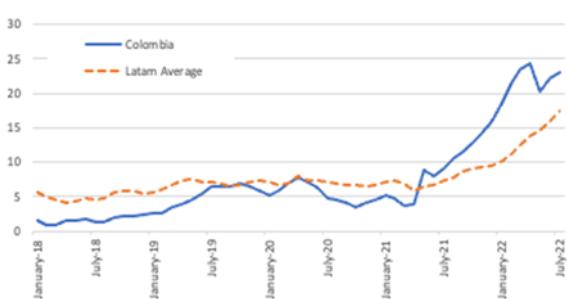
Graph 14



There are multiple factors and shocks that explain the behaviour of inflation. First, several relief measures during the pandemic were implemented through prices. These measures included temporary reductions in the price of public utilities, persistent decreases in the price of fuels, and the temporary elimination of VAT and consumption taxes on mobile telephone plans, hygiene products, restaurants and hotels. The timing of the reversion of these measures has been spread over time and continues to affect measured inflation as price levels recover. Second, the increase in inflation has been led by food and goods prices. On the one hand, food prices started increasing sharply in May 2021, as road blockades, amid two months of social unrest and protests, affected the production cycle and the productive capacity of several products. A year later, food inflation in Colombia was higher than in most countries in Latin America, with the blockades explaining approximately 9 percentage points of the difference (Graph 15). This shock was followed by other negative supply shocks, including the Russian invasion of Ukraine that affected input prices (eg fertilisers) and excess rain over the last two years, as well as a sustained local currency depreciation that mainly affects processed foods. With all this, food inflation was at 28% at the end of 2022. In the case of goods, initially the supply chain disruptions that affected production and trade globally were behind the surge. Cost increases have been widespread (Graph 16) and have been passed through to prices (Graph 17). More recently, the sustained and relatively high depreciation of the currency (Graphs 18 and 19) has also been passed through to goods and food prices, which have continued to rise despite the fall in transport and logistics costs, and the reduction in the growth of these prices globally.

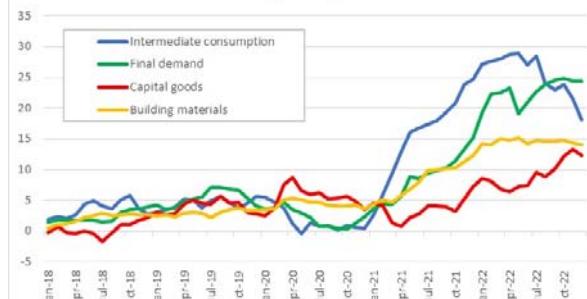
Graph 15

Food Inflation: Colombia vs Latin American Average (Percent)



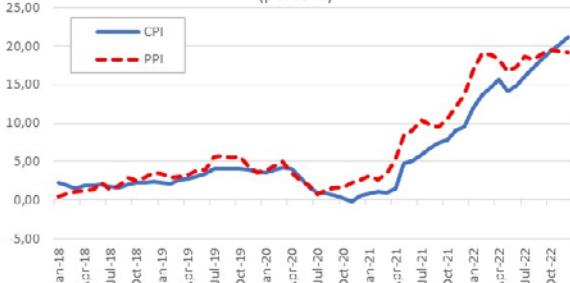
Graph 16

Annual Variation in PPI by Category of Goods (percent)



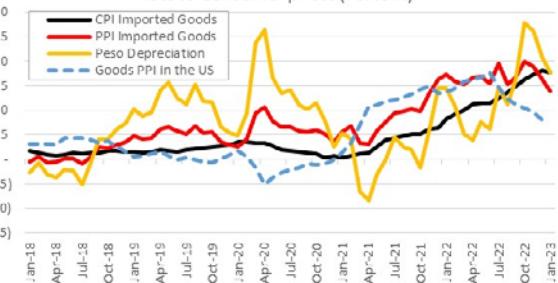
Graph 17

PPI and CPI Inflation - Homogeneous Baskets (percent)



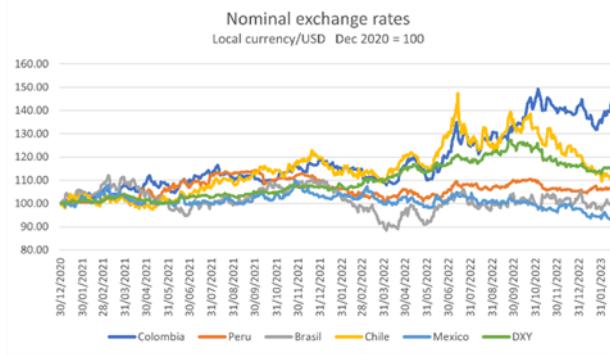
Graph 18

Goods: Pass-through From Global Prices and Exchange Rate to Consumer prices (Percent)

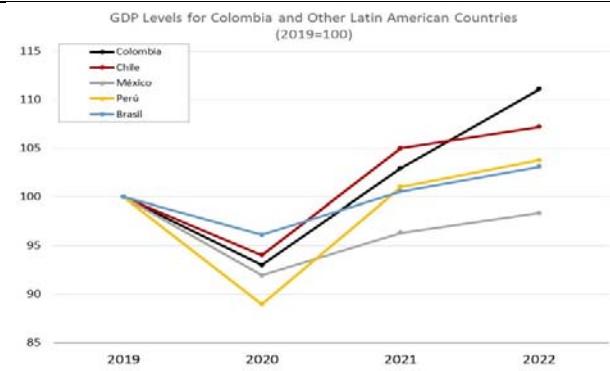


Demand factors have also played a role. The recovery of the Colombian economy after the pandemic has been remarkable (Graph 20) with GDP reaching levels above pre-pandemic trends, led by private consumption (Graph 21) supported by a fall in savings, credit growth and the recovery of the labour market, but also against the backdrop of sustained fiscal deficits (7.2% of GDP in 2020, 7.1% in 2021 and 6.4% in 2022).

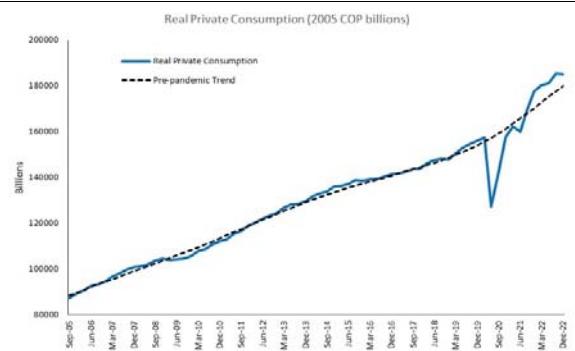
Graph 19



Graph 20

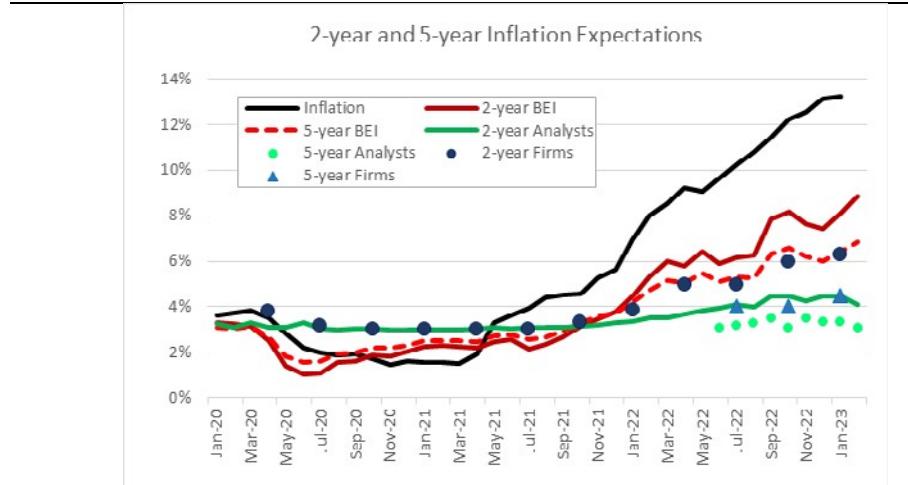


Graph 21



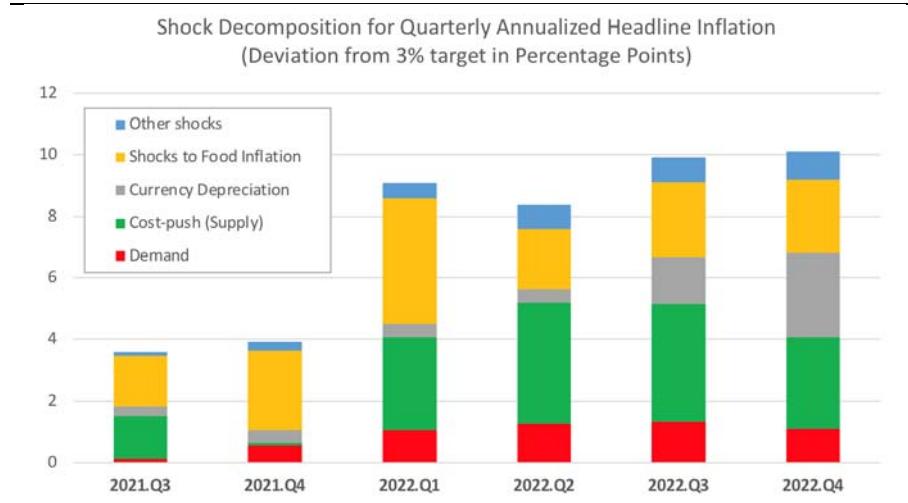
More recently, two additional factors have been playing a role in inflation dynamics – imprinting persistence in inflation and potentially making the disinflationary process longer and more costly. First, as price increases well above the inflation target have become widespread, inflation expectations have risen (Graph 22), with all expectation measures lying well above target at all horizons. This may be underlying generalised and relatively large price increases. Second, as inflation has risen, indexation mechanisms are playing a greater role and the risk of a higher degree of indexation in the economy has become more prominent. These indexation mechanisms affect some important prices, such as those of public utilities and rents, and even the MW, as will be explained below.

Graph 22



All the factors mentioned above have been important in terms of the behaviour of inflation. Using a semi-structural model for monetary policy, we decompose inflation to gauge the contribution of different shocks to inflation (Graph 23). Cost-push shocks, that were the main driver of inflation at the end of 2021 and in the first half of 2022 they have started to vanish. Nevertheless, as of the end of 2022 they still accounted for approximately 30% of inflation. Shocks to food prices that at the beginning of 2022 accounted for approximately half of inflation now account for approximately 25%, whereas shocks that affected the exchange rate contributed little at the beginning of 2022, but now account for approximately 30%. Finally, aggregate demand shocks contribute approximately 10% of inflation, and gained in importance in absolute terms as 2022 progressed. A similar picture emerges from the shock decomposition of core inflation, but with a greater contribution from aggregate demand shocks, which explain 15% of the surge, and a greater contribution (40%) from the depreciation of the Colombian peso (see Graph A2 in Appendix B).

Graph 23



2.2 The wage-setting process in Colombia

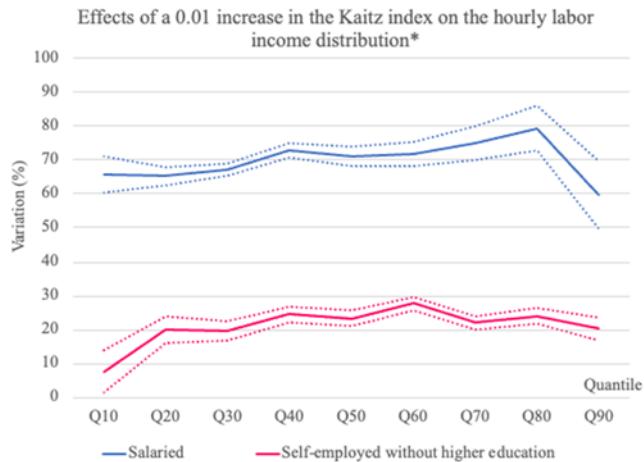
One of the main features of the wage-setting process in Colombia is the critical influence that the mandatory legal MW has both on the observed distribution of wages and on the adjustments of other wages and prices (indexation mechanism). As mentioned above, the ratio of the MW to the median wage in Colombia is high compared with other advanced and emerging economies (Graph 1). The current pervasiveness of the MW in the distribution of wages in Colombia is the result of initially high values and the accumulation of significant positive annual real increases experienced in the last two decades. Graph 24 shows two real MW indices from 2005 to 2023. The MW deflated by the CPI grew by approximately 27.4% between June 2005 and June 2022; using the implicit GDP deflator this is 16.5%. These dynamics are supported by a constitutional court ruling that prevents MW annual increases from being lower than past CPI inflation. It is worth noting that in the aftermath of the pandemic, real minimum wage growth rate reached its highest level of 4.5% and 2.8% in 2022 and 2023, respectively, when deflated with the CPI. These growth rates have been higher than other measures of labour productivity, possibly contributing to the recent rise in inflation, an issue that we explore below.

Graph 24



The influence of the MW is evident not only in the high share of workers earning it, but also in how MW hikes could affect other salary increases in the market. Rises in the Kaitz index (the ratio of the MW to the 70th percentile of the wage distribution) in Colombian cities were associated with increases in virtually all quantiles of the earnings distribution, controlling for fixed time effects, and individual and city characteristics (see Graph 25, and for more details, Appendix C). Moreover, the impacts of rises in the Kaitz index are substantially stronger in the distribution of the earnings of salaried workers than in the distribution of labour income for the non-salaried segment. These observations suggest a possible impact of the MW in the determination of other salaries in the formal sector.

Graph 25



Graph plots the estimated coefficients of equation (B1) in Appendix C that indicate the percentage increase in the value of the corresponding quantile of hourly labour income due to a 0.01 increase in the Kaitz index. See Appendix C for more details.

Source: Arango et al (2022).

Beyond the critical importance of the MW, the literature has explored some microeconomic features of the wage-setting process in Colombia using different firms' surveys. For example, Iregui et al (2012) document that firms adjust wages less frequently than prices, that time-dependent wage adjustments are more common than time-dependent price changes, and that firms usually do not cut wages (suggesting downward wage rigidity). This latter fact is explained by the observed Colombian practice of adjusting wages in line either with the previous year's inflation rate or with the increase in the MW. This result, coupled with the low frequency of wage changes, provides evidence of noticeable wage stickiness in the formal labour market.

Finally, there is evidence of considerable heterogeneity of the pass-through from wages to prices across industries. Iregui et al (2012) find that, when asked about the importance of past wage increases for price changes, 37% of the firms responded that they were not important at all, whereas 20% considered them to be very important. Part of the variation in the answers is explained by the industry to which the firms belong. Accordingly, although the relationship between wage and price changes does not generally seem to be exceptionally strong, the pass-through of wages to prices is particularly high in some sectors, especially those in which the labour cost share is high.¹⁰ The evidence also indicates that the pass-through is mediated by industry-level dimensions, such as the sectoral aggregate labour productivity (Iregui et al (2012)) or market concentration (Heise et al (2021)).

¹⁰ For example, wage increases are very important in setting prices for around 60% of the firms surveyed in the education and health sectors, and in other services.

2.3 Assessing inflationary pressures from the labour market

In order to gauge current and prospective inflationary pressures stemming from wages, a long-run relationship between prices, wages and labour productivity is estimated for Colombia. More specifically, we aim to answer these questions:

- Are wages significantly above their long-term relationship with productivity and prices, thereby contributing to the observed rise in inflation (eg through increasing unit labour costs or high inflation expectations)?
- Do their expected dynamics imply serious inflationary risks in the future?

A simple framework to address these questions acknowledges that consumer prices in a small open economy are made up of domestic and imported components,¹¹ so that the following relationship is posited:

$$w_t = \beta_0 + \beta_1 p_t + \beta_2 lp_t + \beta_3 p^*_t + \beta_4 e_t + \varepsilon_t \quad (1)$$

In which w_t is nominal wages, p_t is the CPI, lp_t is output per worker, p^*_t is foreign consumption goods prices and e_t is the nominal exchange rate (all in logarithms). We estimate equation (1) using a Johansen cointegration methodology. The estimated Johansen's VEC long-run and short-term error-correction coefficients are presented in Table 2, and the cointegration error is shown in Graph 26.¹² The latter indicates that wages in 2022 were *below* their long-term level, given the values of the other macro variables included in the system. This is consistent with the documented formal wage rigidity in the midst of the inflationary and exchange rate shocks mentioned above. Hence, up until the third quarter of 2022, there is no evidence of wage growth in excess of labour productivity significantly contributing to the sharp increase in inflation.

Table 2

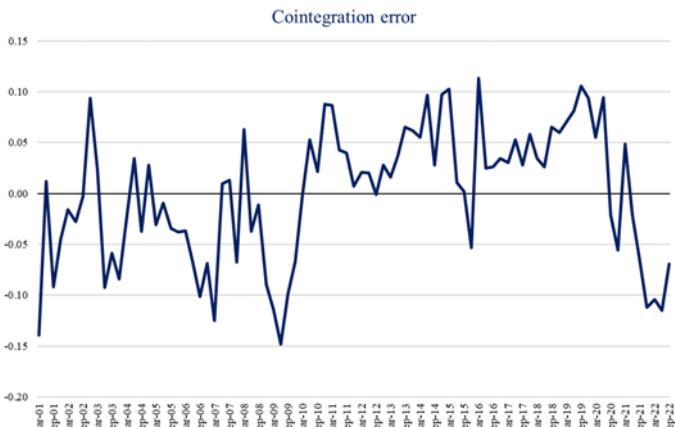
	β LT coefficient	α ST error correction
w	1	-0.39***
p	0.94***	-0.032**
lp	1.36***	0.028
p^*	0.30	-0.027
e	0.09	0.310***

The table shows the estimated coefficients of the cointegrating vector (equation (1)) and the short-term adjustment mechanism of a VECM model with three lags and one cointegrating equation. Significance levels *** p < 0.01, ** p < 0.05, * p < 0.1.

¹¹ Let P be the CPI. Then $P = (P^D)^\alpha (P^M)^{1-\alpha}$ where P^D and P^M are the domestic and imported components of consumer prices, respectively. P^M can be approximated by the product of foreign prices (P^*) and the exchange rate (E): $P^M = P^* E$. Further, P^D is driven by nominal wages (W) and the marginal product of labour (MPL): $P^D = W / MPL$. Therefore, we obtain $P = (W/MPL)^\alpha (P^* E)^{1-\alpha}$ that in logs corresponds to equation (1). The five series (in logs) have unit roots (see Table A2 in Appendix B), so a cointegration relationship is estimated using Johansen's method.

¹² The Johansen trace test, shown in Table A3 in Appendix B, indicates that there is only one cointegration vector for this system in the Q1 2000–Q3 2022 sample.

Graph 26



Source: authors' calculations.

Going forward, however, the evolution of wages does represent a risk for the convergence of inflation towards the 3% target. Starting from levels below their long-term “equilibrium” level, a correction of the current deviation would imply large upward adjustments of wages, *ceteris paribus*. As implied by the significant and relatively large value of the short-term error correction coefficient (α) in Table 2, wages have typically been one of the main ways in which the long-run equilibrium is restored in the estimated system (the other being the exchange rate movements). Indexation of formal wages is a mechanism through which such an adjustment takes place.¹³ Hence, if the inflationary shocks persist for a protracted period, demand pressures remain, or the currency depreciates further, wage increases would likely be large and could delay convergence of inflation to target, requiring a tighter monetary policy stance.¹⁴

3. Macroeconomic effects of the MW

Given the prominent influence that the MW has on the labour market, the observed distribution of wages and on the indexation of other salaries and prices, in what follows we briefly summarise some findings of a comprehensive study on the macroeconomic effects of the MW in Colombia, recently published by the Central Bank of Colombia (Arango et al (2022)). We focus our summary on the effects on three dimensions: inflation, employment (informal work and formal employment) and the adjustment of macroeconomic variables to changes in the MW.

¹³ Suppose, for example, the following “error correction” mechanism for wages: $Dw_t = (p_{t-1} - w_{t-1} - lp)$, with constant labour productivity, lp . Then, $Dw_{t+1} = (p_t - w_t - lp) = (p_{t-1} + Dp_t - w_{t-1} - Dw_t - lp) = Dp_t$, which corresponds to a case of complete backward indexation of wages.

¹⁴ Based on a sample of advanced economies, Alvarez et al. (2022) find that episodes with macro features similar to those of the post-Covid-19 (accelerating inflation, declining real wages and tight labour markets) are followed by nominal wage rises to catch-up with prices, supported by low unemployment.

First, regarding inflation, the study uses different methodologies to assess the impact of MW hikes on prices, exploiting both aggregate and micro-level data. With aggregate data, two methodologies (an IV approach that uses variation over time and an accounting exercise that uses an input-output matrix and the distribution of value added across factors remunerations) find similar results: a rise of 10 percentage points in the MW causes an increase of up to 1.4 percentage points in total CPI inflation and up to 1 percentage point in core inflation. It should be noted, however, that these estimates only cover a period characterised by low inflation (2010–19) and that the input-output analysis finds variable impacts depending on the year evaluated. Regarding the exercise with microdata, the results suggest a considerable heterogeneity of the pass-through of the MW to prices across different price baskets, with food and food away from home showing the greatest transmissions. Excluding regulated goods and services, the median rise in prices following an increase of 10 percentage points in the MW is 1.6 percentage points, a transmission that occurs mainly during the four months after the MW hike.

Regarding employment, the study begins by summarising the literature on the effects of the MW on the informal working rate in Colombia. The tested mechanism in most of those studies is well known: when the rise in the MW is higher than the increase in labour productivity, hiring slows down and job seekers are pushed into the informal sector. This mechanism is particularly relevant in Colombia, where productivity growth is heterogeneous across different regions or labour market segments, but there is a single national MW. For instance, by exploiting regional variation, Arango and Florez (2020a) find that a rise of 10 percentage points in the MW relative to the wage in the 70th percentile of the wage distribution, increases the informal working rate by 1.4 percentage points on average in the main cities. However, there are noticeable heterogeneous effects across cities, with the largest impact for a given city being 6.2 percentage points. Using variation across demographic groups instead, Arango et al (2020) find that the same rise in the relative MW increases the informal working rate by 2.1 percentage points on average. The effect is larger for young, female and less skilled workers. These results confirm the impacts previously estimated in the literature for Colombia, in which rises in the Kaitz index led to higher probabilities of informal working (Mondragón et al (2013); Mora and Muro (2014)).

The study also estimates the impact of the MW on formal employment by considering the effects on formal job creation and destruction separately. The results suggest that a 1% increase in the real MW reduces formal employment by 1%. The drop in formal employment is accounted for by an increase of 44 basis points in formal job destruction and a decrease of 56 basis points in formal job creation. It is worth stating that the destruction of formal employment does not necessarily imply a direct impact on the rate of informal working, since workers could move not only towards the informal sector but also into unemployment or inactivity.

Finally, the study includes an analysis of the adjustments of some macroeconomic variables to unanticipated shocks to the MW through the lenses of two DSGE models. The first model assumes flexible prices, incomplete financial markets and a segmented labour market between the formal and informal sectors. The second model adds price rigidities and a central bank acting to stabilise prices. Regarding the adjustments within the flexible price model, an unanticipated increase of 1% of the MW reduces the share of formal employment by 1% due to the larger

threshold that formal firms face to hire skilled workers. Also, it reduces the capital-labour ratio by 0.78% and aggregate consumption by 0.37%. These effects are due to lower precautionary savings resulting from the insurance provided by the MW, lower savings of workers displaced from formal to informal jobs and a decrease in the marginal product of capital stemming from reduced formal employment. Regarding the adjustments with sticky prices, the same increase in the MW generates a similar recomposition towards informal work and a reduction in GDP, investment and consumption, especially of unskilled workers. The reduction in GDP is more prominent in the short run (0.12%) than in the long run (0.08%) and generates a negative output gap with respect to output under flexible prices. With respect to prices, the cost-push shock induced by the MW hike dominates the impact on the output gap and thus headline inflation rises (8 basis points). Finally, given that the monetary authority reacts to both the output gap and inflation, the calibrated policy rule suggests that the response of monetary policy is mild.

4. Conclusions

This note provides a brief characterisation of the labour market and the connection between wages and prices in Colombia. To accomplish this, we depict the performance of the key labour market indicators, and link this to the main findings of the recent literature on topics such as the impact of the Covid-19 pandemic, the roots of labour informality and the macroeconomic effects of the MW, among others. We document a highly segmented labour market with a significant incidence of informal working and unemployment, although with improvements in both indicators in the decade before the pandemic. Regarding labour income, while we observe procyclical informal labour earnings, salaries in the formal sector are sticky and heavily influenced by the MW. The proportion of the workforce in respect of which the MW is binding in Colombia is high relative to other economies, and there is evidence that increases in the real MW relative to productivity have adverse macroeconomic impacts. The pass-through of wages to prices is not very strong, but there are noticeable heterogeneities in transmission across sectors. Further, based on an estimation of a long-run relationship between aggregate prices, wages and labour productivity, we conclude that, up until the third quarter of 2022, wages were below their "long-term" level, given the shocks to prices and the exchange rate. Thus, wage increases above labour productivity growth were not among the main drivers of the observed inflation escalation. However, their adjustment towards their long-term "equilibrium level" (possibly through indexation) could imply risks for the convergence of inflation to target, especially if inflationary shocks persist, aggregate demand remains strong or the currency depreciates further.

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Appendix A: A stylized model of the labour market under a real minimum wage

Main assumptions:

Consider a closed economy with one good and flexible prices in a static setting. The good is produced by a formal competitive firm that uses a constant returns to scale (CRS) technology that employs formal labour and capital, and is subject to a binding real minimum wage regulation. The good can also be produced with a less productive technology, in which workers use their informal labour input only. The workers earn the totality of the output produced in the informal sector.

The workers are made up by households that do not own capital and decide how much labour to supply in the formal market and how much labour use in the informal production. There are N worker-households of this type. The stock of capital is pre-determined and owned by a capitalist household, who does not work and inelastically supplies capital, earning a competitive rental price.

The assumption of a binding real minimum wage is a reasonable approximation to the MW regulation in Colombia, which establishes that the nominal MW growth cannot be lower than past inflation.

Equilibrium:

The labour supply decision is based on an intra-temporal optimization problem in which households know that, due to the binding real minimum wage, there is unemployment in equilibrium. Thus, they maximize an expected utility function that is computed on the basis of the probability of getting a formal job. The possibility of being unemployed prompts households to allocate time to informal production.

In equilibrium, the rental price of capital clears the capital market, formal labour is determined on the demand side by the binding real MW, formal labour supply may be greater than demand (there may be equilibrium unemployment), informal production is positive and the subjective probability of finding a formal employment coincides with the ratio of formal labour demand to total formal labour supply.

Workers' decision problem:

All households are identical ex-ante. They estimate a subjective probability of formal employment equal to p . They solve the following problem:

$$\text{Max } p U(c_L^f, l^f + l^i) + (1 - p) U(c_L^i, l^f + l^i)$$

$$c_L^f, c_L^i, l^f, l^i$$

Subject to

$$c_L^f = w^{\min} l^f + G(l^i) \quad (\text{A1})$$

$$c_L^i = G(l^i) \quad (\text{A2})$$

l^f , l^i , c_L^f , c_L^i and $G(l^i)$ are formal labour supply, informal labour supply, household consumption when formal, household consumption when informal and the informal production function, respectively. The FONC for this optimization problem imply:

$$w^{min} = -\frac{E[U_L(.)]}{p U_c(c_L^f, l^f + l^i)} \quad (A3)$$

$$G'(l^i) = -\frac{E[U_L(.)]}{E[U_c(.)]} \quad (A4)$$

Formal firm's decision problem:

$$\max F(L^f, K) - w^{min}L^f - rK$$

$$L^f, K$$

$F(.)$, L^f , K and r are the formal firm's technology, demand for labour, demand for capital and the rental price of capital, respectively. FONCs are conventional in this case:

$$F_L(L^f, K) = w^{min} \quad (A5)$$

$$F_K(L^f, K) = r \quad (A6)$$

Capital owner's decision:

Capital owners inelastically supply of a pre-determined capital stock and consume the proceeds from its rent:

$$K = \bar{K} \quad (A7)$$

$$c_K = r \bar{K} \quad (A8)$$

Competitive equilibrium:

Equilibrium values for c_L^f , c_L^i , c_K , l^f , l^i , L^f , K and r satisfy equations (A1) through (A8) and ensure that the subjective probability of formal employment equals the actual ratio of formal labour demand to formal labour supply:

$$p = \frac{L^f}{NL^f} \quad (A9)$$

Thus, formal labour demand will be determined by the fixed stock of capital and the minimum wage and can be lower than formal labour supply, ie there may be unemployment in equilibrium. Good market equilibrium holds by Walras Law, since the capital market clears, informal output is totally consumed by workers, formal employment is determined as previously described and there is a CRS technology in the formal sector (there are no economic profits).

Comparative statics:

The model above is used to explore the effects of changes to the MW on unemployment and informality. It is also used to study the impact of rising physical and human capital, which, as stated in this note, may be behind the declining trend of informality observed in Colombia, despite high MW and formal payroll surcharges.

Preferences and technology are specified as follows:

$$U(c, l^f + l^i) = \ln(c) - \frac{(l^f + l^i)^{1+\varphi}}{1+\varphi}$$

$$F(K, L^f) = A (\alpha K^\rho + (1-\alpha) L^f)^\rho$$

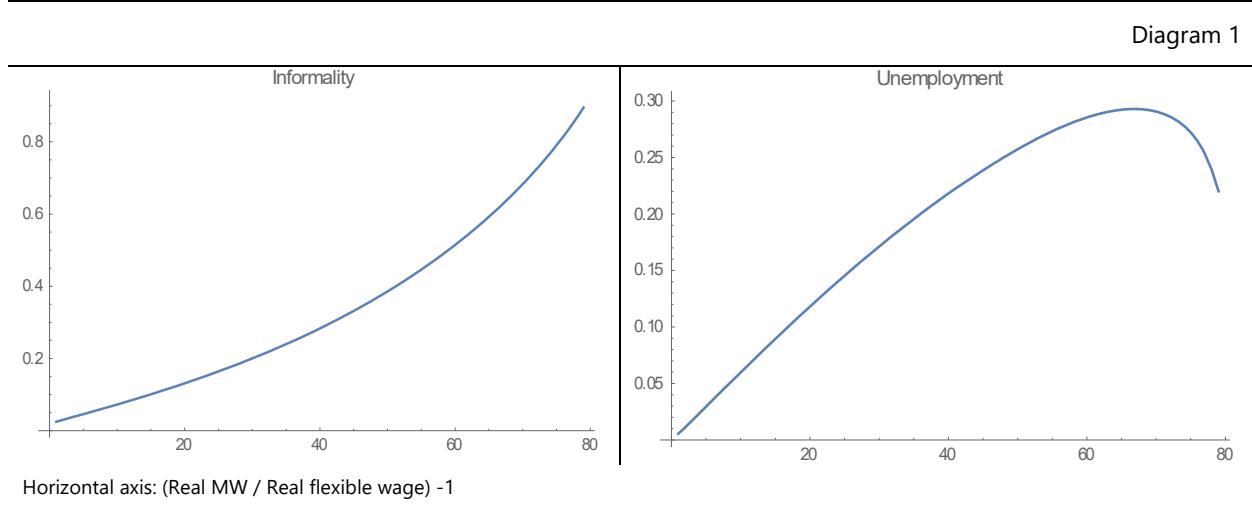
$$G(l^i) = B l^{i\gamma}$$

Given the nature of the model and the specification of preferences and technology, closed form solutions of equilibrium are difficult to obtain. Thus, numerical simulations are performed with the following parameterization:

$$\varphi = 0.4, \rho = -1.35, \alpha = 0.3, \gamma = 0.5, A = 1, B = 0.2 A, N = 1$$

Effects of changes in the real MW on informality and unemployment

As the binding real MW increases, formal labor demand diminishes, reducing the probability of finding a formal job. Workers respond by raising informal labour to sustain consumption, thereby increasing informality (defined as the ratio of informal employment to total employment). Unemployment, on the other hand, may rise or fall following a higher real MW (Diagram 1)¹⁵.



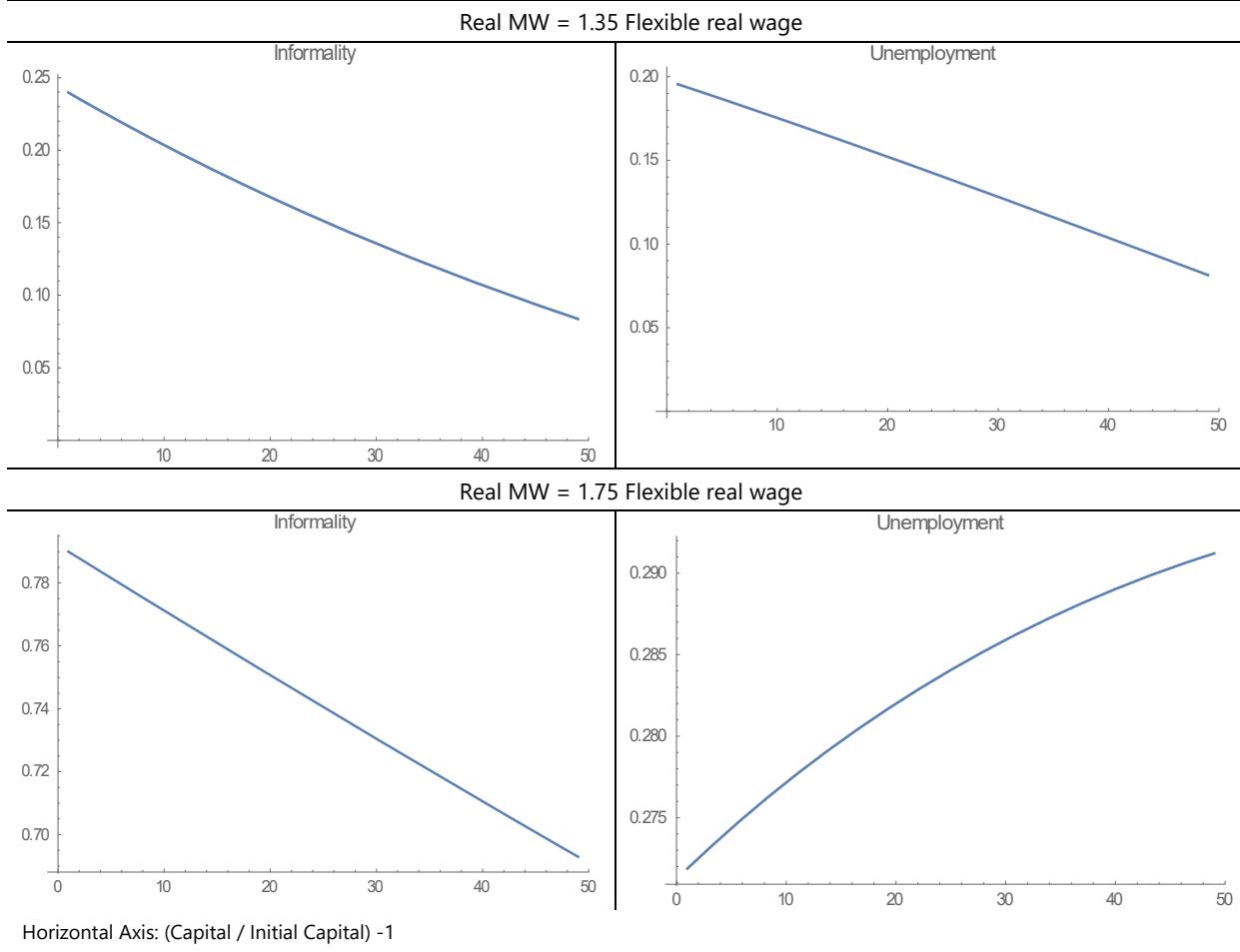
This happens because the rise in the MW decreases formal labour demand, but also discourage formal labour supply. The latter effect is the result of a decreasing *ex ante* perceived probability of finding a formal job. Thus, for not too high real minimum wages, a relatively high probability of finding formal work implies a small drop in labour supply with respect to the fall in labour demand. However, as the effects of higher real MW on formal employment accumulate, the probability of finding a formal job reaches low levels and formal labour supply drops become larger, while, at the same time, formal marginal labor productivity rises, dampening the impact of higher wages on formal labor demand. Consequently, a smaller unemployment rate is obtained in equilibrium.

¹⁵ The horizontal axes in Diagram 1 represent the percentage deviation of the real MW from the real wage that would prevail in the absence of minimum wage regulation.

Effects of changes in the capital stock on informality and unemployment

When the MW is relatively small (eg 1.35 times the real wage with no MW regulation), the probability of finding a formal job is high, so that increases in capital raise formal labour demand, but not so much formal labour supply (Diagram 2). By contrast, when the MW is relatively large (eg 1.75 times the real wage with no MW regulation), the probability of finding a formal job is low. Increases in capital raise formal employment and significantly upgrade the perceived probability of formal employment. As a result, formal labour supply jumps and unemployment rises. In all cases, informality drops (Diagram 2).

Diagram 2

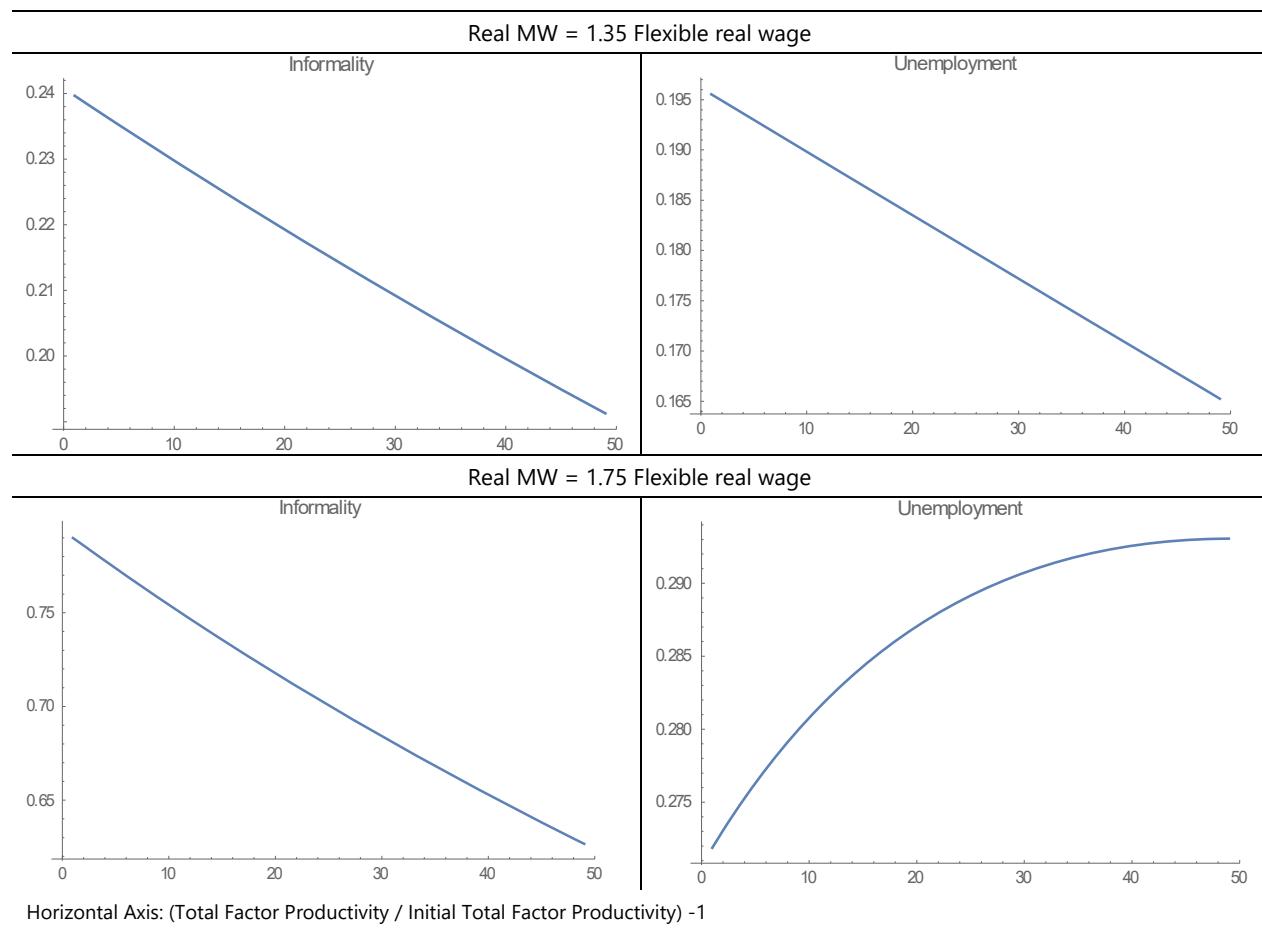


Effects of changes in total factor productivity on informality and unemployment:

As total productivity rises, informality generally drops, following an increase in formal employment and a decrease in the informal one (Diagram 3). Regarding unemployment, as in the exercises above, the effect is ambiguous and depends on

the level of the MW. For a low MW (1.35 times the real wage with no MW regulation), the initial probability of finding a formal job is high and, as consequence, total factor productivity increases raises formal labour demand by more than formal labour supply, thus reducing unemployment. For a higher MW (eg 1.75 times the real wage with no MW regulation), the productivity gains increase the probability of finding a formal job from low initial levels, raising labour supply relative to labour demand. Consequently, unemployment goes up (Diagram 3).

Diagram 3



Appendix B: Additional tables and graphs

1. Additional tables

Full correlation matrix of the key market labour indicators with respect to the GDP

Table A1

Variables	Lags and leads with respect to the GDP												
	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
Employment rate	-0.232***	-0.212***	-0.095	-0.058	0.092	0.388***	0.732***	0.456***	0.195**	0.027	-0.12	-0.217***	-0.247***
Unemployment rate	0.197**	0.140*	-0.019	-0.116	-0.279***	-0.527***	-0.851***	-0.644***	-0.377***	-0.189**	0.048	0.182**	0.201**
Labor force participation rate	-0.174**	-0.202**	-0.174**	-0.227***	-0.152*	0.063	0.308***	0.039	-0.114	-0.189**	-0.162**	-0.173**	-0.201**
Informality rate	-0.143*	-0.211***	-0.274***	-0.286***	-0.358***	-0.330***	-0.349***	-0.360***	-0.350***	-0.093	-0.074	-0.108	-0.053
Salaried wage (median)	-0.102	-0.079	0.007	0.101	0.202**		0.252***	0.224***	0.183**	0.095	0.059	0.081	0.135*
Non-salaried labor income (median)	-0.017	-0.031	0.057	0.155*	0.176**	0.284***		0.578***	0.400***	0.272***	0.098	0.03	0.098

Significance levels: * p<0.10, ** p<0.05, *** p<0.01.

Dickey-Fuller tests for unit root presence

Table A2

	Test statistic	Dickey-Fuller critical value (at 1%)
Log. wage	-1.29	-4.02
Log wage (first difference)	-17.28	-4.02
Log. labor productivity	-1.65	-4.02
Log. labor productivity (first difference)	-15.59	-4.02
Log. CPI	-3.32	-4.02
Log CPI (first difference)	-8.26	-4.02
Log. consumer goods price index	-1.53	-4.02
Log. consumer goods price index (first difference)	-6.93	-4.02
Log. Exchange rate USD/COP	-1.58	-4.02
Log. Exchange rate USD/COP (first difference)	-7.91	-4.02

Trend included.

Johanssen test for cointegration relations

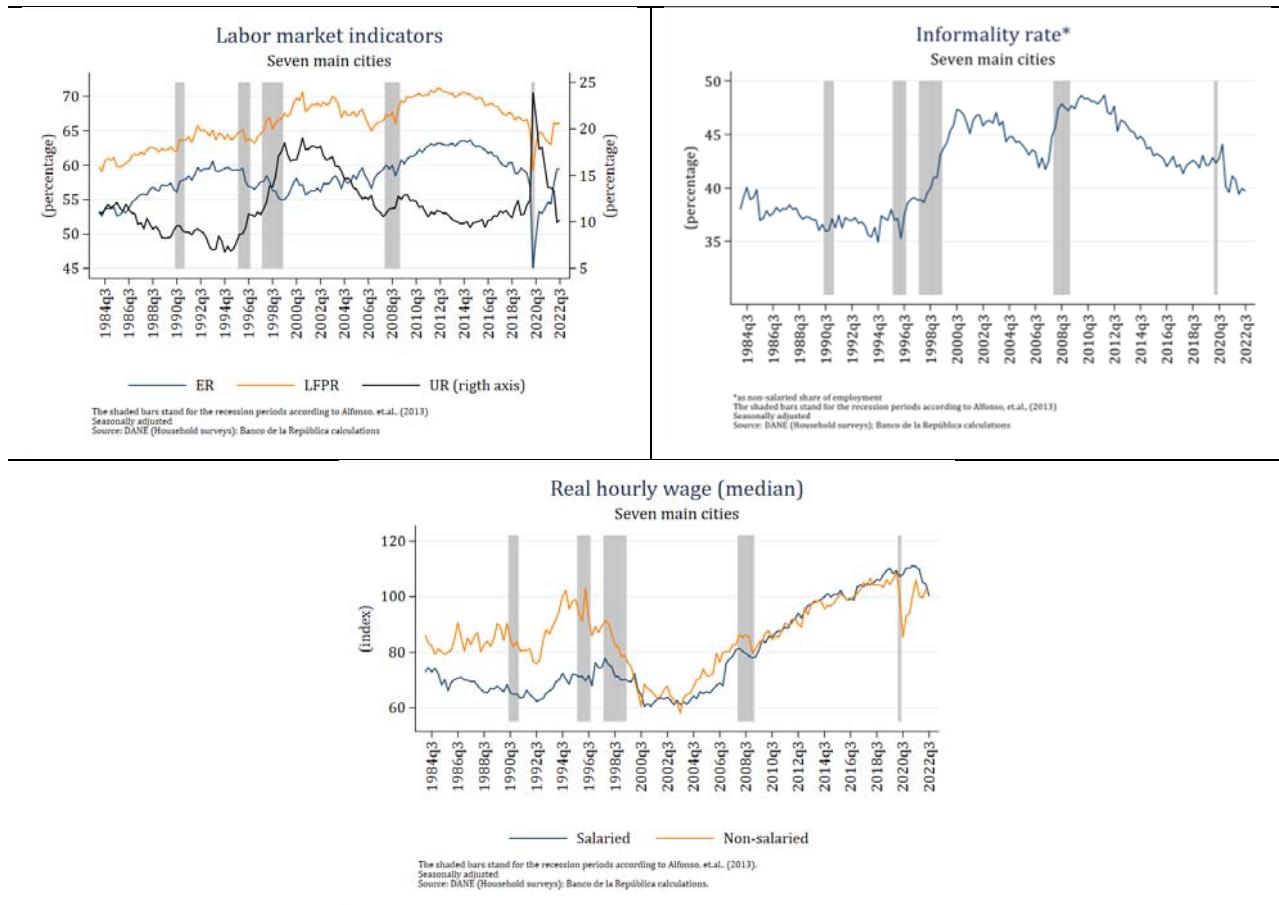
Table A3

Maximum Rank	Eigenvalue	Trace statistic	Critical value (5%)
0	.	76.5043	68.52
1	0.30461	43.4459*	47.21
2	0.23476	19.0974	29.68
3	0.10857	8.6389	15.41
4	0.08808	0.2488	3.76
5	0.00273	.	.

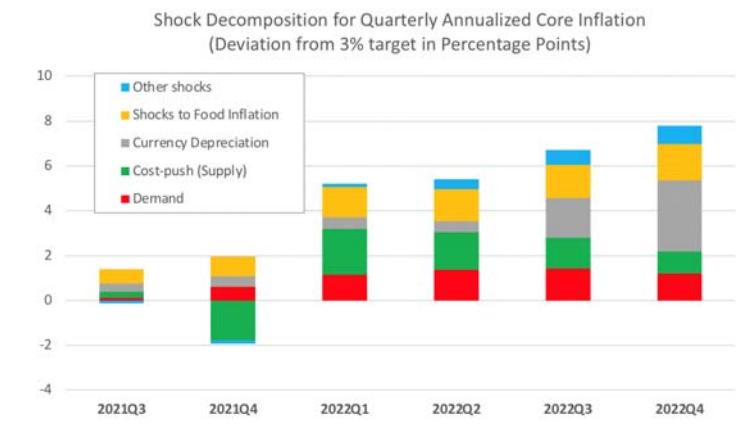
Number of lags in VAR: 4

2. Additional graphs

Graph A1



Graph A2



Appendix C: Effects of an increase in the Kaitz index in the earnings distribution

In this appendix we reproduce the methodology of Arango et al (2022) to assess the effects of changes in the Kaitz index (KI) on the distribution of earnings of salaried workers and self-employed workers with no higher education (as a proxy for informal workers), as displayed in Graph 14. Specifically, Graph 14 plots the estimated coefficients of a regression that quantifies how the quantiles of the earnings distribution of each group of interest, from the 10th to the 90th percentile, change due to increases in the KI of the city c where the person belongs. The method used is that of Firpo et al (2009), which allows for an estimation of the impact of changes in the distribution of the explanatory variable X on the distribution statistic $v(Y)$ of the outcome variable Y . In this case, the distribution statistic is the recentred influence function (RIF)¹⁶ of the quantile τ of the logarithm of hourly labour income for each year t between 2008 and 2019. The estimated equation is thus:

$$RIF_\tau(y_{ict}) = \beta_{0,\tau} + \beta_{1,\tau}KI_{ct} + \beta_{2,\tau}KI_{ct-4} + X_{ict}B_{3,t} + Z_{ct}B_{4,t} + \partial_{c,\tau} + \partial_{t,\tau} + \varepsilon_{ijt,\tau} \quad (B1)$$

where i represents an individual, X_{ict} contains usual individual characteristics, Z_{ct} contains city-level characteristics, and ∂_c and ∂_t are city- and time-fixed effects, respectively. The coefficients displayed in Graph 14 correspond to the sum of the estimated coefficients $\hat{\beta}_{1,\tau}$ and $\hat{\beta}_{2,\tau}$. For more details see Arango et al (2022).

¹⁶ Influence functions measure the influence of a single observation on the statistics of a distribution (in this case the quantile τ). The recentred influence function is the statistic plus its influence function.

Inflation and labour markets in the wake of the pandemic: the case of Hong Kong SAR

The Hong Kong Monetary Authority

Abstract

The consumer price index (CPI) basket of Hong Kong SAR has a rather different structure to that of most other emerging market economies, as the bulk of CPI components reflect services consumption, particularly housing rentals. Given this large share for services, the soft property and labour markets in the past few years have kept local inflation mild in the wake of the pandemic despite elevated external prices. During the pandemic, the Hong Kong Monetary Authority also closely monitored labour market dynamics and their implications for inflation using advanced data science tools.

Keywords: inflation, labour market.

JEL classification: E31, J21.

1. Introduction

Following low and stable inflation over the past two decades or so, inflation in major advanced economies (AEs) and many emerging market economies (EMEs) rose sharply during the post-Covid period. This reflected a host of factors across different economies, including supply chain disruptions and business closures, pent-up demand for goods and services, imbalances between supply and demand in the labour market, high international food and energy prices amid the Russia-Ukraine conflict, as well as earlier fiscal and monetary policy easing.

Unlike many economies that have seen an inflation flare-up, Hong Kong SAR's inflation, albeit generally edging up, has remained moderate at about 2% recently.¹ In tandem, local labour market conditions were still generally soft, alongside periodic resurgences of local epidemic conditions and a resultant slow economic recovery. Against this backdrop, this note discusses developments in inflation and the labour market in Hong Kong, in the wake of the pandemic. The first part of the note will focus more on the inflation dynamics and also touch on the role of the labour market. The second part will discuss our recent use of alternative labour market indicators which are also useful for inflation monitoring.

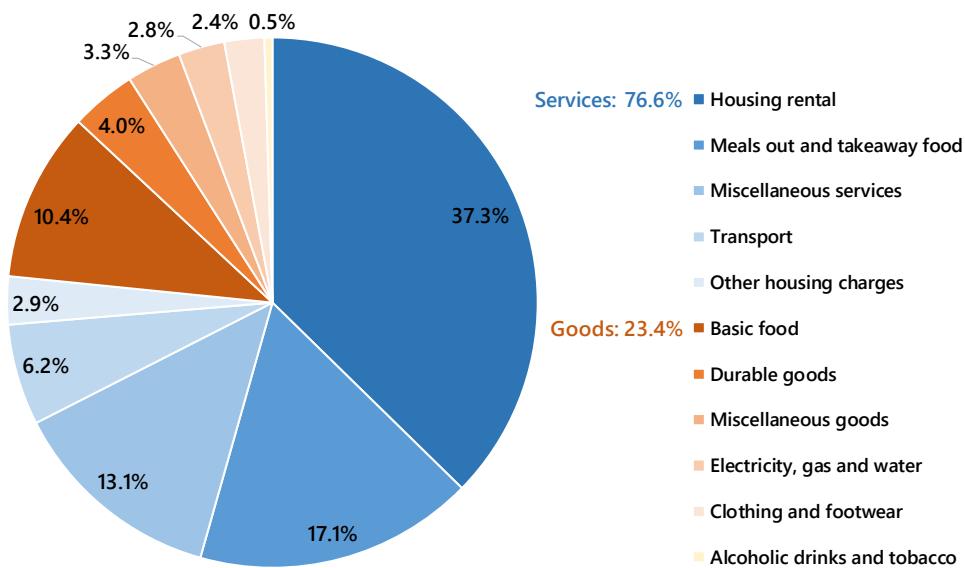
2. Inflation dynamics in Hong Kong SAR

The consumer price index (CPI) basket of Hong Kong SAR has a rather different structure to that of most other emerging market economies, which results in distinct inflation dynamics and has helped to keep inflation mild recently. Unlike in many other EMEs where tradable goods make the largest contribution to inflation, Hong Kong's inflation is heavily influenced by non-tradable services, reflecting the service-oriented nature of the economy. Non-tradable services account for around three quarters of the CPI basket, with the housing rental component accounting for around 37% (Graph 1). In this connection, Hong Kong's inflation is significantly affected by developments in the property market while labour market situations are largely reflected in services costs (see more explanation below). Given the large share of services in our CPI basket and the generally soft property and labour markets over the past few years, inflation has therefore been moderate in Hong Kong (Graph 2), despite elevated external price pressures.

¹ This refers to the official underlying inflation rate. In Hong Kong, the most commonly used indicator of the trend in price changes is the government-compiled composite consumer price index, also called headline inflation. Headline inflation could be quite volatile due to the effects of the Hong Kong government's one-off relief measures such as a public housing rental waiver and electricity charges allowance. As a result, the official underlying inflation rate can be more useful for gauging domestic price pressures, as it nets out the impact of these relief measures.

Expenditure weights of goods and services in the CPI basket

Graph 1

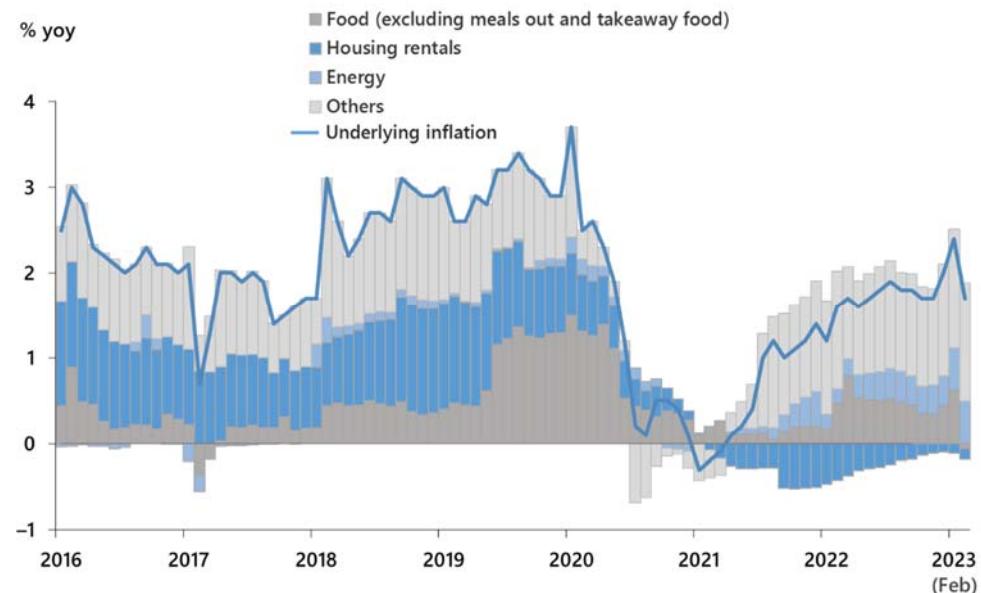


Based on data collected from the Household Expenditure Survey conducted in 2019/20. We classify "electricity, gas, and water" as "goods" here partly because in Hong Kong SAR they are highly affected by import prices. Different economies may classify these items differently according to their own circumstances.

Source: Census and Statistics Department (C&SD).

Underlying inflation and component contribution in Hong Kong SAR

Graph 2



For simplicity, contribution by energy is proxied by electricity, gas and water.

Source: Census and Statistics Department (C&SD).

In Hong Kong, domestic cost pressures have been mild in the wake of the pandemic. As mentioned, Hong Kong's rate of inflation is heavily influenced by developments in the property market, as property prices can affect the CPI through the rental component and the wealth effect on aggregate demand.² Historically, there has been a strong co-movement between housing prices and housing rentals (Graph 3). As such, in conjunction with the soft housing market over the past few years, the housing rental component of the CPI has exerted downward pressures on overall inflation (Graph 4). At the same time, softer property prices also drove down the rentals of commercial premises, further suppressing service fees and charges.

Meanwhile, local labour market conditions, while improving in recent months, still have not recovered to their pre-pandemic levels (Graph 5). Pressures on workers' payrolls as well as unit labour costs have also remained moderate alongside relatively weak economic activities (Graph 6).³ These developments signal potential slack in the labour market and therefore help to keep local inflation in check. Research results also show that over a long horizon consumer prices have been a leading indicator of nominal wages, with little evidence of a wage-price spiral.⁴ From an institutional perspective, wages and prices in Hong Kong are widely regarded as flexible, and explicit wage indexation and collective bargaining are not prevalent.⁵

Growth in housing rentals and prices

Graph 3



Source: Census and Statistics Department (C&SD).

² For more details, see Cheung et al (2016).

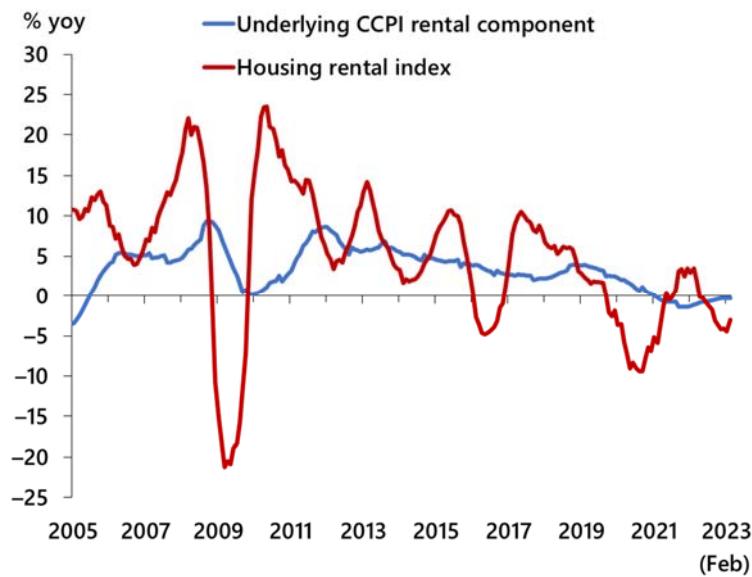
³ In Hong Kong, compared with the wage indices, the payroll indices are a more comprehensive measure of labour compensation that also includes overtime payments and discretionary bonuses. In addition, the payroll enquiry covers more industries than the wage enquiry and includes managers and professionals.

⁴ For more details, see Vere (2022).

⁵ On wage and price flexibility, see Cheng and Ho (2009).

Underlying inflation rental components and housing rentals

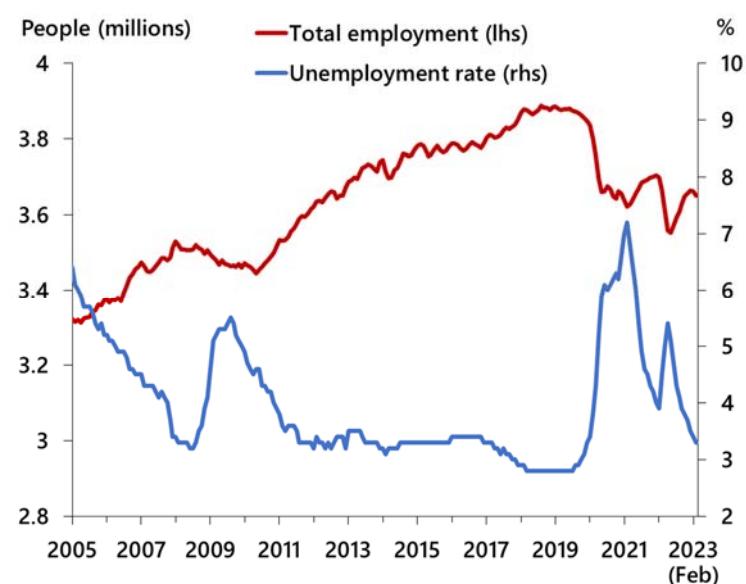
Graph 4



Source: Census and Statistics Department (C&SD).

Unemployment rate and total employment

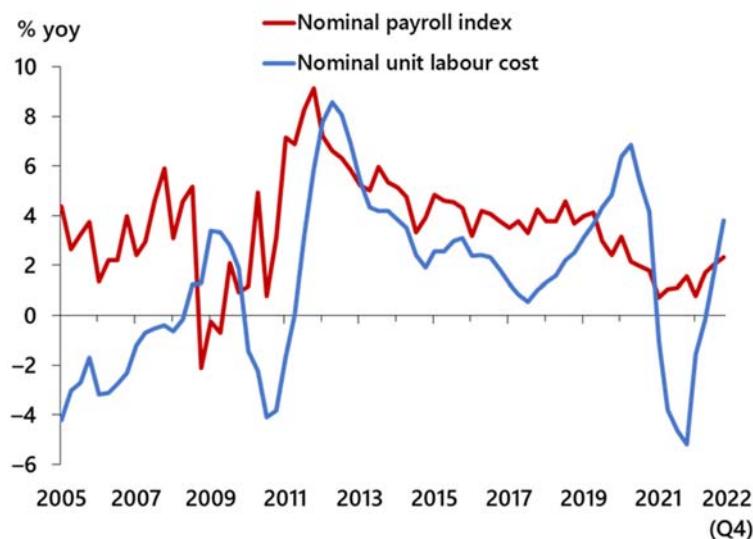
Graph 5



Source: Census and Statistics Department (C&SD).

Nominal payroll index and unit labour cost

Graph 6



Source: Census and Statistics Department (C&SD).

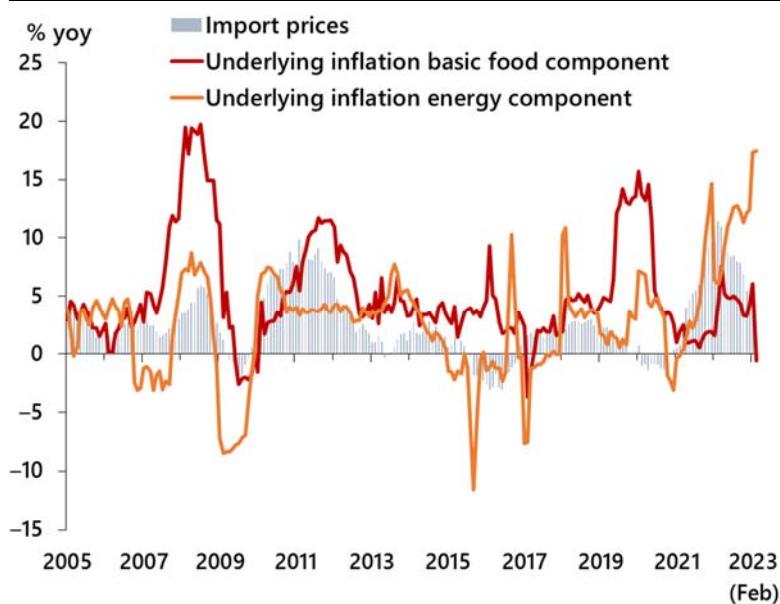
On the other hand, external price pressures were intense, as reflected in the rises in Hong Kong's import prices in general, and in particular in the CPI basket's basic food and energy components (Graph 7). However, the overall impact has been limited so far due to a number of reasons. First, energy shares in Hong Kong's CPI basket are not particularly large and are generally smaller than emerging market Asian peers (Table 1). Given that the expenditure weight of energy is only about 3% in the local consumer price index, the effect of elevated international energy prices on Hong Kong's inflation has been relatively benign. Second, earlier soft imported food prices from Mainland China (where approximately 30% of Hong Kong's imported food comes from) helped stabilise Hong Kong food prices. Third, services accounts for the bulk of Hong Kong's CPI components, with Hong Kong seeing no big shift towards goods consumption during the pandemic.

Given the fiscal strength of the Hong Kong government, some temporary and targeted fiscal measures have been in place to support those vulnerable households with real incomes that have been disproportionately impacted by rising prices. This has been achieved in a way that has not aggravated overall inflation and is in accordance with fiscal sustainability. For instance, an electricity charges subsidy was subject to a cap, and multiple rounds of rental waivers for public housing tenants have taken place. In addition, some other comprehensive policy support measures have been implemented during the pandemic, such as the government's consumption voucher scheme, as a result of which vouchers could be spent in local retail and online platforms but not for payments to the government or to public utilities. An employment support scheme was also initiated. It provided wage subsidies to employers in a wide range of industries. Having said that, the above fiscal measures have had little impact on inflation so far, in part due to the austere economic conditions. Similarly, the impact of a statutory minimum wage on inflation during the period has been limited. The level of the statutory minimum wage has

been frozen at the level of HKD 37.50 per hour since an increment in May 2019, and the proportion of employees for whom it is relevant has remained small.⁶

Import and goods prices in Hong Kong SAR

Graph 7



Source: Census and Statistics Department (C&SD).

Selected economies: weight of food and energy in CPI baskets

Table 1

	Food		Energy (%)	Total (%)
	Basic food (%)	Meals away from home (%)		
The Philippines	37.7	9.5	9.1	56.3
Thailand	33.6	6.7	12.4	52.7
Malaysia	18	11.5	11.7	41.2
Indonesia	22.4	8.7	5.8	36.9
South Korea	15.5	12.7	6.9	35.1
Japan	20.5	4.6	7.1	32.2
Hong Kong SAR	10.4	17.1	3.1	30.6
New Zealand	13.4	5.2	7.8	26.4
Singapore	6.8	14.3	3.8	24.9
Australia	10.4	6.4	6.8	23.6

CPI weights for Mainland China are not available.

Sources: CEIC and HKMA staff calculations.

⁶ The statutory minimum wage will be raised to HKD 40 per hour in May 2023 following a 2022 review of the statutory minimum wage rate by the Minimum Wage Commission.

Looking forward, as the economy is gradually returning to normality, the Hong Kong Monetary Authority (HKMA) and other relevant authorities in Hong Kong are closely watching developments in the labour market and their implications for inflation. For example, when monitoring labour market slack amid the stabilisation of the local epidemic, a holistic approach is adopted by looking into a range of traditional indicators, such as the unemployment rate, and using more timely and granular big data when analysing disaggregated or sectoral data. In what follows, we will discuss our recent efforts to use data science (web scraping) to assemble a large data set of online job advertisements, with the aim of detecting labour demand changes in a more timely manner during the pandemic.

3. Use of labour market indicators: a big data application

Recently, economists at the HKMA have applied advanced data science techniques, eg web scraping, to explore the information in online job advertisements to detect labour demand changes since the pandemic in a more timely manner.⁷ These job postings are available almost in real time, and this compares favourably with the official job vacancy data that inevitably have a time lag. In practice, job advertisements from representative online job searching platforms were collected through daily web scraping and transformed into a structured database for analysis. The collected information contains more granular features, including employment types, education level and skill requirements, and sometimes the remuneration package.⁸

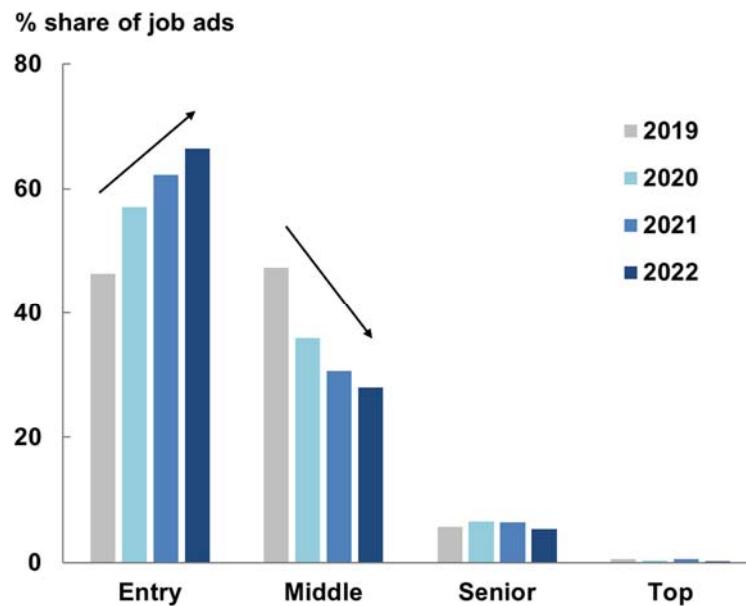
Indeed, as a result of leveraging alternative big data, it has been observed that companies have been upskilling their workforces since the pandemic due to the shift in demand for talent amid the adoption of innovation and technology. Graph 8 shows the change in the share of job advertisement from 2019 to 2022 by job levels, which reveals that the opening for middle-level jobs has declined since 2019 and has mostly been substituted with entry-level positions. In addition, entry level job openings before the pandemic were predominantly comprised of positions that required a secondary educational qualification or below. Nonetheless, Graph 9 further suggests that there have been more entry-level job advertisements requiring tertiary educational qualifications since the pandemic.

⁷ For reference, see HKMA (2020).

⁸ Despite the usefulness of job advertisement data, there are caveats to their use. For example, because not all job vacancies are posted online, the online job advertisements may not entirely reflect patterns in the whole population. As a result, the online job advertisement data should be considered complementary, rather than as a substitute, to the official vacancy data and other traditional labour statistics.

Share of job advertisements by job level

Graph 8

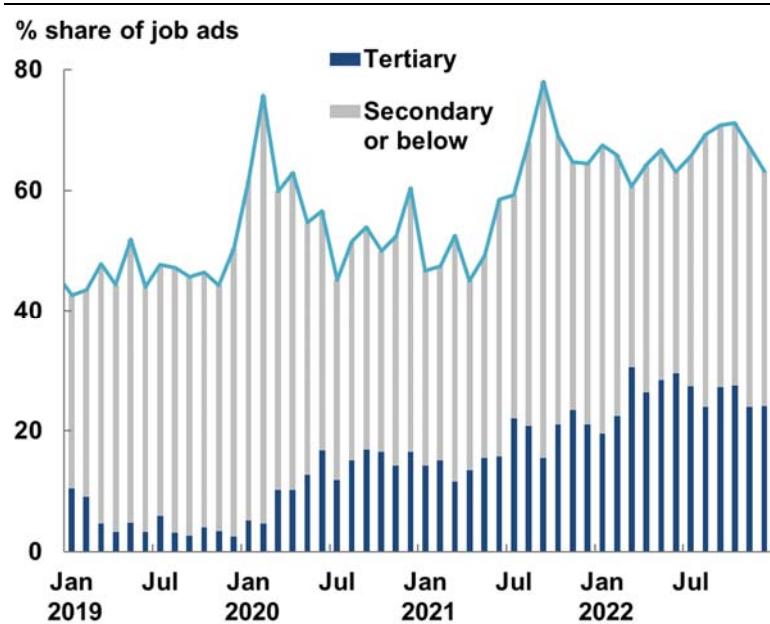


Job advertisements that did not specify a level are excluded.

Source: JobMarket and HKMA staff estimates.

Share of entry-level job advertisements by education level

Graph 9



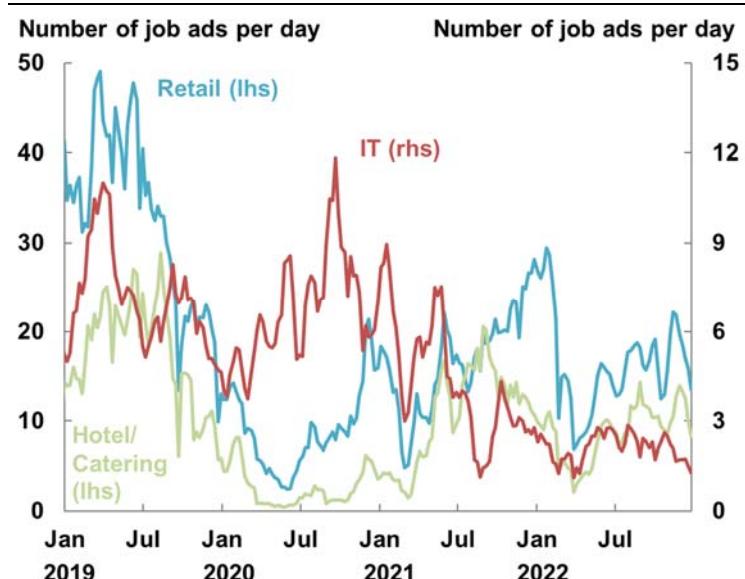
Job advertisements that did not specify a level are excluded.

Source: JobMarket and HKMA staff estimates.

Sectoral data also revealed some signs of employment shifting towards more "high-end" service sectors during the pandemic. Graph 10 shows that new job vacancies in the retail and hotels/catering sectors shrank drastically in the first half of 2020 and picked up slightly in the second half amid a stabilisation of the local infection rate, and the same phenomenon was observed again in the first half of 2022 during the Omicron variant episode. In contrast, new job vacancies in the information technology (IT) sector soared in 2020, plausibly due to the rapid adoption of digital technologies during the period.

Number of job advertisements in selected sectors

Graph 10



Four week average.

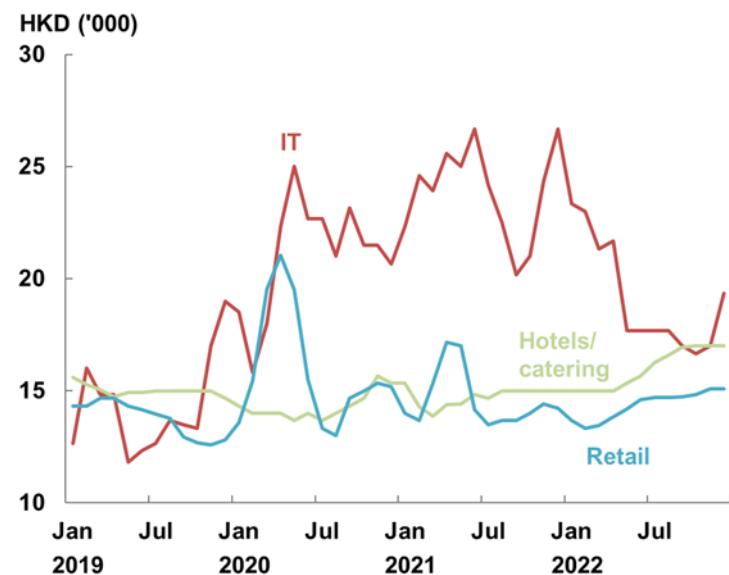
Source: JobMarket and HKMA staff estimates.

The use of big data also shows the median starting salary of full-time jobs in selected sectors (Graph 11). The median starting salary in the IT sector soared in 2020 and 2021 due to the huge demand for technology during the pandemic, followed by a moderation in 2022. On the other hand, sectors that are more vulnerable during the pandemic, such as retail, hotels and catering, maintained a roughly stable median starting salary but a slight upward trend has been restored as local epidemic conditions have eased more recently.⁹ In addition, official data also indicate that real wages increased in some "high-end" industries (eg the financial services sector), while in the "lower-end" sectors real wages have increased much more slowly or even decreased since the pandemic.

⁹ It should be noted that these online data differ from the official nominal wage and payroll indices as they measure the overall compensation for both new and existing employees, while the former pertains only to new recruitment. As such, they are not strictly comparable.

Median starting salary of full-time jobs in selected sectors

Graph 11



As not all companies provide salary details in their job advertisements, some data have been extrapolated using time trends.

Source: JobMarket and HKMA staff estimates.

Having said that, it remains to be seen whether the pandemic will have a "lasting" impact on labour market dynamics or wages, especially considering the fact that domestic economic activities are gradually normalising in the near term. Over the longer horizon, the HKMA is also monitoring the potentially persistent effect of other long-term issues, such as the impact of population aging, to the labour market.

4. Concluding remarks

In contrast with many economies that have experienced soaring inflation recently due to supply chain disruption and geopolitical tensions, Hong Kong SAR's inflation has stayed moderate partly because the impact of rising external prices was offset by mild domestic cost pressures. Hong Kong's CPI basket is primarily comprised of non-tradable services, especially housing rentals. As such, in conjunction with the soft housing market in Hong Kong over the past few years, overall inflation has largely been kept in check.

The local labour market has yet to fully recover to pre-pandemic levels, and there is little evidence of a wage-price spiral in Hong Kong, contributing to mild overall inflation. In addition, fiscal measures during the period are either targeted to support those vulnerable households in a way that does not aggravate overall inflation, or have had minimal impact on inflation so far due to austere economic conditions. In any case, wages and prices in Hong Kong are widely regarded as flexible, and explicit wage indexation and collective bargaining are not prevalent.

During the pandemic, the HKMA has closely monitored the dynamics in the labour market using both traditional indicators and advanced data science tools. Indeed, leveraging timely online big data, it is observed that companies have been upskilling their workforces since the pandemic due to a shift in demand for talent amid the adoption of innovation and technology. In tandem, wages increased in some "high-end" industries (eg IT and financial services) during the pandemic, while in some "lower-end" sectors that were more vulnerable to Covid-19, wages have lagged behind. In the future, as the economy is returning to normality, the HKMA will continue to monitor developments in the labour market and their implications for inflation.

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Wage-price spiral in Hungary

Krisztina Zanaty¹

JEL codes: E24, E31.

Keywords: labour market, wage growth, inflation, wage-price spiral.

1. Introduction

In Hungary, consumer prices rose by 24.5% in December 2022, a rate that had not been seen in the country for the last 26 years. In addition, nominal wage growth in the private sector was in double digits in every month in 2022. This raises the question as to what happens if these processes become self-reinforcing. Usually, the first reading is that this can lead to a wage-price spiral, meaning that high inflation nourishes high wage dynamics, which fuels even higher inflation. However, there are many other factors that should be taken into consideration when analysing wage and price growth. This study presents an examination of the recent wage and price dynamics in Hungary.

Both high wage growth and inflation are present in Hungary, but this does not mean that a wage-price spiral has emerged. According to our findings, high wage growth has started to be reflected in prices, but inflation has not really been reflected in wages yet. The first statement is supported by the strengthening relationship of the wage-price pass-through, which suggests that the role of wage growth in the development of inflation has increased. The second statement can be supported by the fact that the wage Phillips curve seems to show a stable relationship, as it has not changed substantially over recent years.

There have been a lot of different factors contributing to high wage and price growth in Hungary. High wage dynamics can mainly be explained by labour market tightness and minimum wage increases. In addition, some workers have upgraded from low-productivity companies to high-productivity companies where they receive higher wages, meaning that the high wage growth is partly due to a compounding effect which does not, *per se*, cause inflationary pressure on the supply side. At the same time, according to various surveys, only between 30 and 40% of companies were planning to implement additional wage increases due to rising inflation, which confirms that inflation has not been the main reason for rising wages. Inflation had been high because of the external environment and extreme circumstances, however domestic factors are now increasingly contributing to price dynamics. One country-specific factor that contributes to the high inflation through rapid increases of food prices, is the poor productivity of the food industry in Hungary. Moreover, the acceleration of price growth does not only reflect higher costs as there have been significant rises in profits.

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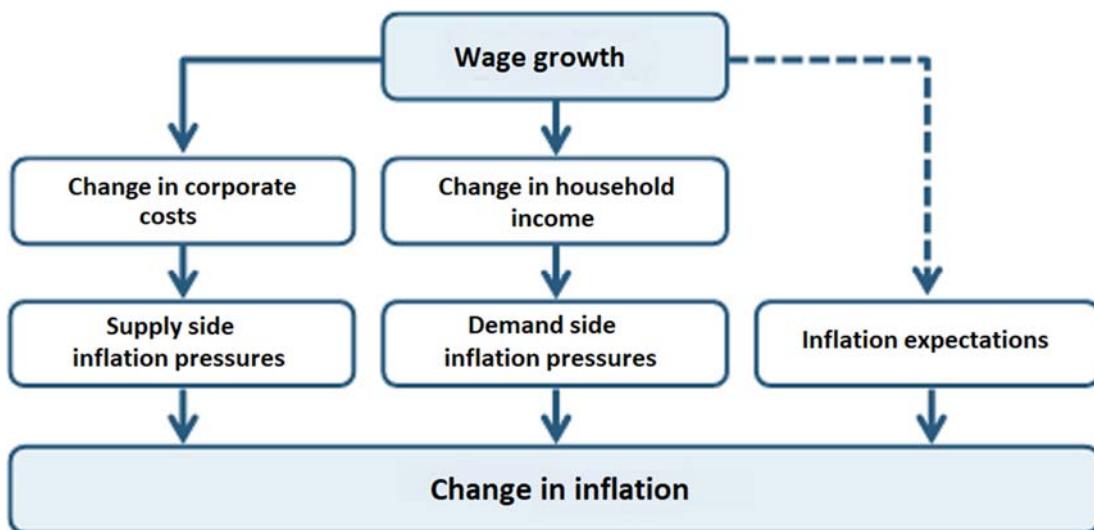
2. The framework of a wage-price spiral in advanced economies

Wages play an important role in pricing processes, primarily through three channels. They can influence nominal processes from the supply and demand sides and also through inflation expectations (Graph 1). From the demand side, persistently high wage dynamics represent the greatest inflation risk, if the extra income is used for household consumption. Because of the non-linearities, the cyclical position of the economy determines the effect of the consumption on inflation dynamics. At the same time, raising wages increases corporate costs, which companies can incorporate into the prices of their products, transferring these costs to the customers. This creates a supply side inflation pressure, but only if wage growth exceeds productivity. If wages rise at the same rate as productivity, companies will not have to raise their prices as their profits will cover the wage costs.

Although there has been much debate in recent years about whether wages are primarily determined by productivity, the link between productivity and wages continues to be strong. Stansbury and Summers (2017) conclude that productivity growth still matters substantially for wage growth. Strain (2019) adds that worker productivity should be the baseline from which wages are determined.

From the point of view of a wage-price spiral, inflation expectations have the greatest role. Expectations can influence the changes in inflation by affecting wage negotiations. When prices rise, employees strive to achieve a higher nominal wage during the negotiations, in line with the higher expected inflation. The incorporation of inflation risks into the expectations of the public may result in permanently higher price dynamics.

A wage-price spiral develops when wage and price growth become self-reinforcing. When workers expect higher inflation in the future, they negotiate for higher wages as they want a real wage increase (or at least to sustain its level). On the one hand, it heats up the demand side of the market, and on the other hand forces the employer to raise prices to compensate for the increased costs. When this creates a cycle, it sustains inflationary pressures.



Source: MNB

Examining the relationship between labour market variables and inflation was put into focus with the creation of the theory of the Phillips curve. The Phillips curve shows the correlation between the cyclical position of the economy and inflation. Originally, it depicted a negative correlation between wage inflation and the unemployment rate, according to the findings of Phillips (1958). Following that, Samuelson and Solow (1960) found a similar, negative correlation between unemployment and price increases. Keynesian economists of that time welcomed these findings enthusiastically, as they provided an explanation for an important missing link in Keynesian theory regarding inflation prior to achieving full employment.

In the 1960s and 1970s, many economists thought that inflation was a constant threat once wages started to rise. Economists argued that when households demand higher wages because of high expected inflation, businesses will be forced to pass on the cost of higher wages, which will create a second round of rising prices. This concept is based on a theory rather than empirical evidence. It stems from an era in which a large number of workers were working in state-owned industries, and unions had more power than they have today (Inman (2022)). As inflation was thought to be the result of a wage-price spiral in the late 1960s, wages and prices were frozen to control inflation in 1970 by President Nixon in the United States. However, the measure was not proven to be effective, the price controls did not work.

Recently, there have been several research studies investigating the possibility of a wage-price spiral. Boissay et al (2022) found that there is limited evidence that most advanced economies are entering such a spiral. They state that the current environment does not support the formation of such a spiral. The correlation between wage growth and inflation has declined over the last decades and is currently near historical lows. Another reason is that workers' collective bargaining power has declined in recent decades. They add however, that this correlation has strengthened recently.

In their recent study Bluedorn et al (2022) found that the risks of a wage-price spiral in advanced economies are limited. The authors identified 22 intervals over the past 50 years, that had similar characteristics to those present in 2021. During the selected time spans, price inflation was rising, wage growth was positive, but real wages and the unemployment rate were flat or falling. They concluded that these episodes did not lead to wage-price spirals on average. Instead, inflation finally fell in subsequent quarters and nominal wages gradually rose, helping real wages recover. They mention three factors that contain the risks. The first is that the underlying shocks to inflation come from outside the labour market. The second is that when inflation outstrips nominal wage growth, real wages turn negative and falling real wages help to reduce price pressures as aggregate demand slows down. Finally, recent tightening actions by central banks will help to prevent a permanently high inflation environment.

Alvarez et al (2022) conclude that sustained wage-price acceleration is hard to find when examining episodes similar to the situation of today. For their examination, they create a database of past wage-price spirals in advanced economies going back to the 1960s. It was found that only a small minority of the episodes of accelerating prices and rising nominal wages were followed by a sustained acceleration in wages and prices. Usually, inflation and nominal wage growth tended to stabilise, leaving real wage growth broadly unchanged. They add that a decomposition of wage dynamics suggests that nominal wage growth stabilises at levels that are consistent with observed inflation and labour market tightness. Their final statement is that an acceleration of nominal wages should not necessarily be seen as a sign of an emerging wage-price spiral.

Boissay et al (2022), however, point to some factors that may increase the likelihood of a wage-price spiral. First, firms' pricing power has increased to historical highs. The pricing power is measured by the markup of prices over costs. In the current high inflation environment, higher markups could fuel inflation as businesses pay more attention to aggregate price growth and incorporate it into their pricing decisions.

3. The reasons for high wage growth and inflation in Hungary

Both high wage growth and inflation are present in Hungary, but this does not mean that a wage-price spiral has emerged. The processes need to be analysed more closely to reach a conclusion about whether a wage-price spiral exists in the economy or not. Inflation has been rising since the spring of 2021 in Hungary, and this is a consequence of many factors. With the post-pandemic restarting of economies, raw material and food prices have jumped at an international level. The supply bottlenecks and the effects of the Russia-Ukraine conflict have also had a huge impact on domestic price pressure. Inflation has been double digit since May 2022 and reached more than 20% on a yearly basis since September (Graph 2).

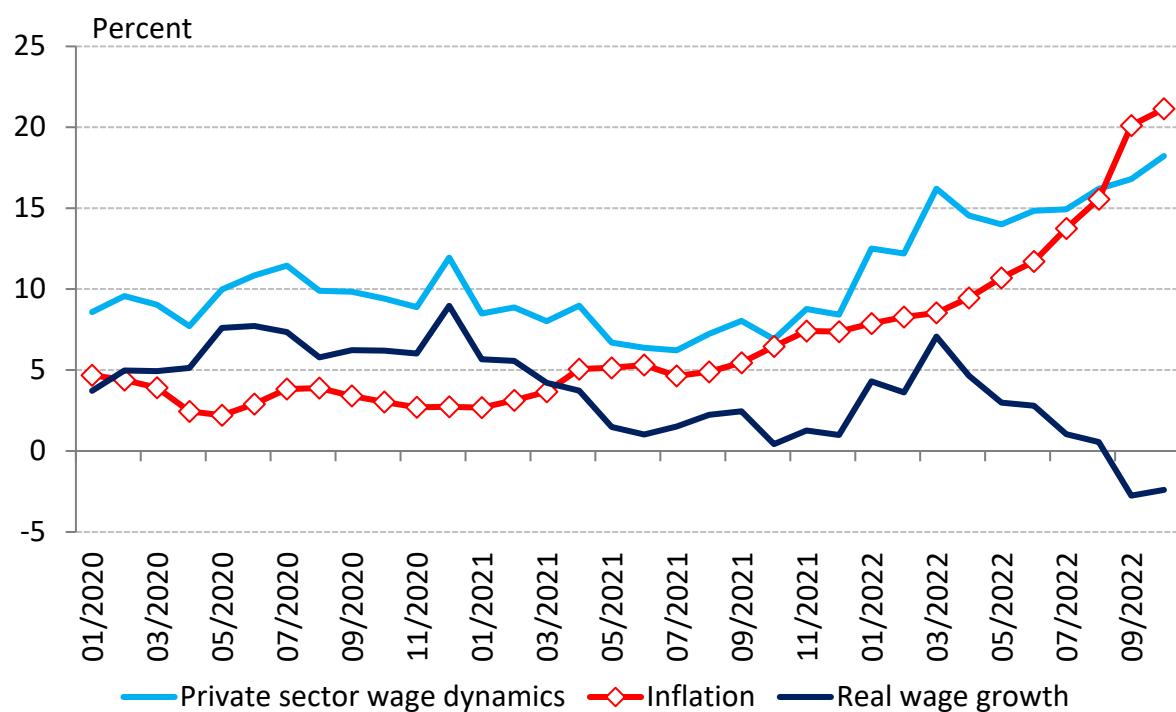
Prices rose by 24.5% in December on a yearly basis which was the highest reading amongst EU countries. Food and household energy price indices increased

significantly. High energy prices affect prices through various channels, a drought in Europe and geopolitical tensions continue to exert pressure on consumer prices.

Inflation had been high primarily because of the external environment and extreme circumstances, but now domestic factors increasingly contribute to price dynamics. According to our calculation, compared with the period of price stability, i.e., during the period 2017–19, 80% of the increase in inflation in 2021 was caused by external factors (MNB (2021)). However, domestic factors have played a more significant part in the acceleration of inflation recently. On the one hand, the poor productivity of the food industry in Hungary has caused prices to increase. On the other hand, the acceleration of price growth does not only reflect higher costs as there has also been a significant rise in profits (see Chapter 3.4). The increase in corporate profits can be observed in a wide range of sectors, thus the high repricing is supported not only by cost side pressures but also by rising profit rates.

Wage and price dynamics in Hungary

Graph 2



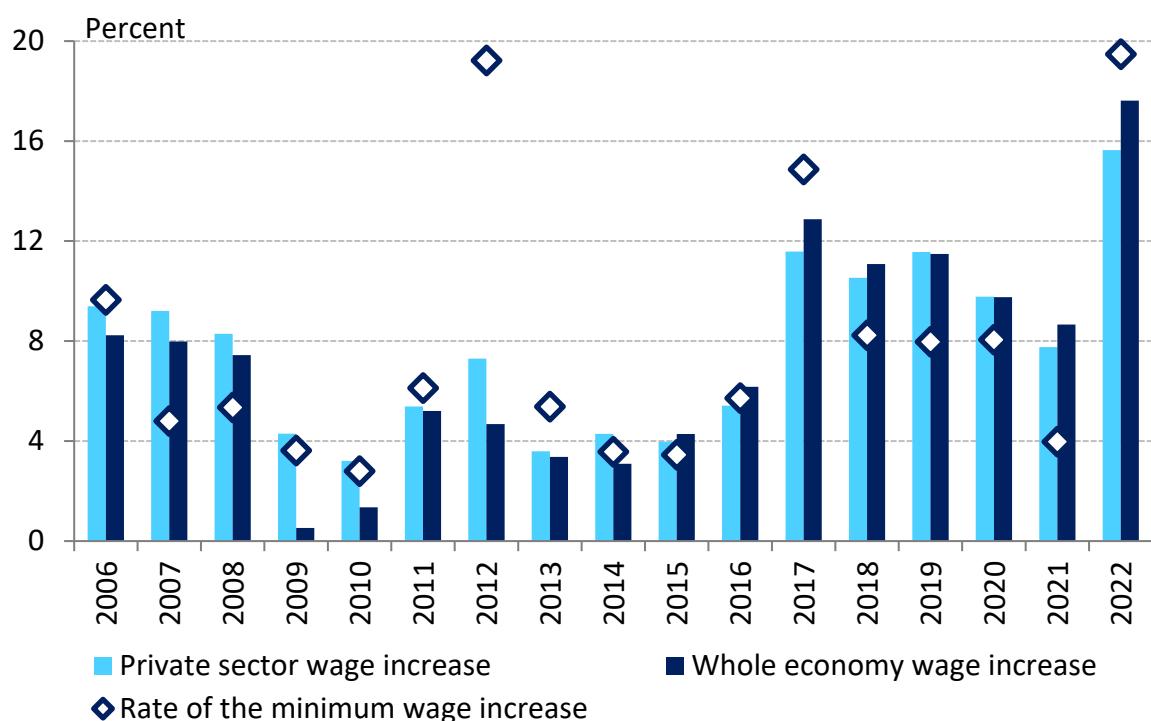
Source: HSCO

Private sector wage dynamics were historically high in the past years in Hungary, which is partly due to the minimum wage and guaranteed minimum wage increases. A six-year wage agreement was signed in 2016, which included a 15% minimum wage rise in 2017 and an 8% minimum wage rise in 2018. After that, increases in administrative wages were decided on a yearly basis. The major rise in these wages is perceived in the higher earnings categories as well, since this is the only way that employers can maintain the differences in wages between jobs that require various skills and experience. As a result of this, private sector wage growth has been double digit since 2017, except for 2021 due to the pandemic (Graph 3).

The supply-side inflationary effect of administrative wage increases was offset by a reduction in corporate contributions throughout the years. Raising the minimum wage and the guaranteed minimum wage adds to companies' costs, which they could incorporate into the prices of their products and services. However, employers' taxes and contributions were significantly reduced to compensate them for the higher wage costs. Between 2017 and 2022, the social security contribution declined in four steps, by between 2 and 2.5 percentage points in each step so that the inflationary effect from the cost side remained moderate.

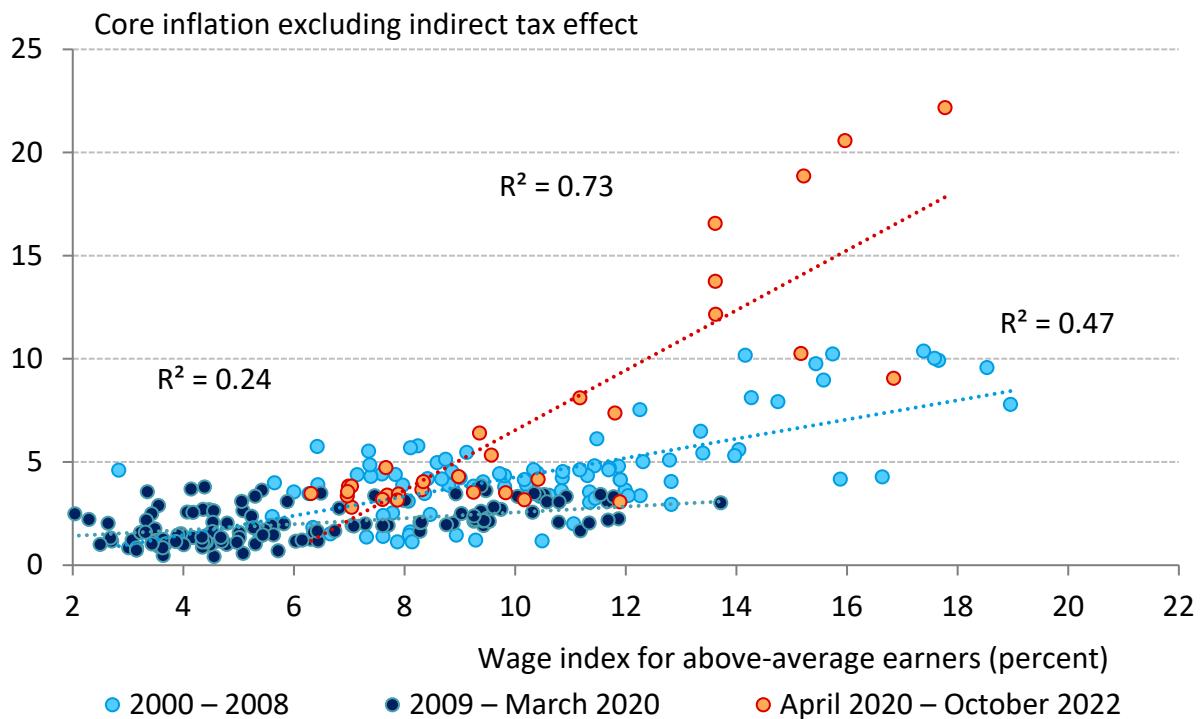
Rate of minimum wage and private sector wage increase

Graph 3



Source: HSCO

The wage-price pass-through has strengthened in recent years, which means that high wage growth has started to be reflected in inflation. If we examine the relationship between wage growth and inflation, we can see that although it had flattened in the last decade, it has now become steeper again (Graph 4). Before the crisis in 2008, there was a close relationship between the two variables, however, after the crisis, the relationship has weakened. In recent years, wage dynamics and inflation have started to move closely together again and the role of wage growth in the development of inflation has increased.



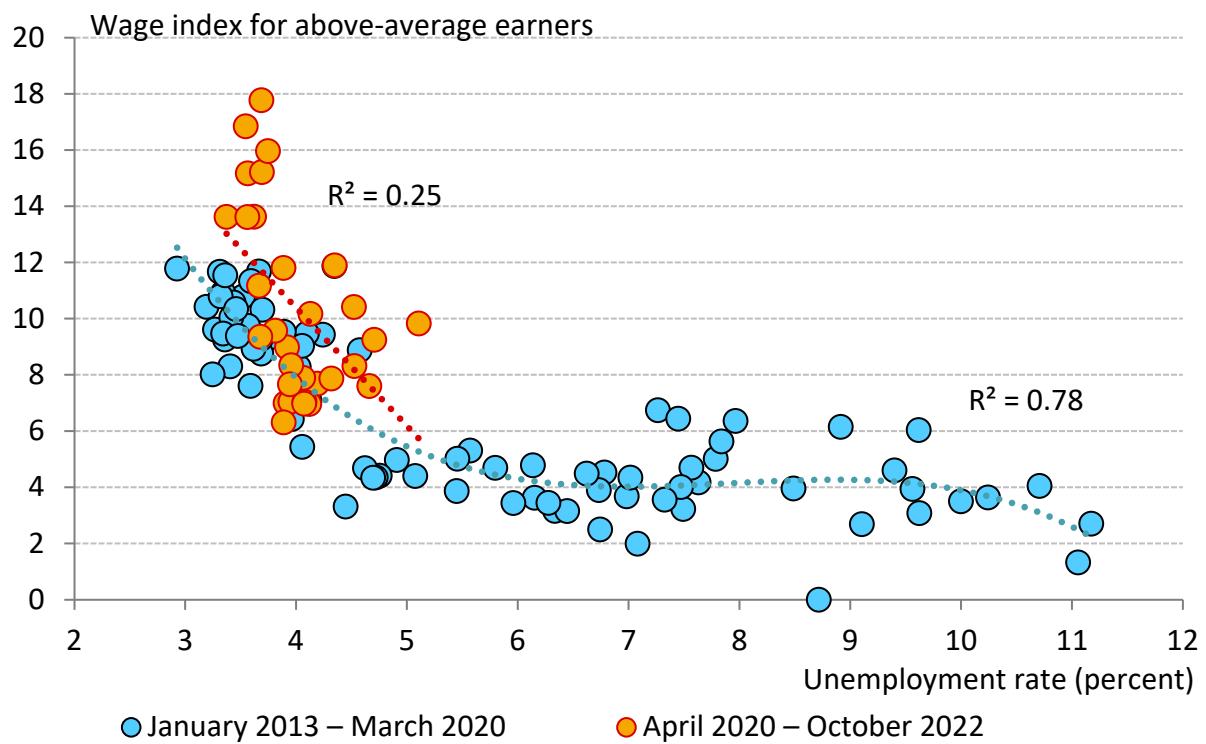
Sources: HCSO; MNB-calculation

The Phillips curve in Hungary shifted upwards and became steeper, indicating a non-linear, state-dependent relationship between the economic cycle and inflation. The labour market may have contributed to the price-determining Phillips curve becoming steeper through two channels: via a change in the relationship between unemployment and wage increases (in the change in the wage Phillips curve) or via a strengthening of relations between wages and inflation. We have not found convincing evidence for the former, whereas the latter assumption plays an important role in the Phillips curve becoming steeper.

The wage Phillips curve seems to be a more stable relationship than the price Phillips curve, which suggests that inflation has not been the main reason for raising wages. In the current labour market situation, low unemployment – and the tight labour market that comes with it – improves employees' bargaining position during wage negotiations. Administrative measures affect wage dynamic considerably; therefore, in order to obtain a clearer picture of the underlying wage-setting trends, our calculation is based on the wage index of those who earn above the average (Graph 5). As the data show, the regression lines do not differ much between the two examined periods. This means that there is no new, strong relationship between the two variables. This is also important because we can only speak about a wage-price spiral when positive feedback between the two Phillips curves occurs – this cannot be detected in Hungary at present.

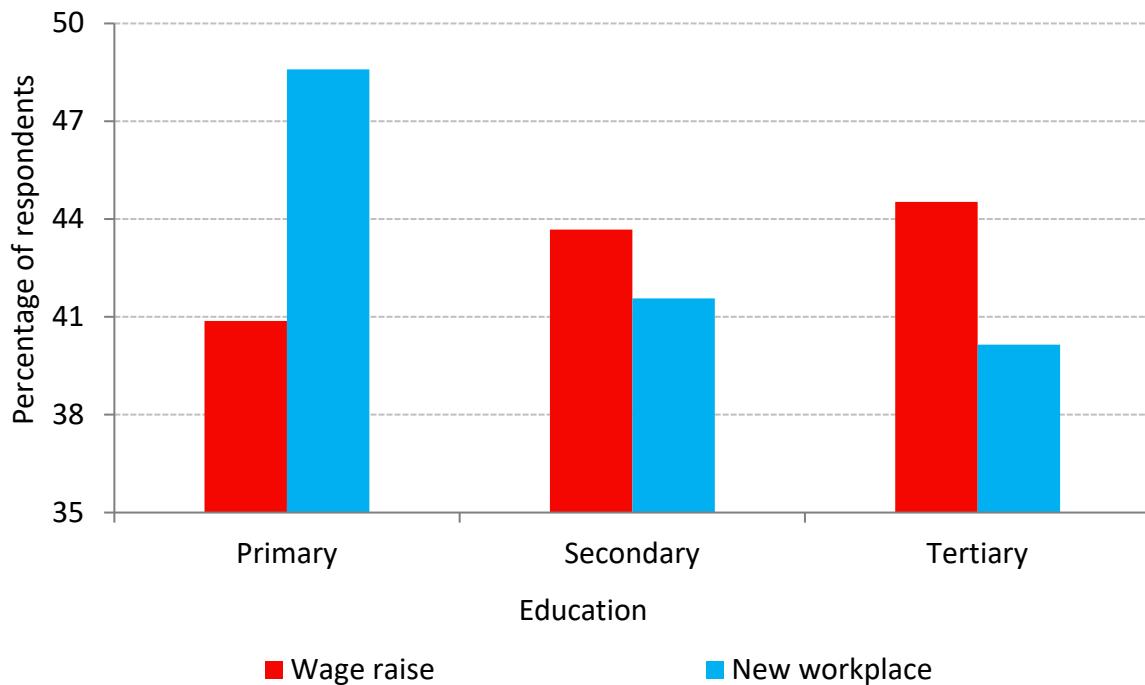
Relationship between wage dynamics and unemployment rate between 2013 and 2022

Graph 5



Sources: HCSO; MNB-calculation

To protect against the effects of high inflation, employees behave differently based on their levels of education. According to an MNB survey, while most of the low-skilled workers seek to increase their wages by changing workplaces, while mid- and highly-skilled workers tend to make wage demands at their current workplaces (Graph 6). The flow of low-skilled workers to jobs with somewhat higher wages raises the overall productivity of the corporate sector through the compound effect. While this may increase the aggregate demand in the economy, it does not cause wage inflation on the supply side, as productivity increases proportionally with wages.



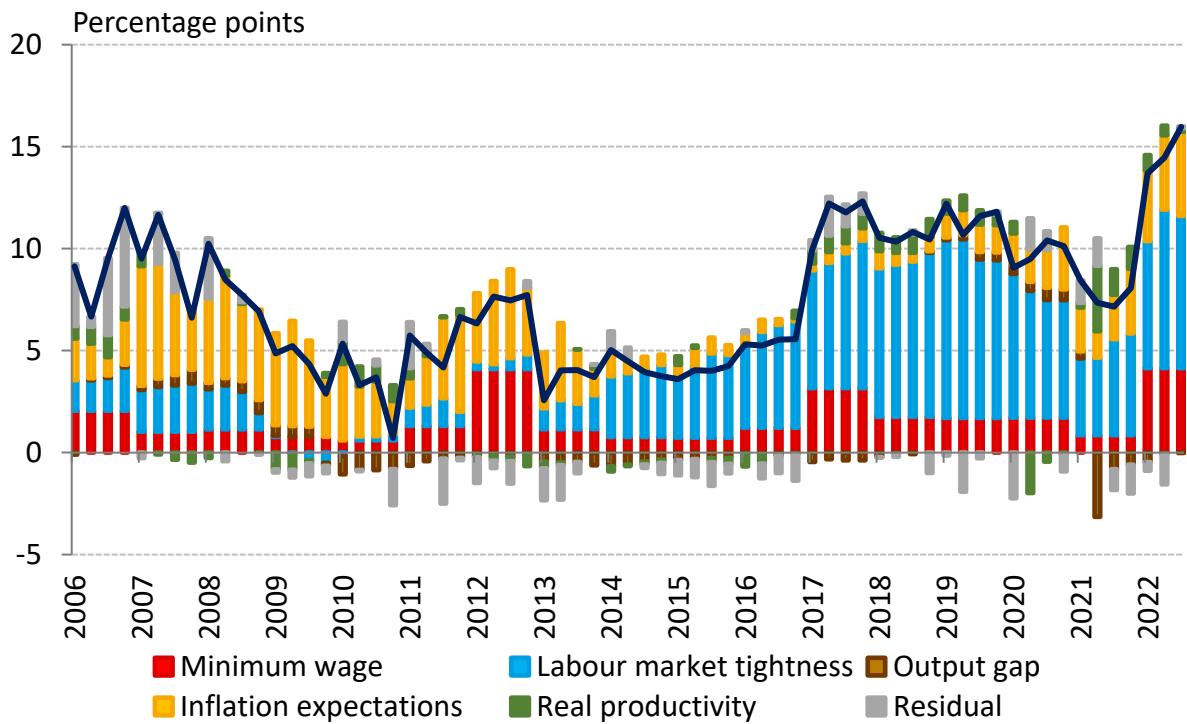
Source: MNB survey

3.1 Labour market tightness

Wage dynamics in 2022 can be explained to a great extent by the historically tight labour market. After 2013, the degree of labour market tightness mainly determined the development of the annual change in average earnings in the private sector, while earlier inflation expectations had the greatest explanatory power (Graph 7). The tightness of the labour market explained almost 8% of private sector wage dynamics in the third quarter of 2022. In addition to these factors, accelerating wage dynamics in recent quarters were boosted to a lesser extent by higher inflation expectations.

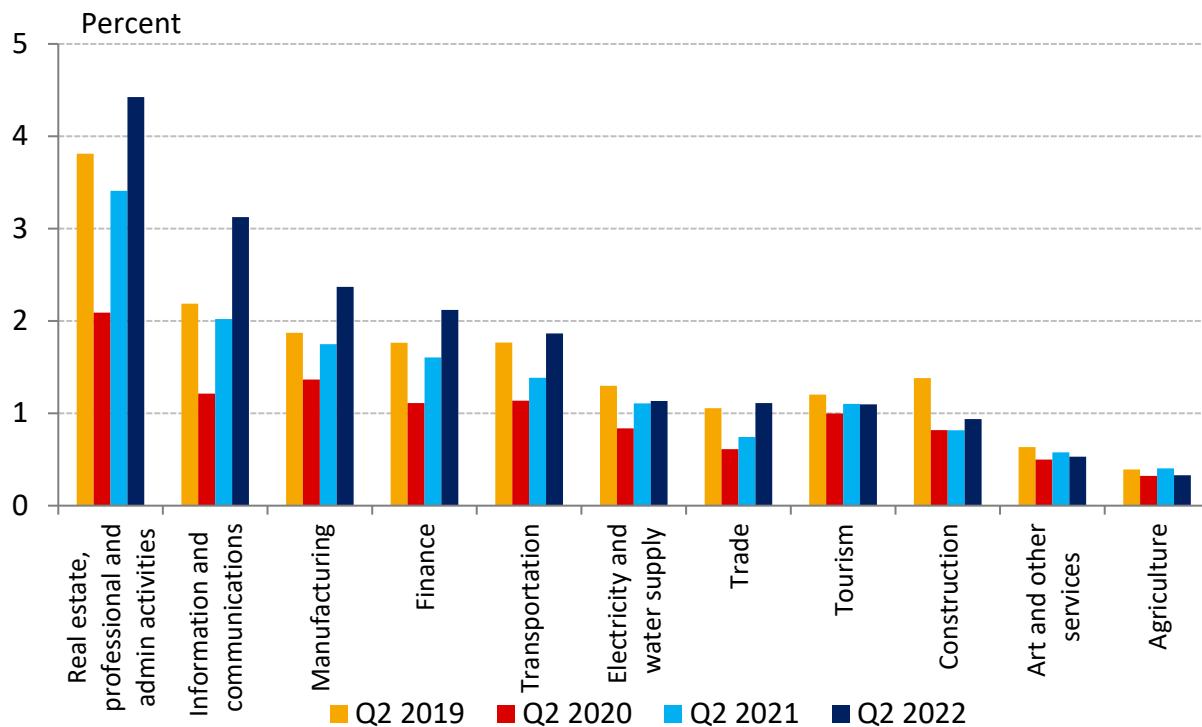
The decomposition of the annual private sector wage dynamics

Graph 7



Source: MNB-calculation

Labour demand remains strong in Hungary, facing supply constraints in some sectors. Overall employment has reached a historically high level, while labour market tightness is above the pre-pandemic level. Sectoral tightness is significant in some service sectors and there were already labour bottlenecks in the second quarter of 2022 in the information and communications, finance and real estate sectors, as well as in other professional services sectors (Graph 8).



Source: HSCO

Wage development at companies has become increasingly important to retaining workforces. In the current historically tight labour market, companies have to compete to retain workers and fill vacancies. Therefore, workers' wage bargaining position continuously improves, which leads to robust wage growth. As a consequence of the declining free labour capacities, underlying wage developments remain strong.

3.2 Minimum wage and guaranteed minimum wage increases

In addition to the rise in the underlying trends of wages, the minimum wage and the guaranteed minimum wage increase contributed significantly to wage growth in the private sector. The guaranteed minimum wage applies to those with at least a secondary education. In 2022, the minimum wage was increased by 19.5% and the guaranteed minimum wage by 18.5%, the former being the highest, the latter being the second highest increase in the last 15 years. According to our calculations, the proportion of those employed on the minimum wage today is approximately 8% and the proportion of those earning the expected minimum wage is approximately 12%, so every fifth employee will be directly affected by the measure. It means that the wage increase directly affects more than one million employees, while via wage compression it may exert an effect up to the level of gross average earnings, thus influencing the wages of 2.5 million employees in total (somewhat more than half of the total of 4.6–4.7 million employees).

The cost side inflation effect was offset by reductions in the corporate tax burden. In 2022, company contributions were reduced by 4 percentage points (social contribution tax by 2.5 percentage points and vocational training contribution by 1.5 percentage points), the small business tax was decreased to 10%, and the local business tax allowance has been extended until 2022. These measures offset the increase in wage costs resulting from the higher minimum wage. Accordingly, no significant inflationary effects were expected through the supply side channel.

3.3 Mid-year wage increases

One of the early signs of a wage-price spiral is non-seasonal wage increases due to high inflation expectations. Mid-year wage increases were not typical for most companies in Hungary this year. A survey conducted by the MNB shows that only a quarter of companies were planning to implement additional wage rises due to rising inflation in August, the number of these companies increased to 31.6% in October. According to Randstad's September 2022 compensation and benefits survey, 38% of the companies offered at least two salary increases this year. According to a joint survey conducted by the Publicus Institute (2022) and Népszava at the end of August, 25% of employees can expect a wage increase during the year due to inflation.

The reason for mid-year wage increases is not necessarily high inflation. The degree of wage development at companies shows that employers want to retain their employees and increasingly focus on retention instead of recruitment (Profession (2022)). This means that they will increase the salaries of workers, even during the year if necessary, due to labour shortages. On the other hand, fluctuation has become more common in Hungary and employees expect a high starting salary when they join a new company, which is often higher than other employees who have been working there for some time.

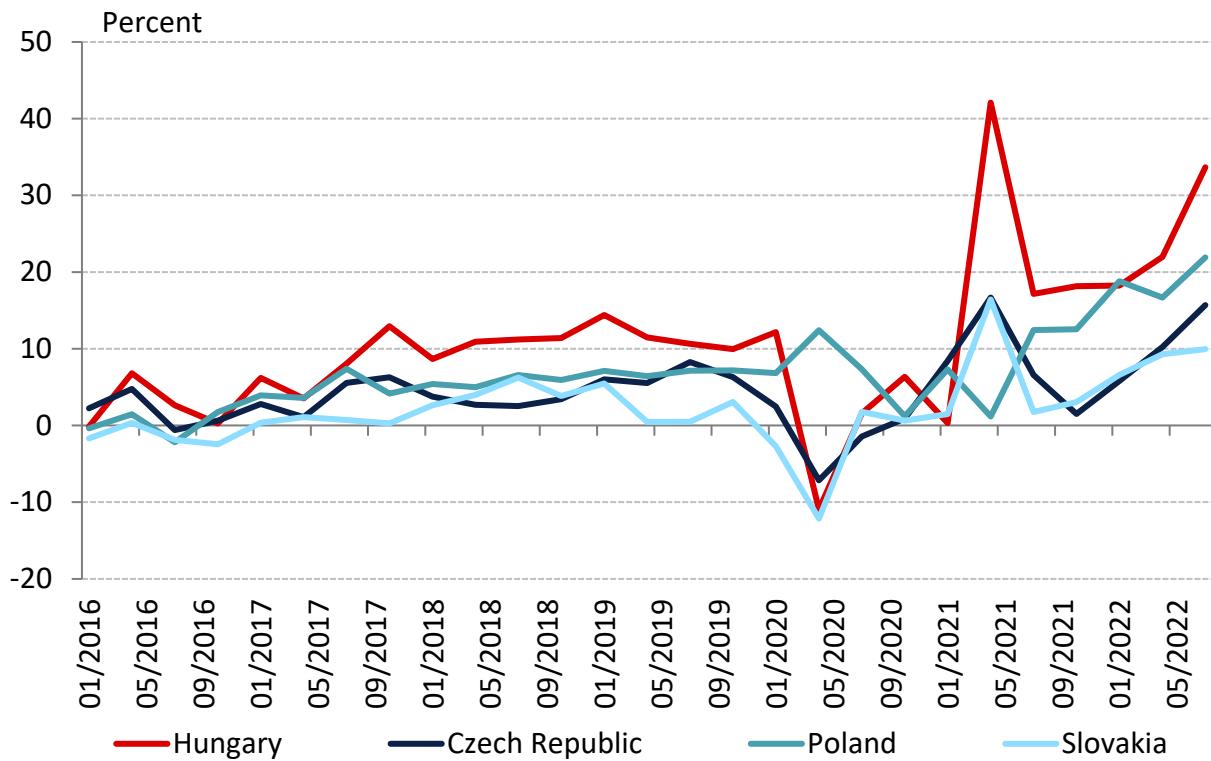
To conclude, wages are driven by the present labour market conditions, which have increased the importance of retaining the workforce. There is huge competition for labour and employers do not want to let go of prized employees. This is in accordance with the fact that an increasing number of companies are reacting to the inflationary situation by offering increases in salaries on their own initiative, and not due to external influence, preventing fluctuation.

3.4 High profit growth

In the third quarter of 2022, corporate profits increased notably in Hungary, the highest among EU countries (Graph 9) and this weighs against the presence of a price-wage spiral. The outstanding increase in profits may be due to the overpricing of products, as companies tend to increase their markups in addition to passing through commodity price increases to final consumer prices. Therefore, dynamic wage growth did not cause a deterioration in profitability.

The change in gross operating surplus and mixed income in the region

Graph 9



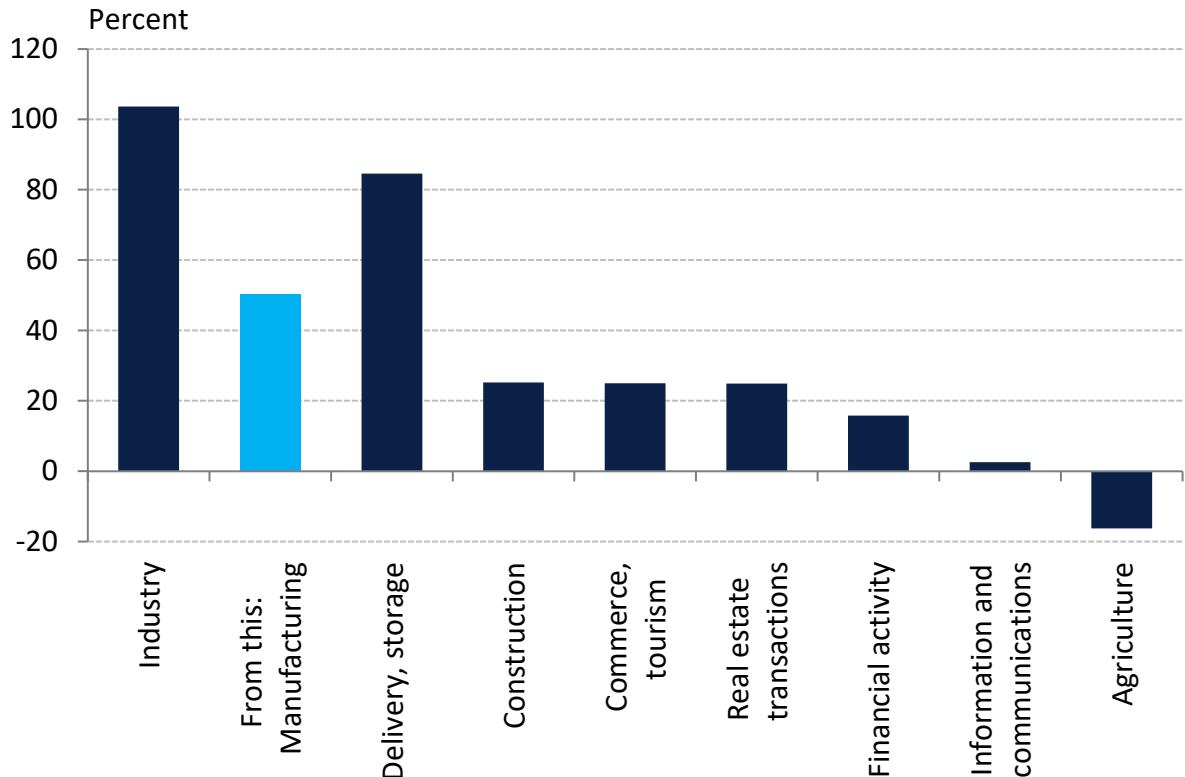
Nominal data. Annual change

Source: Eurostat

Gross operating surplus doubled in the industry sector compared with the same period of 2021. Of course, this was mainly supported by the outstanding jump in the profits of the energy industry, in connection with energy prices soaring to historic heights. High profit growth was present in a wide range of economic branches, annual change in gross operating surplus also exceeded 50% in the delivery, storage and manufacturing sectors in the third quarter. (Graph 10). The increases in profits across the board underlines that companies were able to improve profitability in parallel with increasing prices.

Annual change in gross operating surplus and mixed income in Q3 2022

Graph 10



Nominal data

Source: HSCO

4. Conclusion

High wage and price growth has been present in Hungary recently, and while high wage growth has started to be reflected in prices, inflation has not really been reflected in wages yet. Wage dynamics has been double digit for the past five years, which can mainly be explained by the tight labour market and minimum wage increases – partly compensated for significant decreases in social security contributions. In 2022, according to various surveys, only 30–40% of companies were planning to implement additional wage increases due to rising inflation, which confirms that inflation has not been the main reason for increasing wages. At the same time, the role of domestic factors has strengthened in the development of prices. In addition to stronger wage-price pass-through, low productivity in the food industry in Hungary has also caused prices to increase. Moreover, the acceleration of price growth does not reflect higher costs alone – there has been a significant rise in profits.

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India's recent inflation experience: drivers and policy responses

Michael Debabrata Patra¹

1. Introduction

With 55 per cent of its consumer price index (CPI) comprising food and energy and being a net commodity importer, India was engulfed in the global upsurge in inflation that took hold during the pandemic and was exacerbated by the war in Ukraine. This turned out to be a regime shift in India's recent inflation history. In the four years prior to the onset of the pandemic, ie from 2016, India had adopted a flexible inflation targeting framework after putting in place the necessary pre-conditions. During October 2016 to March 2020, CPI headline inflation had averaged 3.9% and was closely aligned with the target of 4 +/- 2%.

2. Drivers of the inflation surge

With a strict lockdown in response to the first wave of the pandemic in March 2020, coupled with a massive urban to rural migration fleeing from the virus, overlapping supply shocks in the form of goods and labour shortages, supply chain and logistics bottlenecks, and spillovers from spikes in international food prices (especially edible oils) pushed inflation above the upper tolerance band of 6% right up to November 2020.

Monetary and fiscal stimuli, the ensuing easing of financial conditions and the usual seasonal softening of food prices in the winter did combine to bring down inflation to 4.8% during December 2020-March 2021. This turned out to be short-lived, however, as a devastating second wave of infections aggravated domestic supply chain and logistics disruptions once again even as retail margins were raised by local suppliers in a bid to recoup lost incomes. Inflationary pressures flared up in May-June 2021 and were intensified by spillovers from hardening international commodity prices, especially of crude petroleum and edible oil. At this time, the release of pent-up demand and its rotation away from contact-intensive services to goods collided with severe supply chain pressures, container shortages and surges in shipping costs across the world. Accordingly, as imported inflation became elevated and tenacious, core inflation pressures broadened in India and became persistent.

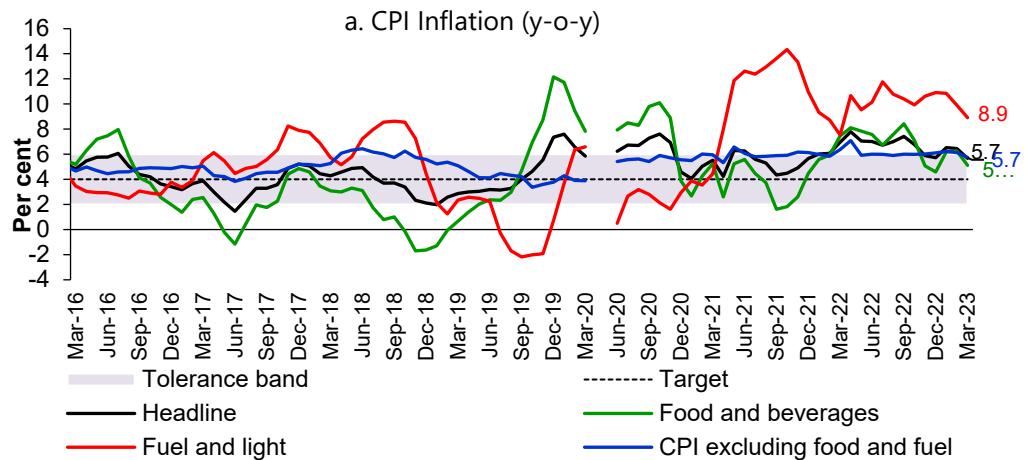
In early 2022, signs of moderation in inflation pressures were becoming evident as supply chains normalised gradually, contact-intensive services regained traction and infections ebbed as a massive national vaccination drive was undertaken. These

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developments were, however, overwhelmed by the war in Ukraine in February 2022. The initial shocks took the form of global food and fuel prices – international food prices scaled a historic high in March, and Brent crossed US\$ 100 per barrel in the same month. Sporadic domestic weather events such as heat waves and unseasonal rains also worsened inflation conditions (Graph 1 a and b).

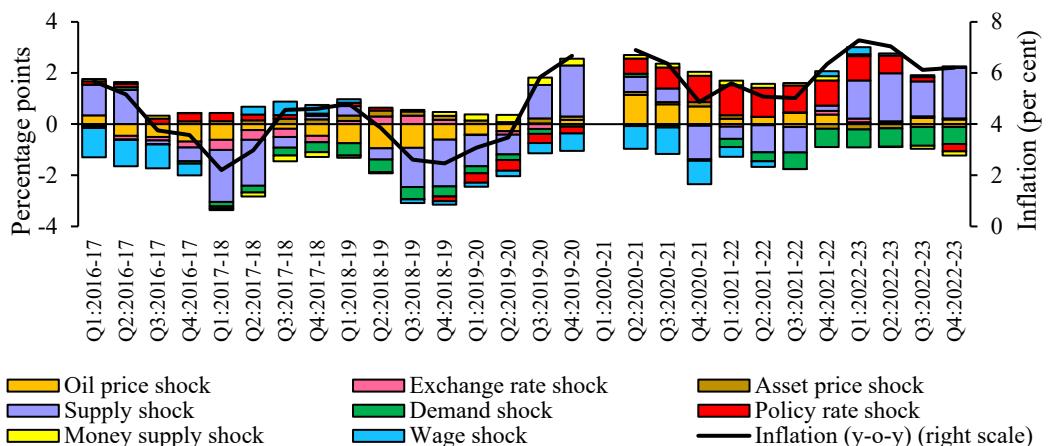
CPI inflation drivers

Graph 1



Note: The imputed CPI prints for April and May 2020 are regarded as a break in the CPI series.

b. Decomposition of CPI Inflation*



* Deviation from deterministic trend.

Note: Estimated using a vector autoregression over the sample period (Q4:2010-11 to Q4:2022-23). The VAR can be written in reduced form as: $Y_t = c + A Y_{t-1} + e_t$, where e_t represents a vector of shocks. Using Wold decomposition, Y_t can be represented as a function of its deterministic trend and sum of all the shocks e_t .

What started as multiple food and energy price shocks started getting generalised in the ensuing months as aggregate demand recovered and spending on services – especially recreation, hospitality and travel – resumed. Firms regained pricing power and input costs got increasingly passed on to retail prices. With

headline inflation remaining above the upper tolerance band for three consecutive quarters (Q1, Q2 and Q3 of 2021) accountability procedures mandated in legislation were triggered. The Reserve Bank of India submitted a report to the Government of India in November 2022 explaining the reasons for the persistent deviation of inflation from the target, the actions contemplated to return it to target and the time frame over which this was expected to happen.

Based on the influential work on a two-regime view of inflation with focus on transitions (Borio et al (2023)), an analysis of the properties of inflation regimes in India using a Markov switching model, suggest that since the fourth quarter of 2022, there is a rising probability of the Indian economy transiting away from the high inflation regime. Absent unfavourable idiosyncratic shocks, conditions are right for the early signs of grudging disinflation to firm up into a central tendency. Inflation persistence and trend are on the decline, indicating that inflation expectations are slowly getting re-anchored as monetary policy actions – an effective increase of 290 basis points in the policy rate, supported by the withdrawal of liquidity – and stance gain traction and aggregate demand is getting restrained. Individual sub-groups in the CPI are exhibiting higher volatility – sporadic supply shocks are still at work – but, importantly, covariance is declining. This suggests that generalisation of inflationary pressures is on the ebb. Increasingly localised price movements are influencing headline inflation. This calls for fine-tuning measures to align demand and supply of specific goods and services, which lies outside the realm of monetary policy but are being undertaken on an ongoing basis to head off potential price pressures from spreading. Additional evidence is found in the decline in the month-on-month momentum of core inflation, reinforcing empirical support that a low inflation regime may be setting in and that headline inflation will converge to its core. As demand pull is increasingly gaining traction, however, monetary policy has to remain in readiness to act pre-emptively to ensure that the disinflation that is underway is not interrupted till inflation aligns with the target of 4% (Patra et al (2023)).

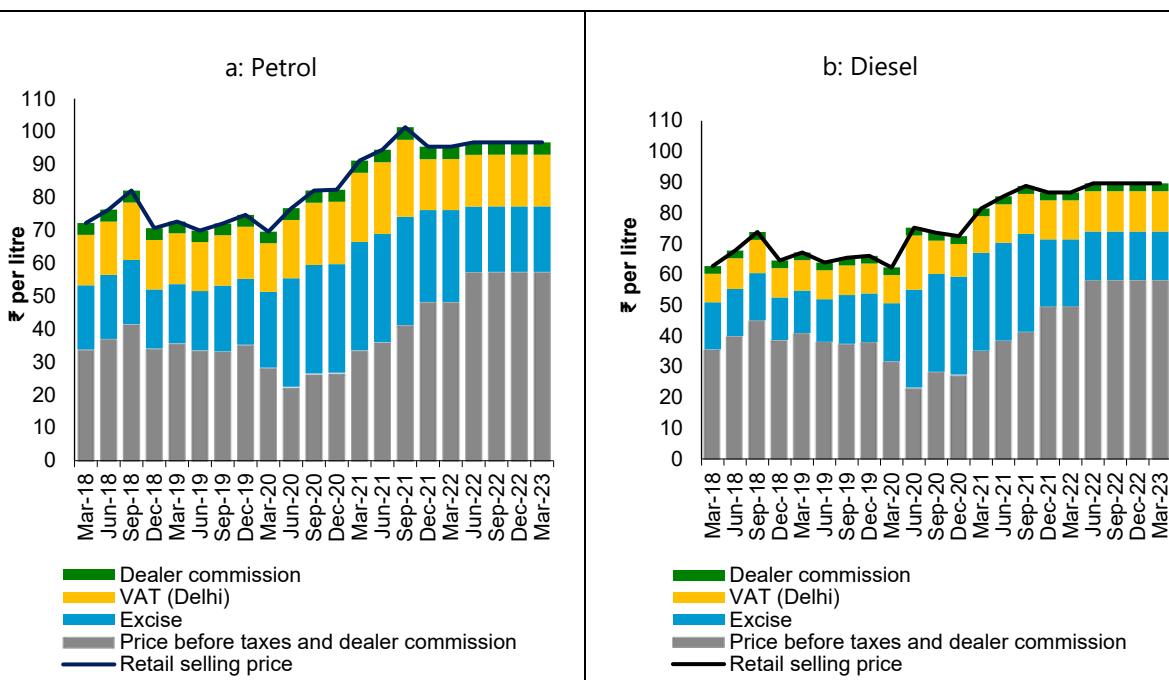
3. Supply side measures

India imports around 85% of its crude oil requirements and domestic pump prices are benchmarked to international prices. Fuel (including petrol and diesel) constitutes around 9% of the CPI and, in addition to direct effects on headline inflation, indirect effects are transmitted through transportation costs to product prices. At the start of the pandemic in 2020, fiscal measures in the form of higher taxes on domestic pump prices were announced to fund pandemic related expenditures. In 2021, however, as international commodity prices rose sharply, excise duties on petrol and diesel were reduced by 15% and 32%, respectively, in November. The spike in energy prices since the start of the conflict in Europe in February 2022 brought in its train a direct impact on domestic headline inflation as well as second-round pressures. In order to shield the economy from this geopolitically induced shock, excise duties on petroleum products were further reduced by 28% in May 2022 (leading to a cumulative excise duty reduction of 40% and 50% for petrol and diesel, respectively, since November

2021)² along with a freeze on domestic energy prices and a one-time grant to oil marketing companies to compensate for their losses (Graph 2).

Price build-up of petroleum products

Graph 2



Note: Price build-up based on Indian Oil Corporation Limited pump prices for Delhi.

Sources: IOCL; and PPAC.

Import taxes on pulses, edible oils, vegetables, plastic products, steel, cotton, rough diamonds, gemstones, chemical products and key industrial inputs were reduced to mitigate cost-push pressures. Fiscal outlays on spending on food and fertiliser subsidies were increased to keep input costs for farm production under check. Assured access to essential food items at subsidised prices to all poor, needy and vulnerable households covering around two-thirds of India's population was provided. Cereal and sugar exports were temporarily suspended in order to augment domestic supply. Stocking limits on edible oils and oilseeds were extended.

On the whole, analysis based on historical pass-through estimates indicates that between 2021 and Q2 2022 (when international energy prices peaked), the cumulative excise duty reductions and price freeze on domestic petrol and diesel translated to lowering headline CPI inflation by around 50 basis points. In addition, the lower pass-through of international LPG prices resulted in a reduction in CPI inflation by around 20 basis points.

² Excise duty on petrol was reduced by INR5 per litre and on diesel by INR10 per litre on November 4, 2021. It was further reduced by INR8 per litre for petrol and INR6 per litre for diesel on May 22, 2022, leading to a cumulative reduction in excise duty on petrol and diesel by INR13 per litre and INR16 per litre, respectively. With these two rounds of reductions, the excise duties of petrol and diesel were reversed to pre-pandemic levels.

4. Labour markets and inflation dynamics

In India, the large size of the informal sector in employment and the existence of disguised employment in agriculture makes the assessment of structural characteristics of the labour market challenging.³ Cyclical features of labour market dynamics are gauged on the basis of official and private surveys covering rural and urban areas.⁴ In addition, job flows in the organised sector are assessed on the basis of social security contributions.⁵ Information on wages is gleaned from official surveys of rural wages,⁶ while for the organised sector, it is extracted from staff costs in financial results of listed companies. Information on vacancies/hiring is obtained from open online sources. Sentiments on labour market conditions and outlook are collected from surveys of consumer confidence and enterprise perceptions.

These indicators suggest that the unemployment rate has eased below its pre-pandemic level, while the labour force participation rate is still lagging. New hiring in the organised sector has crossed pre-pandemic levels. The demand for employment at the government guaranteed minimum wage had risen strongly during the pandemic; since July 2022, however, it has fallen but remains above pre-pandemic levels, indicating that employment opportunities are being gradually restored on farms as well as allied activities. Vacancies in the organised sector, especially in real estate, hospitality, chemicals, pharmaceuticals, biotech and gems and jewellery are above pre-pandemic levels. Forward-looking surveys suggest that consumers' perceptions about the employment situation have improved but they are still in the pessimistic zone. One year ahead expectations are optimistic but lower than the pre-war period. Enterprises in manufacturing, services and infrastructure sectors are optimistic about future employment prospects.

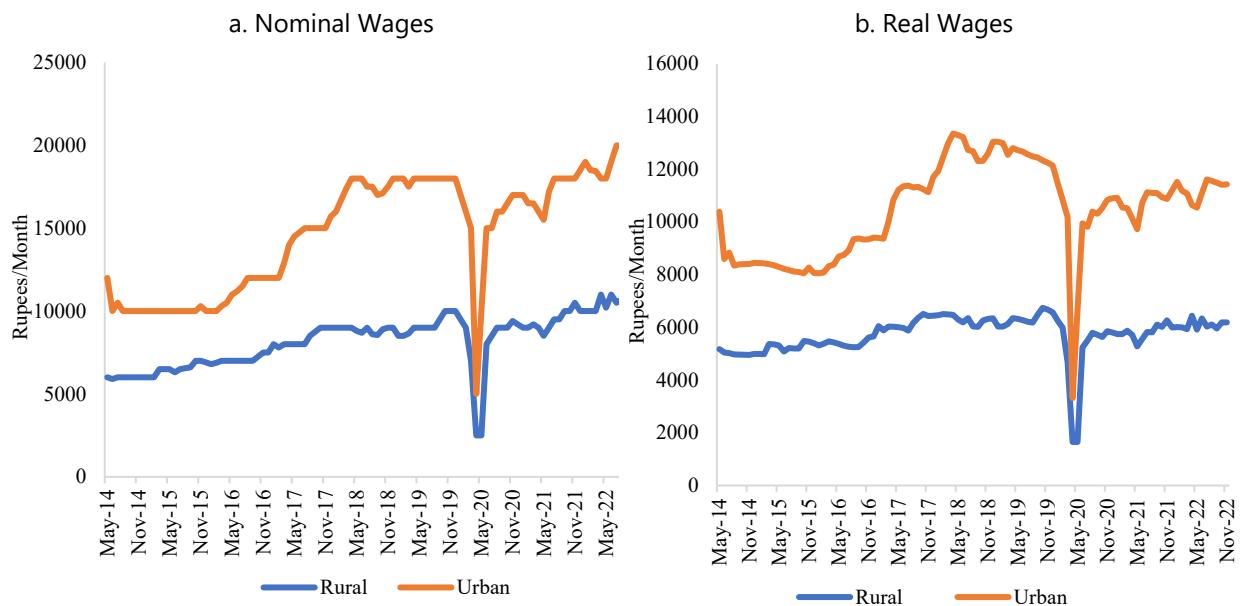
Both nominal and real rural wages declined sharply during the first wave of the pandemic. Real wages have remained flat since then, posing a downside to private consumption demand (Graph 3).

³ An Annual Survey of Industries (ASI) provides estimates of employment, man-days employed and emoluments paid in the factory sector for each 2-digit/3-digit industry group (NIC-2008) for each State/UT and for each 4-digit industry group at the all-India level. While these data can be used for understanding the structural characteristics of the labour market, the lag in their availability of up to 2 years makes them less relevant for monetary policy formulation.

⁴ The Periodic Labour Force Survey (PLFS), published by National Sample Survey Office (NSSO) since April 2017, consists of two components: (i) employment and unemployment indicators for both rural and urban areas annually (July-June period) and (ii) quarterly employment and unemployment indicators for the urban areas. The Centre for Monitoring Indian Economy's (CMIE) survey-based data for employment situation for both rural and urban areas on a weekly basis are analysed.

⁵ In the organised sector, data from Employees' Provident Fund Organisation (EPFO), Employees' State Insurance Corporation (ESIC) and National Pension System (NPS) scheme are analysed to track the change in net subscribers over a given period.

⁶ The Labour Bureau, Government of India provides information on daily wage rates in agricultural and non-agricultural occupations.



Source: CMIE.

For the organised corporate sector, the results of a vector error correction model suggest that there is one-way long-run causality from the per employee staff costs to urban consumer prices, with long-run coefficient below unity indicating no wage-price spiral (Graph 4).⁷ On the other hand, there is a bi-directional convergence between rural wage growth rate and rural consumer price inflation, with a stronger impact from inflation to wages than from wages to inflation, suggesting that a rural wage-price spiral may develop if high inflation persists.⁸ This is backed by empirical estimates which suggest that changes in rural prices have a positive and significant impact on changes in nominal agricultural wages, but the latter do not adjust completely to changes in prices (Kundu (2019); RBI (2022)). The impact of growth in wage income of households on inflation has marginally increased in the post-COVID period, though it remains less than one for one to cause any wage-price spiral.

⁷ Manufacturing:

$$\Delta cpi_t = -0.05^{**}(cpi_t - 0.75^{***}wage_t - 2.03) + 0.28^* \Delta cpi_{t-1} - 0.07^{***} \Delta wage_{t-1} + 0.01$$

$$\Delta wage_t = 0.17(cpi_t - 0.75^{***}wage_t - 2.03) + 0.52\Delta cpi_{t-1} - 0.22\Delta wage_{t-1} + 0.01$$

Services:

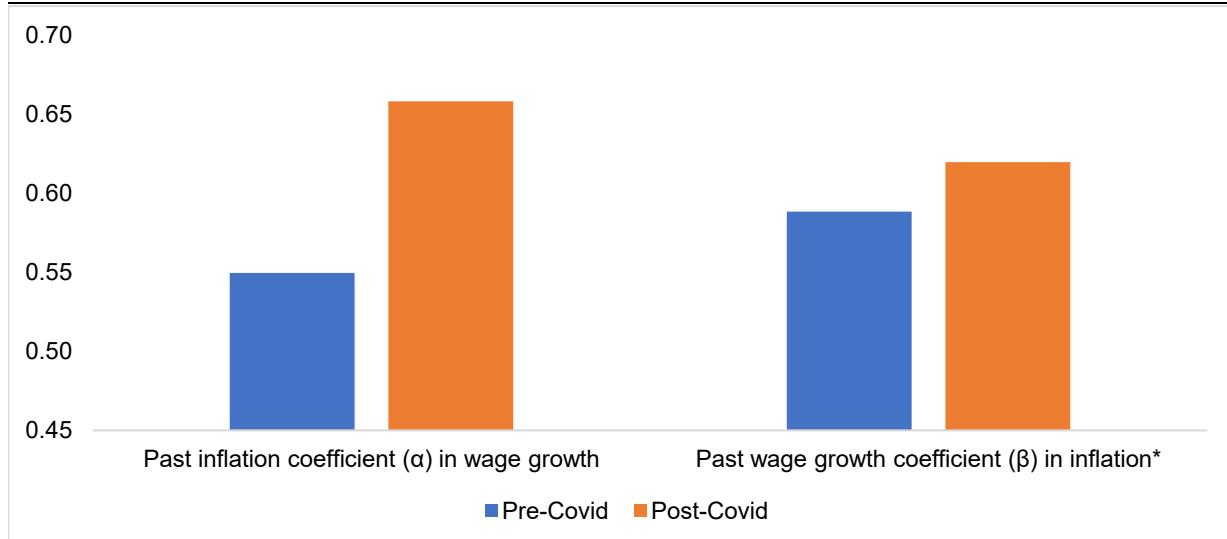
$$\Delta cpi_t = -0.08^{***}(cpi_t - 0.49^{***}cpi_t - 3.06) + 0.08\Delta cpi_{t-1} - 0.14\Delta cpi_{t-2} - 0.06^{**}\Delta wage_{t-1} + 0.02\Delta wage_{t-2} + 0.02$$

$$\Delta wage_t = 0.02(cpi_t - 0.49^{***}wage_t - 3.06) + 0.30\Delta cpi_{t-1} - 1.62^*\Delta cpi_{t-2} + 0.04\Delta wage_{t-1} + 0.38^{***}\Delta wage_{t-2} + 0.03]$$

⁸ $\Delta w = -0.1^{***}(w_t - 0.97^{***}p_t - 0.44) + 0.21^* \Delta w_{t-1} - 1.00$

$$\Delta p_t = -0.06^{**}(w_t - 0.97^{***}p_t - 0.44) + 2.23$$

* , ** , *** , refers to significance at 10 per cent, 5 per cent, 1 per cent levels, respectively.



Note: Estimations are based on following two equations:

$$[\text{inflation}]_{-(t+6)} = \mu + \alpha [\text{wage growth}]_t + \gamma [\text{unemployment gap}]_t$$

$$[\text{wage growth}]_{-(t+6)} = \omega + \beta [\text{inflation}]_t + \varphi [\text{unemployment gap}]_t$$

*: Statistically not significant at 10 per cent level.

Source: RBI Staff estimates based CMIE Consumer Pyramid Data.t

In the organised manufacturing sector, there is little evidence of household inflation expectations leading to higher wages, which may be reflecting weakening bargaining power of labour because of factors such as globalisation and cheaper imports, automation, monopsony power of employers due to concentration of production in large firms and weakening unionisation. In the services sector, however, there is some evidence of inflation expectations exerting pressure on wages (Pattanaik et al (2020)).

Cyclical influences in the labour market such as slack or tightness are measured by the unemployment gap (actual unemployment rate minus its trend). When the unemployment gap is used as a proxy for marginal cost in a new Keynesian hybrid Phillips curve framework to analyse the trade-off between inflation and unemployment and to forecast inflation, the Phillips curve is steeper (coefficient is 0.2) relative to when the output gap is used (coefficient is 0.07),⁹ validating the empirical regularity enshrined in Okun's Law¹⁰ (Graph 5). A unit increase in the unemployment gap (ie unemployment rate relative to trend) lowers inflation by around 20 basis points. The unemployment gap had increased to 3% during the pandemic in the third quarter of 2020 from almost zero in the fourth quarter of 2019,

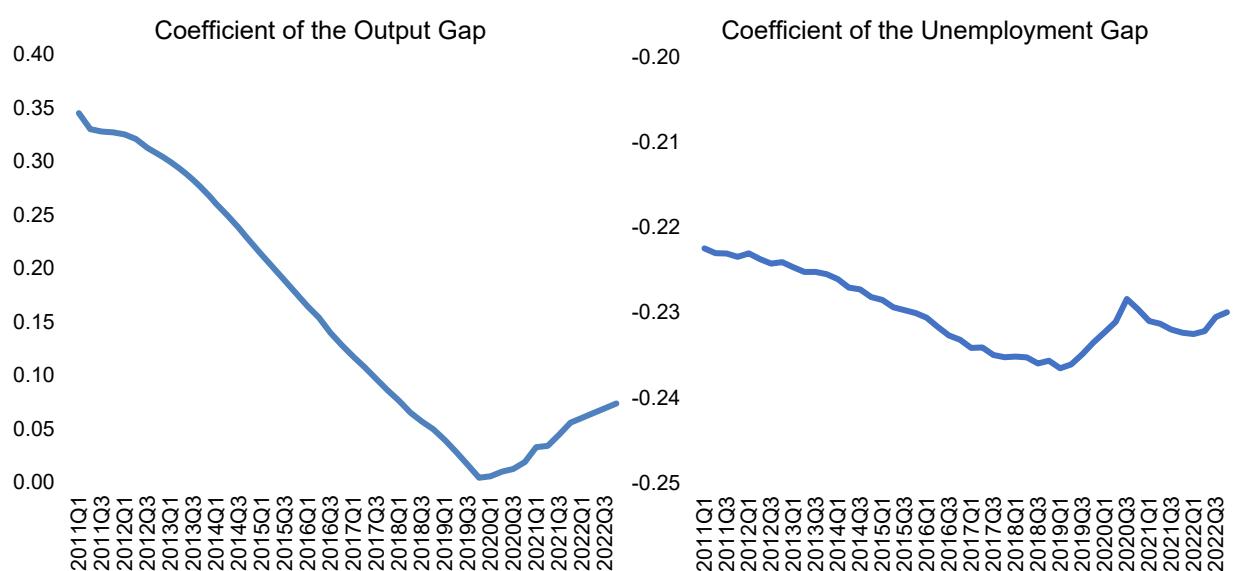
⁹ Patra et al (2021) found that the slope of the Phillips curve in India flattened from 2011 to the first half of 2020. From the second half of 2020, it has started steepening. The responsiveness of inflation to the output gap rises when the gap is positive.

¹⁰ The relationship between unemployment and output – a 1% increase in unemployment will usually be associated with a 2% drop in GDP in India.

reflecting extreme slack in the labour market as people dropped out of employment to escape infection/lockdown. The unemployment gap has turned negative since the second quarter of 2021 as migrant labourers returned to workplaces and a rebound in contact-intensive services took hold.

Time-varying slope of the Phillips curve

Graph 5



Source: RBI Staff estimates.

5. Conclusion

The experience with the recent elevation in inflation in India and across the world has been a defining one. The question confronting policy makers is: is it behind us and will inflation make its tryst with its target over the next two years? Or, have the structural characteristics of inflation information changed? The dynamics observed since the pandemic and the war have formed under high uncertainty and are, therefore, potentially vulnerable to shifts. Hence, they need to be regularly updated with new information and better-quality surveys. Both are work in progress.

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Bank Indonesia's short note for the BIS Annual Meeting of Emerging Market Deputy Governors

Inflation and labour markets in the wake of the pandemic

November 2022

Inflation in Indonesia showed an increase, although below the initial estimate. The increase was mainly driven by higher fuel prices amid the gradual improvement in domestic demand. The labour market is recovering in the wake of the pandemic, with no signs of tightening. Thus, additional inflationary pressure originating from a wage-price spiral is not likely to happen in the near future. Labour market structural reform, especially concerning the minimum wage setting, also contributed positively to more controlled inflation, particularly wage-induced inflation. Labour market developments and their potential impact on inflation is one of the considerations in the formulation of Bank Indonesia's monetary policy.

Inflation in the wake of the pandemic

Soaring global food and energy prices, coupled with higher fuel prices at home, continue to be the main drivers of inflation, amid the gradual improvement in domestic demand. Global inflationary pressures continue to intensify in response to high commodity prices caused by supply chain disruptions given the ongoing geopolitical tensions between Russia and Ukraine, coupled with the proliferation of inward-looking policies. These persistently high global prices have become the source of cost-push inflation, especially through imported inflation. Such increases will affect consumer price index (CPI) inflation through its components: volatile food (VF) and administered prices, and will have second-round impacts on core inflation and inflation expectations.

However, for Indonesia, inflation is lower than initially projected. The CPI in October 2022 stood at 5.71% (yoy), a decrease from 5.95% (yoy) the month earlier. Inflation in October 2022 was lower than previously projected because the impact of fuel price hikes on volatile food and administered prices was weaker than initially forecasted. Volatile food inflation decreased to 7.19% (yoy), in line with close policy coordination and synergy between Bank Indonesia and the Government through the Central Inflation Control Teams (TPIP) and Regional Inflation Control Teams (TPIP), as well as National Movement for Food Inflation Control (GNPIP), which aim to safeguard supply availability, seamless distribution, price stability and effective communication. The administered prices inflation was also lower than previously expected, namely 13.28% (yoy). Meanwhile, low core inflation was maintained at 3.31% (yoy), given the weaker second-round effect of fuel price adjustments, coupled with mild inflationary pressures from the demand side and stabilization policies implemented by Bank Indonesia. Bank Indonesia expects lower inflation in 2022 than

previously projected, despite still exceeding the upper limit of the $3.0\% \pm 1\%$ target. Policy synergy between the central/regional government and Bank Indonesia will be strengthened to restore inflation to the target corridor.

On labour markets

In Indonesia, the labour market is recovering with no sign of tightening. The recovery is reflected in the decrease of the unemployment rate to 5.83% in February 2022 from the spike to 7.07% in August 2020, although it was still higher than the pre-pandemic level of 4.94% in February 2020. The support provided by fiscal and monetary stimulus as well as well-coordinated national policies through the Financial System Stability Committee (KSSK) is aimed at accelerating the domestic economic recovery, export performance, and improve economic activity and public mobility. The recovery is also supported by a better structure of the labour market as shown by an increase in the share of formal workers from 39.53% in August 2020 to 40.00% in February 2022, although still lower than the pre-pandemic figure of 43.36%. Nonetheless, as the supply of Labour is still high, there is no sign of tightening in the labour market.

In line with the recovery, wage growth is gradually increasing. However, increases in wages are not as rapid as the increase in inflation, as inflation rate pressure is intensifying in response to high and volatile commodity prices. Relatively faster recovery of the labour supply side compared with the recovery of the labour demand side also contributes to the slower pace of wage increases. Furthermore, wage increases are still uneven. The services sector had the largest wage increases as mobility improved, while wage increases in the manufacturing sector remained restrained. The wage increases in primary sectors (agriculture and mining) also increased slightly, although these were still lower than in the services sector.

Considering recent developments in Indonesia's labour market, Bank Indonesia believes that a risk of a wage-price spiral in Indonesia in the near future is still low. Historically, wage growth and inflation are moderately correlated, and workers have collective bargaining power, as reflected by relatively high trade union density. However, Bank Indonesia is of the view that the risk of a wage-price spiral in Indonesia is still relatively low for a number of reasons: (i) relatively loose labour market conditions due to the dominance of informal workers; (ii) weak individual bargaining power; and (iii) continued low firm pricing power due to the ongoing recovery.

Inflation and labour markets: structural aspects

On the structural aspects of inflation

Bank Indonesia is of the view that several structural improvements have had a positive impact in supporting inflation control efforts amid increasing domestic inflationary pressures due to rising global commodity prices. These include:

- The stronger role of inflation expectations in inflation formation in Indonesia. In addition, the inflation expectation remained anchored to the inflation target. This

reflects an increase in Bank Indonesia's credibility given its track record of keeping inflation within the target.

- A relatively manageable exchange rate movement with a lower exchange rate pass-through to inflation. Lower exchange rate pass-through is also the result of central bank policy to maintain exchange rate stability in line with the currency's fundamental value. Consequently, both developments have made it unnecessary for producers to adjust the prices of final products frequently and abruptly due to exchange rate movements. Competitive rivalry among producers also leads to more competitive pricing policy especially in the digital era. Therefore, the impact of cost-push inflation due to pricing dynamics is limited, as producers absorb some of the price increases by increasing efficiency or reducing profit margin, among others.
- Consistent government policies in improving Indonesia's infrastructure, including providing better connectivity infrastructure to support more efficient distribution of goods and services. This policy helps to create more efficient distribution/logistics services that supports the availability of goods, particularly staple foods.

On the structural aspects of labour markets

In Indonesia, the setting of the minimum wage is indexed to inflation and economic growth while also taking other factors into account, including labour conditions. These changes are in line with the wage reforms carried out by the government since 2015. The provincial minimum wage (UMP) has become the main benchmark for wages for businesses. The minimum wage is determined by the provincial governor, following recommendations from the provincial and/or district wage councils. In addition, the governor of the province may also impose a city or regency minimum wage if that regency or city's economic growth has been higher, for the past three years, than that of the province in which it is located. The minimum wage applies to all workers who have been working in a company for less than one year. After one year, an employee is eligible to be paid in accordance with the pay scale of a particular company. Nevertheless, setting wages for these employees no longer refers to the government's minimum wage. In this regard, wage setting is more of a bilateral agreement between employers and workers.

The minimum wage setting reform, first implemented in 2015, has had a positive impact on controlling inflation, particularly wage-induced inflation. Prior to these reforms, the determination of minimum wages was more irregular, as they did not follow a standard formulation or process. Such conditions, in turn, could drive second-round pressures on wage inflation that were not regulated by the government. With increased certainty in the formulation after the reform, inflation from the wage side becomes more predictable so that its impact on inflation, mainly through the demand side, can be controlled.

On post-pandemic effects on the labour market

The Covid-19 pandemic has the potential to cause scarring to the economy. Economic capacity and employment declined from their normal paths. The potential

for scarring exists, although it differs between sectors. Differential impacts across sectors may depend on whether a sector is a high or low contact in nature, the degree to which it was affected by the pandemic, and whether or not it is an essential sector. Sectors that were hurt during the pandemic face different paths of recovery and the potential scarring in each sector is different. Scarring depends on the recovery and also impacts the recovery. AEs with limited scarring may be able to recover faster, while EMs and LICs with larger scarring will recover more slowly.

For Indonesia, the potential for scarring during the current pandemic period is significantly lower than that of during the Asian financial crisis. This is in line with the relatively faster economic recovery, which has boosted improvements in labour demand, and national policy packages implemented to mitigate the impact of Covid-19 pandemic on Indonesia's economy. The recovery is reflected in the decrease of the unemployment rate to 5.83% in February 2022, down from the spike to 7.07% in August 2020. The recovery is also reflected in sectoral labour absorption in line with the reopening of the economy.

To mitigate the risk of scarring and promote economic recovery, Bank Indonesia and the government are strengthening national economic policy synergies. This is to maintain the stability of macroeconomic and financial systems, and revive lending to businesses in priority sectors to stimulate economic growth and exports. Increasing economic and financial inclusion is also a goal. There are several structural avenues to mitigate the risk of scarring. These include labour reallocation to eliminate persistent unemployment and create new capabilities. Additionally, capital reallocation to modernise production and operational functions will boost investment to increase productivity. In turn, these structural changes will create an innovative environment and increase digital inclusion.

Use of labour market indicators in the policy process

Bank Indonesia makes use of labour market indicators and monitors employment dynamics in economic assessments. Labour market indicators are one of the main economic variables that determine the level of prosperity, the standard of living and the poverty level of an economy. At the same time, increasing prosperity and living standards, and minimising poverty, is one of the main goals and is included in the economic policy framework. As the monetary authority, Bank Indonesia analyses the labour market thoroughly and granularly, as well as consider the impact of labour market developments on economic growth and inflation, to determine the necessary policies to maintain stability and the momentum of the recovery.

Bank Indonesia utilizes and monitors various indicators of labour market conditions. Monitoring multiple indicators of the labour market is important to assess economic developments accurately. These include the extent to which a shift in the unemployment rate reflects labour market slack caused by the Covid-19 pandemic, the scarring effect on labour in particular sectors and industries, and differences in labour conditions that impact production. The primary source of employment data in Indonesia is the National Labour Force Survey (Sakernas), which is designed specifically to collect labour force statistics. Sakernas is also one of the

statistics used and monitored in conducting assessments on the labour market, including the labour market participation rate; job availability and creation; part-time working numbers; economic inactivity; employment shifts across sectors and between formal/informal sectors; rates of commuting among workers; and unemployment rates by education, real wages, and total working hours. Sakernas surveys are published periodically in February and August. For this reason, Bank Indonesia also utilises higher frequency data/indicators and big data processing, such as job vacancies and consumer surveys. Based on these indicators, Bank Indonesia generates assessments of the latest labour market conditions as part of the analysis of the domestic economy. These are presented to the Board of Governors at their monthly meeting, in which policies are formulated.

The formulation of monetary policy takes into account the impact of labour market developments on economic growth and inflation. Bank Indonesia continues to strengthen monetary policy by raising the policy rate. The decision to raise the policy rate was taken as a front-loaded, pre-emptive, and forward-looking measure to lower overshooting inflation expectations, make sure core inflation remains within the level of $3.0\%\pm1\%$, and return CPI inflation to the target corridor of $3.0\%\pm1\%$ in the second half semester of 2023. It was also taken to strengthen the exchange rate stabilisation policy in line with the rupiah's fundamental value in response to broad-based US dollar appreciation and elevated global financial market uncertainty to minimise imported inflation.

Labour market tightness and inflation in the aftermath of Covid-19: the case of Israel^{*}

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Abstract

This study examines the impact of Israel's labour market recovery from the Covid-19 crisis on inflation. The Covid-19 crisis significantly impacted the labour market, with a peak unemployment rate of 36% in April 2020. In response, the government implemented a full furlough programme and a safety net programme. By the end of 2021, the labour market had fully recovered, with employment and unemployment rates returning to pre-Covid-19 levels. Tight labour markets transmit inflation via wage increases, pushing inflation through the income and cost channels. However, we find that the effect of wages on inflation is not dominant for two main reasons. First, the concentration of wage increases was in industries that do not serve domestic private consumption. Second, public wages remained stagnant due to public sector wage negotiations and delays in reaching agreements.

Keywords: inflation, wages, Covid-19, labour market, slack, furlough programme, Israel.

JEL classification: E31, J64.

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1. Introduction

The Covid-19 pandemic has had a profound impact on economies around the world, and Israel is no exception. In parallel, the induced response to the pandemic as well as major geopolitical events have pushed the global economy towards a high-inflation regime. In this context, one area of particular interest is the relationship between wages and inflation, which can provide insight into the degree of second-round effects and the persistence of inflation.

In this paper, we will examine the wage-prices relationship in Israel during and after the Covid-19 pandemic. We will use standard and non-standard macro data to analyse trends in inflation and wage growth, and we will discuss the implications of our findings for the Israeli economy and for policymakers in other countries.

In our analysis, we will consider the role of government policies and industrial composition changes in shaping the relationship between wages and inflation in Israel during this period. Overall, our goal is to provide a comprehensive picture of the degree to which the labour market had a role in the acceleration of inflation in Israel during and after the Covid-19 pandemic.

Economists have discussed the possibility of a wage-price spiral in the past year, whereby rising wages lead to higher prices. According to Blanchard (1986), the phenomenon is caused by workers' attempts to keep or increase their real wages and firms' attempts to keep or increase their markup on prices over wages. Historically, Alvarez et al (2022) find that only a small fraction of global wage-price spiral episodes (defined as episodes in which at least three out of four consecutive quarters saw accelerating prices and rising nominal wages) since the early 1960s were followed by a sustained acceleration in prices and wages. Similarly, Battistini et al (2022) find that in the euro area, wage shares and GDP deflators have remained muted compared with the 1970s, and second-round effects of rising energy prices on inflation have been mostly absent on average since 1999. However, a high and persistent inflation rate increases the likelihood that higher wages and profit margins will result in second-round effects. Whether such a spiral occurs in the upcoming years depends upon the state and structure of the labour market and the persistence of elevated inflation (Boissay et al (2022)). Although the current evidence the authors provide is mixed regarding a broad acceleration in wage growth, if inflation persists, households may demand higher wages and firms may increase prices to protect profits. BIS (2022) discusses how the recent increase in inflation has led to a focus on the factors driving inflation and how it can become entrenched. Traditional models of inflation often focus on the relationship between inflation and economic activity, but a more comprehensive analysis should also consider the role of relative price changes and the wage-price formation process. In particular, during times of high inflation, workers may demand higher wages to keep up with the rising cost of living, and employers may be willing to pay these higher wages in order to attract and retain workers. On the other side, higher wages may generate more domestic demand for consumption goods and higher marginal costs of production – both of which put pressure on inflation.

The Covid-19 pandemic has introduced a new level of complexity to the relationship between inflation and wages. On the one hand, the sharp economic downturn and high levels of unemployment have put downward pressure on wages.

At the same time, the governments' response to the pandemic – including measures such as monetary and fiscal stimulus – has the potential to drive up inflation. As such, it is important to carefully examine the relationship between inflation and wages in the context of the Covid-19 pandemic.

Another issue that arose during this period relates to measurement. The non-homogeneous nature of the effect of the pandemic shock and its aftermath on the economy makes it difficult to draw conclusions from aggregate data. In particular, the entry and exit of employees from the labour market, as well as workers changing jobs between sectors, distorted the signal conveyed by commonly used variables such as the average wage, labour productivity and unemployment. Furthermore, policy responses in such circumstances may be more challenging than depicted in the typical playbook. Blunt policy easing or tightening may not be optimal when the economy is experiencing sectoral shifts.

Our analysis of the data reveals several key findings about the relationship between wages and inflation in Israel during and after the Covid-19 pandemic. First, we find that inflation in Israel increased significantly after the pandemic, but to a smaller extent than in other OECD economies. Second, we show that, to date, the labour market has not played a major role in the acceleration of inflation. However, there are risks that in the near future it may generate second-round effects.

The remainder of this paper is organised as follows. In the next section, we will provide a brief overview of developments in wages and inflation in Israel following the outbreak of the pandemic. In Section 2, we will present the methods used by the Bank of Israel in real time to measure economic slack and the state of aggregate wage growth during the major shifts caused by the pandemic. In Section 3, we will provide an overview of the results of our analysis. Finally, in Section 4 we will conclude our findings and provide some guidance and lessons for policymakers.

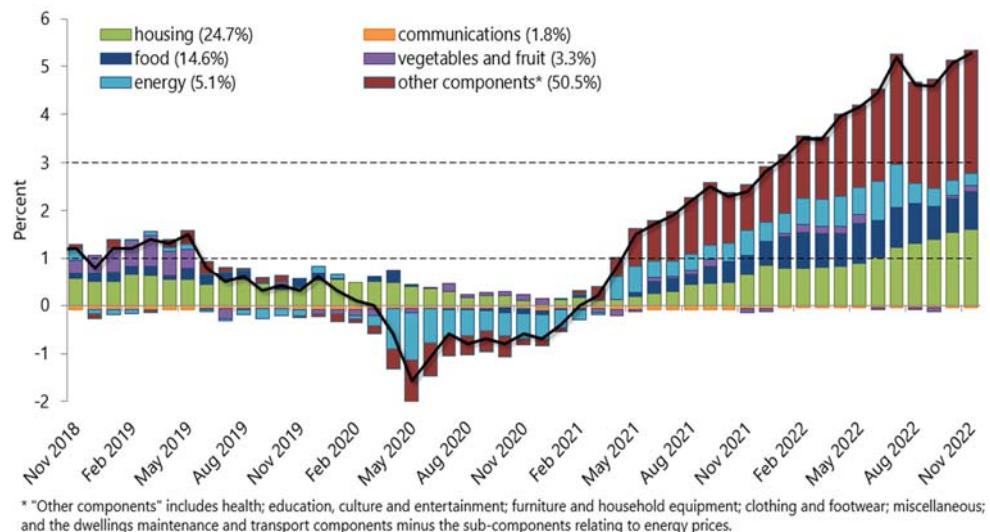
2. Recent developments

2.1 Inflation

The consumer price index declined by 0.7% in 2020, reflecting a significant decline in inflation compared with previous years (which had also recorded inflation lower than the target range of 1–3%), mainly as a result of the impact of the Covid-19 crisis on economic activity in Israel and abroad. The main forces driving down inflation in 2020 included declines in global energy and food prices, and in activity and demand in the economy – factors directly related to the Covid-19 crisis (Graph 1). Other factors that contributed to the decline in inflation were the moderate decline of home rental prices due to the crisis and the appreciation of the shekel. Despite the sharp drop in estimated one- and two-year inflation expectations during the year, estimated five-year forward expectations remained stable near the centre of the target range throughout the year – evidence that the inflation target maintained its credibility. The shekel appreciated by 5.5% in terms of the nominal effective exchange rate in 2020, thus moderating inflation even more.

The contribution of primary components to annual CPI inflation

Graph 1



* "Other components" includes health; education, culture and entertainment; furniture and household equipment; clothing and footwear; miscellaneous; and the dwellings maintenance and transport components minus the sub-components relating to energy prices.

Source: Central Bureau of Statistics.

In 2021, the consumer price index increased by 2.8%, within the price stability target range and close to its upper bound. This pace of inflation was the highest in the past decade, and was significantly higher than in 2020 when the Covid-19 pandemic began. The picture is similar for various measures used by central banks around the world of core inflation (eg excluding food and energy)¹. The main upward forces on inflation were the recovery of domestic demand following the Covid-19 crisis and the increase in global inflation due to the recovery of global demand and interruptions in supply chains.² In contrast, the appreciation of the shekel worked to moderate inflation in Israel by lowering the shekel price of imported goods. Inflation in Israel was significantly lower than in other OECD countries in 2021, partly due to the aforementioned appreciation of the shekel.

The year 2022 was marked by an even higher inflationary environment compared with previous years, due to rising energy and commodity prices worldwide following the outbreak of war in Ukraine and rising morbidity rates in China, among other factors, and a depreciation of the shekel. By the end of the year, the annual inflation rate rose well above the upper bound of the target and reached 5.3% in November, the highest rate in the past 10 years. Moreover, the inflation was widespread as approximately 70% of CPI articles increased by more than 3% (Graph 2). Nevertheless, the rate of inflation in Israel was significantly lower than the rate of inflation in most advanced economies (Graph 3), though less so when looking at core inflation measures. One-year inflation expectations in Israel, as well as medium-term (two- and three-year) expectations, were also above the target, but expectations for the longer term were anchored within the target range.

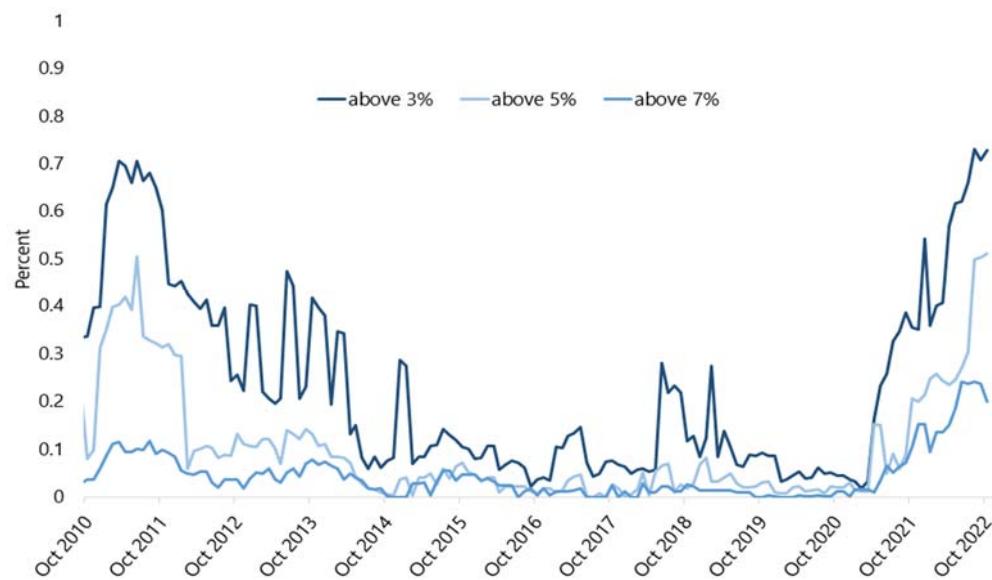
¹ For Israel there is no formal measure of core inflation that was found to better reflect sticky price inflation of medium term inflation pressures.

² A model based examination of the forces behind the Inflation increase in Israel is presented in Bank of Israel (2023b).

The weight of consumer price index items above the target

(118 items in total)

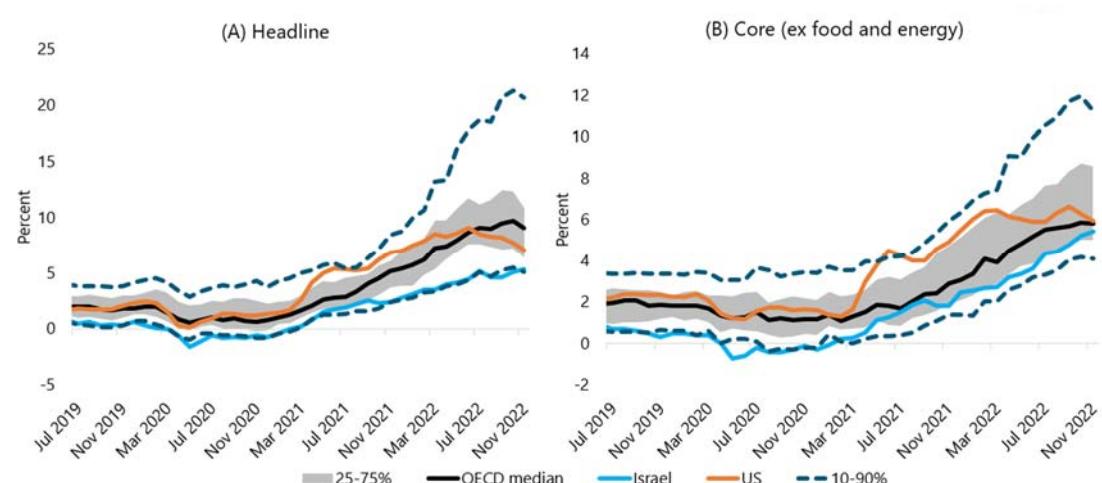
Graph 2



Source: Central Bureau of Statistics.

Inflation in Israel, the United States and OECD countries

Graph 3



Source: Central Bureau of Statistics.

In general, the trend of low inflation in 2019, followed by a decrease during the Covid-19 outbreak and then an increase in 2021–22, was common among many advanced economies (Graph 3). However, compared with other OECD countries, Israel's inflation trend exhibits some significant differences. As can be seen from the graph, Israel's inflation rate trend was similar to the OECD median inflation rate trend until September 2021. Since that date, there has been a growing difference between

Israel's trend and the OECD's trend, likely due to the weaker influence of energy and food prices in Israel. This explanation can be inferred directly from the core inflation rate, which showed the same trend for Israel and the OECD median. An important distinguishing feature is that in Israel natural gas prices from domestic suppliers, that are the main energy sources for electricity generation, were fixed on long-term contracts and thus not influenced by fluctuations in the spot market.

2.2 The labour market during and exiting Covid-19

In 2019, prior to the onset of the Covid-19 crisis, Israel was considered to be in a state of full employment. This was evidenced by several indicators, including high employment and vacancy rates, a low unemployment rate of 3.5%, and a nominal wage growth of 3.0%. After accounting for the low inflation rate at the time, this translated to a real wage growth of approximately 2.1%. This high rate of wage growth was observed across all income levels. Binyamini (2021) found that throughout the decade, most of the wage growth was a result of positive productivity shocks, while decreasing workers' bargaining power moderated wages.

The outbreak of Covid-19 had significant short-term effects on the labour market, as it did in most economies around the world. To address the sudden need for temporary layoffs, the government implemented a full furlough programme in mid-March 2020. This programme allowed employers to temporarily send workers on leave for at least 30 days while providing them with full unemployment benefits. In June 2020, a safety net programme was announced that promised unemployment benefits for furloughed workers until June 2021.³ This programme was intended to prevent widespread layoffs and provide a financial safety net for affected workers.

Due to the unique nature of the furlough programme, standard unemployment statistics were not adequate to capture the true extent of unemployment during the Covid-19 crisis. To better reflect the situation, new, expanded definitions of unemployment that included furloughed workers were introduced. This new unemployment rate peaked at 36% in April 2020, and subsequently fluctuated between 10 and 20% depending on the state of lockdowns (Graph 4.A). The reduction in employment was particularly pronounced in "contact industries" such as accommodation, entertainment and trade, which are characterised by relatively low wage levels. Additionally, within these industries and across other industries, furloughed workers tended to come from the lower end of the wage distribution.

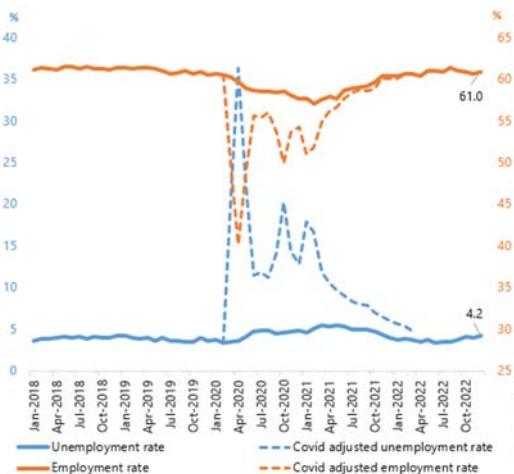
Toward the end of 2021, less than half a year after the labour safety net was withdrawn, the labour market had recovered, with adjusted employment and unemployment rates returning to pre-Covid-19 levels. Among the prime working age group (those between 25 and 64 years of age), the employment rate even surpassed pre-Covid-19 levels by significant amounts. Demand for labour by firms increased faster than supply, and vacancy rates reached new peaks exceeding pre-Covid-19 levels (Graph 4.B).

³ At this point of time, the minimum duration of leave that entitled workers to unemployment benefits was shortened to 14 days.

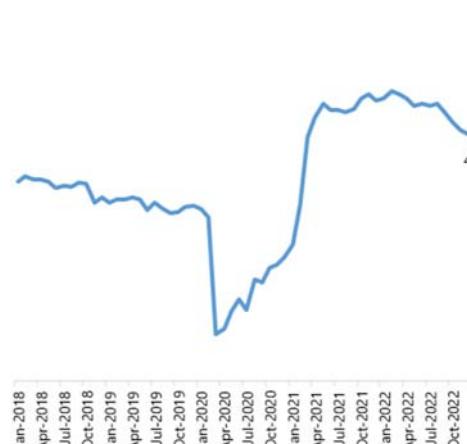
Employment, Unemployment and Vacancies, 2018-22

Graph 4

A. The employment and unemployment rates, standard and Covid-19 adjusted



B. The job vacancy rate in the private sector



Source: Central Bureau of Statistics.

3. Measuring slack in real time

One important question the Bank of Israel's Monetary Committee faced was the extent to which the rapid recovery of the labour market had contributed to accelerating inflation. The analysis presented in the remaining part of this note, which also discusses the special data challenges faced, indicates that this effect was not dominant. It was certainly not as significant as other factors.

In general, price increases reflect either increases in firm input costs, as labor, or increases in firm markups. The main channel through which tight labour markets transmit to inflation is via increases in wages. Excess demand for labour generates pressures for wage increases, which push inflation through income and cost channels. In the income channel, an increase in the real wage (in the view of consumers) generates more demand for final goods, which pushes up prices either through increased markups or increases in input costs needed in order to meet the demand. According to the cost channel, higher wages (in the view of producers) raise marginal costs, which push up prices – directly through firm input costs.

The only formal wage data that is published in Israel on a timely basis is the average wage per employee post.⁴ At the start of the Covid-19 pandemic the average wage skyrocketed by almost 20%. But this was only due to a composition effect, as low salary paid workers were furloughed and therefore removed from the average. The increase in average wages due to composition effects has no impact on inflation

⁴ Formally, it is the total salary wage bill reported to the National Insurance Institute by employers, divided by the number of employee posts (in the same reporting period). This does not include self-employed individuals. Note that individuals may hold more than one employee post.

if wages on a personal basis did not increase (and therefore there is no income effect) or if position- or duty-specific wages did not increase (and therefore marginal costs of remaining producers stayed constant). It is easy to understand the data complexities that this distortion generated at the peak of the Covid-19 crises. But, to understand the relevance to 2022 analysis, one more step is needed. Since wage data are normally volatile, the preferred measure we usually follow is year-on-year average wage growth rate on a three-month moving average (month-on-month, or even quarter-on-quarter comparisons are too volatile to draw information from). Hence, even if the throughout most of 2022 do not contain a significant composition effect, data from the previous year (needed to calculate annual growth rates) do contain positive composition effects, and therefore simple year-on-year wage growth rates are downwardly biased, even in 2022.

The Bank of Israel has overcome this data analysis problem by two means: use of an estimate of composition-adjusted average wage index and comparison of wage levels to pre-Covid-19 expected trends. In the pre-Covid-19 expected trend approach, we calculate the log-linear trend of each wage series, starting a few years before Covid-19 and ending in 2019. Then the trend is extrapolated from 2019 to the last data points. This allows us to compare the level average wages reached at the end of the period covered by the data to trends reflecting normal developments absent the Covid-19 crises. The analysis is independent of biases in wage data that prevailed during Covid-19 and is calculated on the basis of a single data set. However, its main weakness is that it does not tell us when wage pressures were apparent: if we find that the wage level is above trend, it does not necessarily mean that current wage growth is fast.

The second calculation, the composition adjusted wage rate, tries by indirect means to reflect throughout the data the development of wages of constantly present workers (ie those that did not exit or enter the labour market during the sample period). Since wages are not reported on a personal and monthly basis, we needed to approximate the calculation by adding new sources of information on top of the aggregate average wage data that are publicly published. We use a combined data set of the labour force survey and employee annual incomes for 2019. For each observation in the survey (individual i , month t) we have standard labour force statistics on employment status ($L_{i,t} = 1$ if employed) and his/her 2019 annual salary ($W_{i,2019}$) – if he/she was employed. In the first stage, we calculate for each month the average 2019 wage given the *current* month's employment state: $CE_t = (\sum_i L_{i,t} W_{i,2019})/L_t$. CE_t is actually an estimate of the composition effect: since the wage level is fixed, resulting average changes are only due to changes in the composition of the labour market. In the final step, the standard average wage (W_t) is divided by the composition effect in order to reach the composition adjusted average wage ($W_t^{CA} = W_t/CE_t$).⁵

There are some pros and cons in this calculation. First, it theoretically allows us to follow the growth rate of wages throughout the Covid-19 crisis, and beyond, as it fixes the most inherent data problem. In addition, this composition adjusted wage is expected to be more related to inflation, certainly when considering the cost channel that is affected by marginal costs. In periods of macroeconomic slack, marginal costs are reduced if the same workers, doing the same jobs, receive lower wages; and vice

⁵ For a broader discussion on composition adjustments, see Bank of Israel (2022a).

versa in the case of tight markets. The main downside of this calculation is that its indirectness generates inaccuracy. It is a mix of three data sets that are not naturally fully aligned. The indirectness makes the estimate less accurate as we get further away from 2019, since more and more young workers that first entered the labour market later than 2019 are not included in the composition effect (CE). This is because they did not have a salary in 2019, but they may have been steadily working throughout 2021–22.

4. Results

Graph 5 shows the informative wage data. As the graph shows, throughout the Covid-19 crisis (2020–21) the composition-adjusted economy-wide wage grew in accordance with the pre-Covid-19 trend,⁶ ie during the crisis wage pressures were not different from past years. However, starting in 2022 we witness a faster increase in the growth rate of the composition-adjusted estimate. However, as stated above, care should be taken on this point as the composition adjustment becomes less accurate as we get further away from 2019. When looking at the economy-wide wage level, during most of 2022, it was some 2.5–3.0% above the pre-Covid trend (Graph 5, orange line). This might indicate there were some wage pressures on a macro level as labour markets were tight.⁷ However, this does not seem to be part of a wage spiral from increasing inflation, as real wages (CPI deflated) are actually on a downward path and below pre-Covid trend at the end of the period (Graph 5, blue line). Moreover, when looking at the labour share, we can see it is on a downward path (Graph 6)⁸. The share reached a peak on the eve of the pandemic, and since then it has been reducing. This means that over and above labour market tightness, which operates to increase prices through wage demands, other factors affecting domestic prices through increased markups were more dominant causes of the share of wages in total income not rising and even continuing to drop.

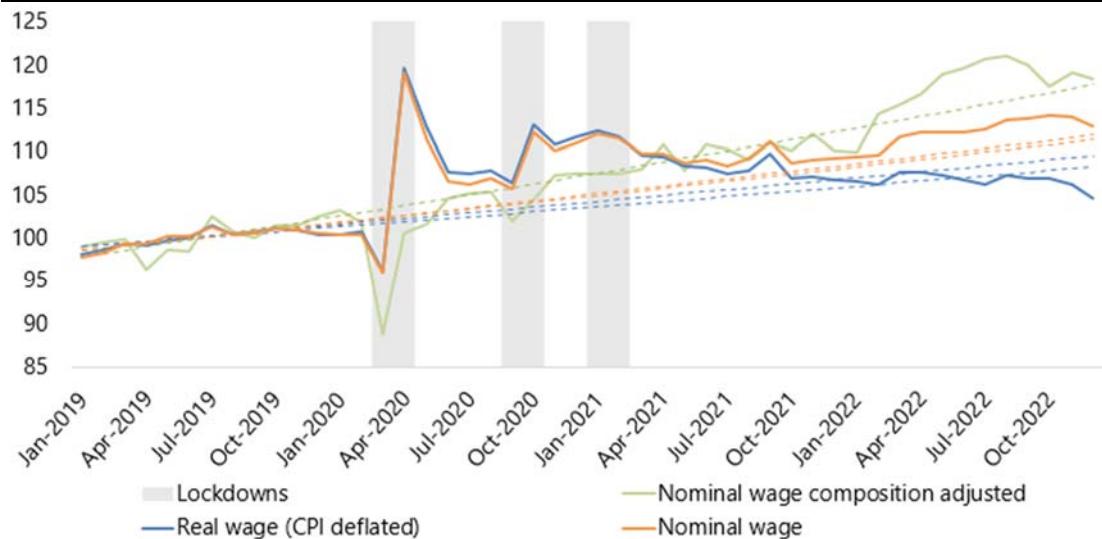
⁶ There are two *technical* one-month drops in the composition-adjusted wage (March 2020 and September 2020). This is due to the fact that the lockdowns that resulted in the furloughing of workers were imposed in the middle of those months (March and September), and many workers did work at the beginning of those months. The result is that during the month as a whole, there were more positions than are reflected in wage payments (some of which were halted mid-month due to the furloughs), so the calculated average wage declines greatly. The composition adjustment does not quantify this technical and temporary effect.

⁷ OECD (2022) also shows in Figure 1.8 that labour markets were tight in most OECD countries as vacancy rates in 2022 were higher than pre-Covid-19 averages (2011–19).

⁸ We note that compared to the average wage (nominal or real) the labor share is rather immune to composition effects.

Average wage per employee real, nominal and composition adjusted

Graph 5

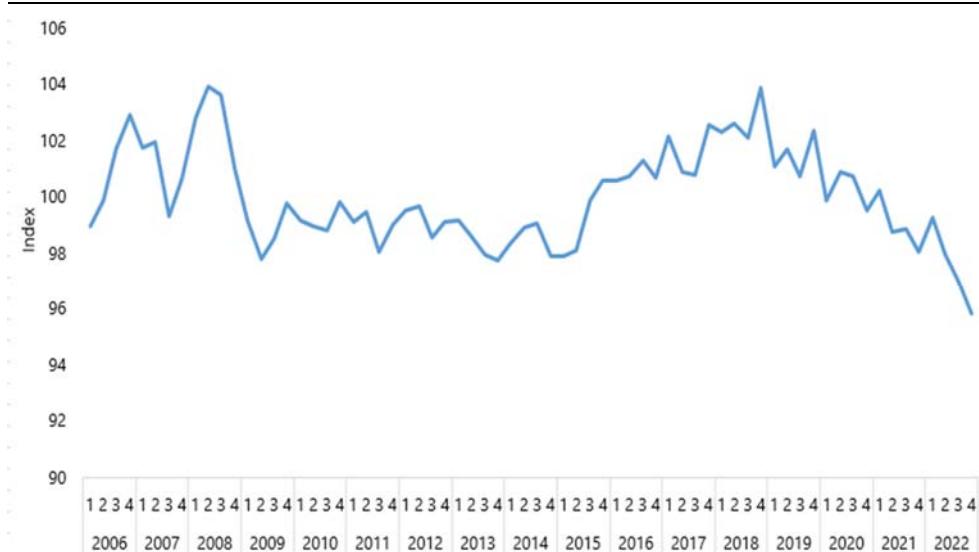


Dashed lines are pre-Covid-19 trends. Index (2019 = 100), January 2019–December 2022, seasonally adjusted. Pre-Covid-19 trends are estimated according to data starting in 2016, 2017 or 2018, and ending in 2019. The range of trends (for a given variable) reflects the differences in the starting point of the estimation. For the composition adjusted data, there is just one trend, as these data are only available from 2018.

Sources: Central Bureau of Statistics; Bank of Israel calculations.

The labour share, Index: average 2010–19 = 100; seasonally adjusted, 2006–22

Graph 6



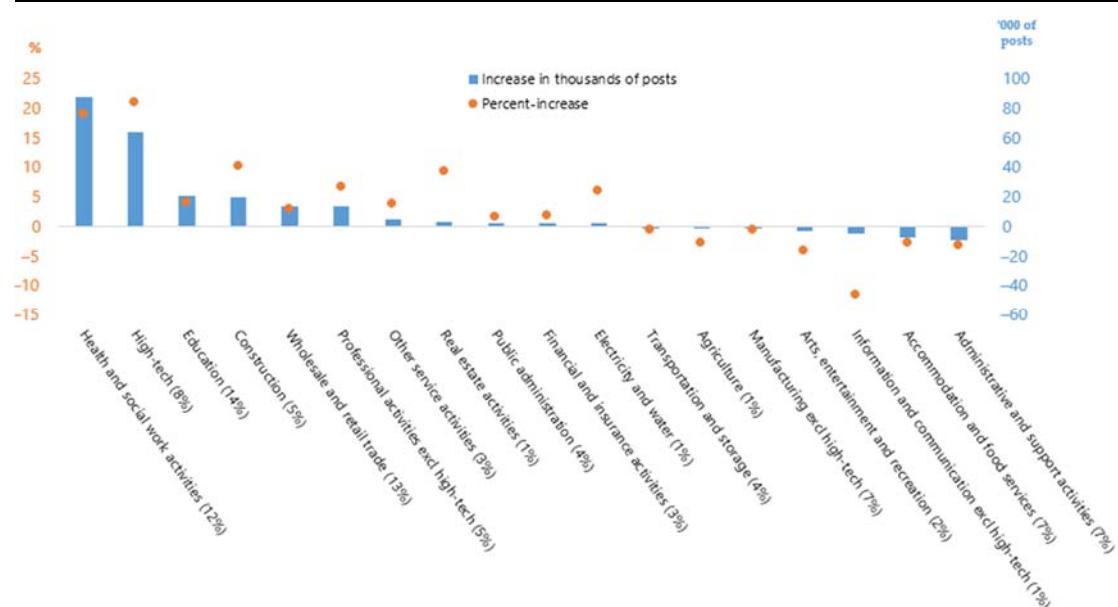
Source: Central Bureau of Statistics.

Looking more deeply at the data through industry and sector specific developments reveals two important phenomena that are important in order to analyse wage-inflation dynamics: the high-tech boom effect and public sector austerity.

The high-tech industry accounts for approximately 10% of Israel's employment, 15% of its GDP and 52% of exports – one of the highest in the OECD.⁹ It is a very dynamic sector that includes both branches of multi-national firms (mainly research and development centres) and small startup companies. The productivity of the sector is very high, so that the average wage is more than double the economy-wide average wage. Throughout 2020–21, activity in the sector continued to grow and even accelerated due to high international demand for digital technology. Along with the health sector, the high-tech sector led the growth in employment and accounted for one third of employment growth in the country from 2019 to 2022 (Graph 7). Since this activity depends on high-end human capital that is naturally in short supply, wage increases in the high-tech sector led the economy-wide wage growth. While the overall private sector nominal wage surpassed its pre-Covid-19 trend by 2–3%, if the high-tech sector is excluded the average private sector wage is in line with the pre-Covid-19 trend (Graph 8).

The pre- to post-Covid-19 increase in jobs by industry

Graph 7



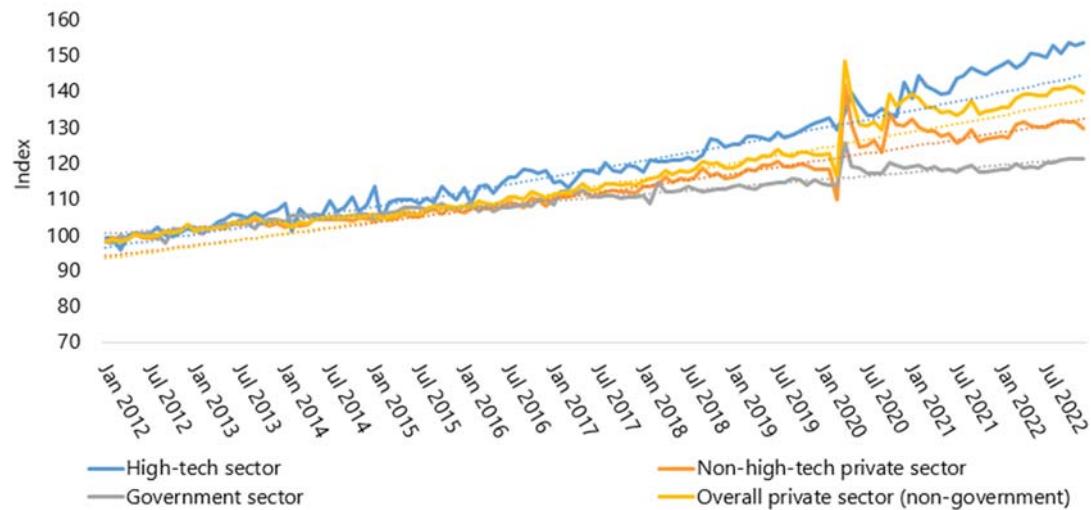
The share of each industry in employment appears in parenthesis. Pre-Covid-19 is October 2018 to September 2019, and post-Covid-19 data cover October 2021 to December 2022. High-tech sector includes both manufacturing and services industries that are defined as high-tech.

Source: Central Bureau of Statistics and Bank of Israel calculations.

⁹ See Bank of Israel (2022b).

The average wage in the high-tech, private non-high-tech and government sectors

Graph 8



Dashed lines are pre-Covid-19 trends (based on 2016–19 data). Index 2012 = 100; Jan 2012 to December 2022 period is seasonally adjusted.

Source: Central Bureau of Statistics and Bank of Israel calculations.

Since the high-tech sector is very export oriented, its goods and services make up a very small proportion of the value chain in the production of local private consumption. Table 1 shows the industry distribution of the 2014 wage bill by two definitions, the normal economy-wide distribution and as primary inputs in the production of private consumption. It is based on input-output tables that allow us to decompose the value of each final use (for example, household consumption) between four primary inputs that were used to produce it – imports, taxes, labour compensation and other added value. The calculation takes into account the complete value chain of production (industries that buy intermediate goods from other industries), and not only the direct sales to households. We can see that while the high-tech sector accounts for 15% of the economy-wide wage bill, it is negligible in the value chain of private consumption. This means that its effect on domestic CPI inflation is most probably lower than its share in the economy because it does not pass through the cost channel.¹⁰

¹⁰ High-tech sector wages may affect inflation through the income channel. However, also here it may be assumed that as high income earners, they have a lower than average Marginal Rate of Consumption meaning their effect through the income channel is also lower than average.

The industrial distribution of labour compensation (2014) and pre- to post-Covid-19 wage growth, in per cent

Table 1

Industry code	Industry name	Distribution of labour compensation*		Pre- to Post-Covid-19 annualised 3-year wage growth rate**
		Overall in the economy	As primary inputs in households consumption	
A	Agriculture	1.4	2.4	4.6
B-C	High-tech	Manufacturing excl high-tech	8.1	4.2
D-E		Electricity and water	1.2	1.7
F	Construction	7.3	0.3	5.1
G	Wholesale and retail trade	10.6	26.9	3.2
H	Transportation and storage	4.3	6.4	3.2
I	Accommodation and food service	3.0	9.9	3.0
J ex high-tech	Information and communication excl high-tech	1.5	3.5	4.2
K	Financial and insurance activities	4.4	9.3	3.7
L	Real estate activities	1.0	2.9	3.7
M ex high-tech	Professional, scientific and technical activities excl high-tech	5.5	1.5	4.4
N	Administrative and support service activities	4.2	1.6	3.5
O	Public administration and defence	9.2	0.4	2.1
P	Education	9.9	6.3	3.2
Q	Health and social work activities	9.0	6.1	-0.1
R	Arts, entertainment and recreation	1.8	4.5	1.1
S-T	Other service activities	2.4	6.7	2.5
High-tech	High-tech	15.2	0.2	5.6
	Total	100.0	100.0	

* These calculations are based on input-output tables, the latest available data for which are for 2014.

** Average wage in latest three months (October–December 2022) compared with pre-Covid-19 (October–December 2019), in annualised terms.

Source: Central Bureau of Statistics Input-Output tables for 2014.

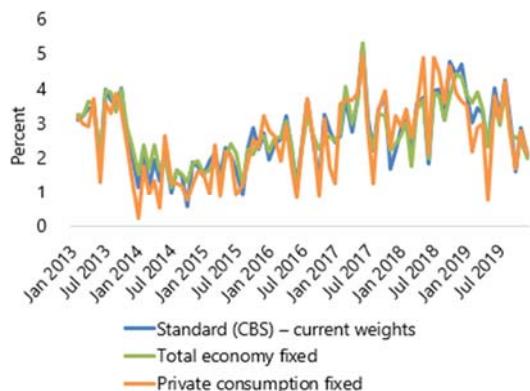
Table 1 also shows that construction sector wages are negligible in the primary inputs of private consumption (compared with 7% weight in the overall wage bill). Both of these industries' wage growths (latest compared with 2019) were the highest among the major industries. We take this concept one step further by calculating two weighted-average wage indexes that appear in Graph 9. The first average (green line in Graph 9) is based on constant 2014 economy-wide industrial weights in labour compensation as they appear in the first column in Table 1.¹¹ The second weighted-average (orange line in Graph 9) is based on the weight of each industry in household consumption primary inputs (as they appear in the second column of Table 1). This may be thought of as a cost-relevant wage index for private consumption. Both weighted-averages are compared, in Graph 9, to the regular average wage index (blue line).

¹¹ That is, each industry's wage index (2014 = 100), is multiplied by the industry's weight in 2014 labour compensation (first column of Table 1).

Average wage by industrial weighting

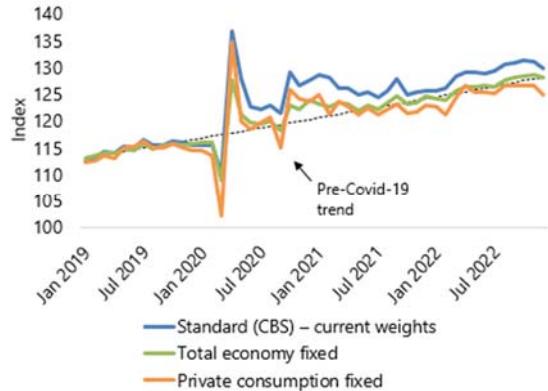
Graph 9

A. Pre-Covid-19 wage growth rate
yoY, 2013–19



B. Average wage index

Index 2014 = 100, 2019–22



Sources: Central Bureau of Statistics and Bank of Israel calculations

From panel A in Graph 9 we can see that up until the Covid-19 period, all three indexes developed in similar manners. In Panel B we can see their development after the break of Covid-19. First, the regular average wage rose to a higher level than the two weighted averages. This gap is the result of the composition effect, most of which is muted in the weighted averages, as they are based on constant industry weights. At the beginning of the Covid-19 period (2020 to mid-2021), the composition effect was due to restrictions that were mainly imposed on low-wage contact industries (as described above). In the later part (mid-2021 to 2022), the composition effect reflects the more than complete recovery in high-wage industries such as the high-tech and healthcare sectors. Comparing the consumption-weighted wage to the economy-wide weighted wage, shows that the wage index most relevant to the cost of consumption is indeed a little bit lower (by approximately 1%) than the economy-wide wage. This reflects lower cost pressures on consumption prices. This analysis is also supported by the fact that since 2019, and specifically in 2022, the GDP deflator increase more than the private consumption deflator did.

One of the reasons that the gap between the consumption-relevant wage index and the economy-wide index is small, is the fact that the latter includes a significant weight of public administration, such as public administration and defence (industry code O), which produce government consumption as opposed to private household consumption. The wage growth of the public administration sector was among the lowest in the main branches (Table 1), moderating the economy-wide weighted-average index.

This brings us to the final point on factors that reduced the labour market's effect on accelerating inflation. General government employee posts account for 19.6% of the economy.¹² Turning back to Graph 8, we can see that as of 2017, the growth rate

¹² The general government employee posts include all jobs working for general government institutions (government offices, public authorities, public schools and health institutes, national insurance etc). It is broader than the public administration industry (industry code O), as it also includes employee posts in other industries such as education and health.

of the average wage in the government sector was low, well below that in the private sector – even when excluding hi-tech from the private sector. A main force driving government sector wages are "framework agreements" between the government and the main labour union ("Histadrut") that directly affect a large proportion of the public sector. The last major agreement was in respect of the years 2013–17, with some small ad hoc supplements in 2018 and 2019. However, partly due to the long period of government instability that Israel experienced in the period 2020–22, no additional framework agreements have been signed in the years 2020–2022. Had such agreements been signed, they may have acted to accelerate wage growth. The result was that throughout this period, wage pressures from the government sector did not materialise. Had they occurred, more pressure on inflation might have been generated for two basic reasons: first, through additional private consumption by government workers, and second, through cross-industry wage pressures that could also affect the cost channel. Moreover, had these agreements included automatic inflation indexation (as was customary in past eras of high inflation), then rigid pass-through effects might have been generated.¹³

5. Conclusions and policy implications

This study has examined the relationship between wages and inflation in Israel during and after Covid-19. We find that the effect of wages on inflation was not dominant, due in part to the concentration of wage increases in industries that do not serve domestic private consumption and the very moderate growth of public sector wages due to delays in wage negotiations and agreements. Our analysis also considered the role of government policies and industrial composition changes in shaping the relationship between wages and inflation in Israel during this period, with a focus on the challenge of measuring slack in the labour market during times characterised by unprecedented composition effects.

Our analysis suggests that while the labour market may have played a role in the acceleration of inflation in Israel during and after the Covid-19 pandemic, the impact was limited due to the unique circumstances of the Israeli economy. We hope that our work will help policymakers understand the complex relationship between wages and inflation in the aftermath of Covid-19, how to overcome inherent measurement issues and identify potential implications. One direct lesson to be learned is the importance of using disaggregated data in times of major changes in the economic environment, as appearing during the COVID-19 period, that enable a better understanding of the dynamics of aggregate data. Optimally, such disaggregated data sets should be prepared before crises rather than in the midst of events.

Several risks and opportunities are associated with our research conclusions. On the one hand, our findings suggest that the impact of wages on inflation was limited during and after the Covid-19 pandemic, indicating that there may be less need for policymakers to focus on wage growth as a key driver of inflation. This could potentially create opportunities for policymakers to prioritise other economic

¹³ In March 2023, after the period described in this note, a new agreement was signed. It seems that the agreement is moderate and supports the goal of bringing inflation back down to the stability target.

concerns, such as boosting employment or supporting industries that have been disproportionately affected by the pandemic. Conversely, such muted pressures for a second round of inflation, especially from the public sector, pose a risk of entrenching inflation in the future and increasing the disinflation sacrifice ratio.

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Labour markets and inflation

Bank of Korea

Abstract

This paper first examines the recent trends in inflation and wages through the lens of the labour market situation in South Korea. Then it investigates the pass-through of wages to consumer prices and assesses the likelihood of emerging wage-price spirals in the near future. Lastly, we attempt to estimate the Phillips curve using regional data to investigate the direct relationship between labour demand (the job openings rate) and headline inflation. The main results are as follows.

First, the recent growth in nominal wages has been highly affected by inflation expectations. A decomposition of the growth rate of regular wages reveals that high inflation expectations and a tight labour market are the main sources contributing to the recent high wage growth. In particular, between inflation expectations and labour market tightness, the former has a greater impact on wage growth.

Second, while the effects of wages on CPI inflation is significant in high inflation regimes (such as during the 1990s), it is weak and not significant during low inflation regimes (since 2000). Considering the recent slowdown in inflation, it is difficult to say whether or not a high inflation regime has returned. This indicates that there is little evidence of emerging wage-price spirals in the wake of the pandemic.

Third, a wage-price spiral is not likely to occur in the near future, largely due to the following factors: the recent easing of labour market tightness, a slowdown in inflation expectations and Korea's institutional characteristics, such as less active wage indexation.

Fourth, the slope of the Phillips curve varies significantly depending on whether cost-push shocks are controlled. When such shocks are not controlled, the slope of the Phillips curve is only 0.01. When they are controlled, however, the slope rises to 0.56. These findings imply that recent studies arguing that Korea's Phillips curve is flattening are likely to have been significantly affected by identification problems and that labour market conditions and inflation are still closely correlated.

JEL classification codes: E24, E31, J31.

Keywords: labour market, inflation, wage, wage-price spiral.

1. Recent developments in inflation and wages

Trends in inflation

Korea's headline inflation accelerated to above 6% (6.3%, yoy) in July 2022, the highest since 1998, from a level below 1% at the onset of the Covid-19 pandemic. The jump in inflation is attributable to sizeable supply side factors, such as supply chain bottlenecks and a surge in commodity prices of crude oil and natural gas due to the protracted Russia-Ukraine conflict, as well as an increase in demand side pressure. A tight labour market also appears to have contributed to the rise in services prices in the aftermath of the pandemic.

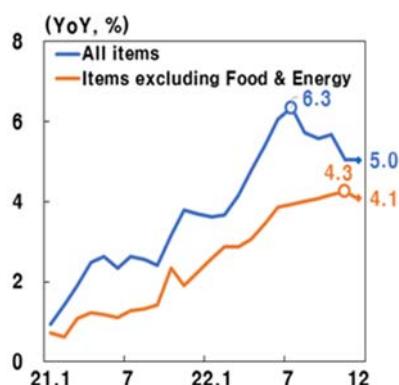
After peaking in July 2022, headline inflation has gradually decelerated to approximately 5% in recent months due mainly to the easing of supply side pressure, such as a fall in oil prices on concerns over a global economic slowdown. Core inflation for items other than food and energy has also recently decelerated, albeit at a slower pace compared with headline inflation, reflecting a sluggish housing market and downgraded growth outlook.

The recent development in short-term inflation expectations of households appears to be closely related to headline inflation, having peaked at 4.7% in July 2022 and since then fallen to a level below 4% at the end of last year. However, long-term inflation expectations among professional forecasters appear to be well anchored at approximately the target level (2%).

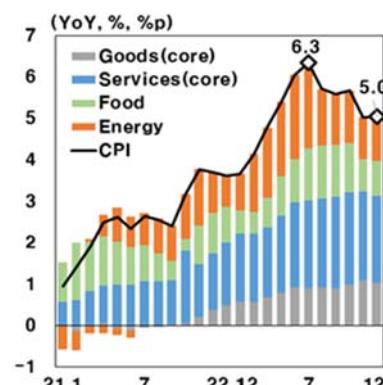
Trends in inflation

Graph 1

A. CPI inflation



B. Inflation decomposition



C. Inflation expectations (%)



¹ Households (one year). ² Professional (five years).

Sources: Bank of Korea; Consensus Economics; Statistics Korea; author's calculations.

Trends in nominal wages

Nominal wages in Korea have shown a steep upward trend since 2021. From the first quarter of 2021 to the first quarter of 2022, the increase in nominal wages appears to be mainly attributed to a base effect in special payments. As employers adjusted their

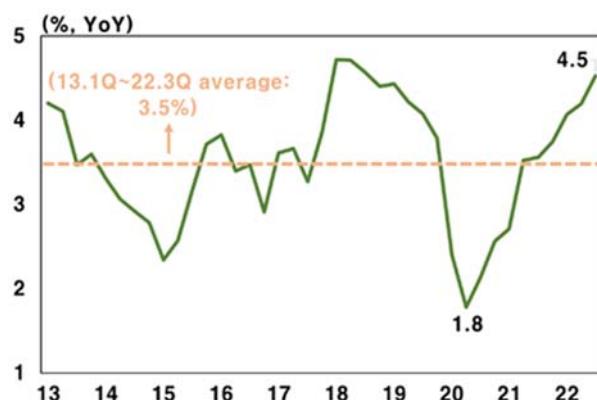
special payments in response to business uncertainty, special payments decreased in 2020, which was followed by a significant rebound after 2021.

Unlike nominal wages, regular payments to permanent employees have shown a consistent upward trend since the second quarter of 2020. They rose by 4.5% in the third quarter of 2022, hovering above the long-term average of 3.5%. In addition, the rising trend in regular payments to permanent employees is a phenomenon seen in most industries. The diffusion index, the proportion of industries with higher regular payment growth rates than the average of the previous three years, recorded 72.6% in the third quarter of 2022, which is 34.9% higher than that in the same quarter last year (see Graph 2).

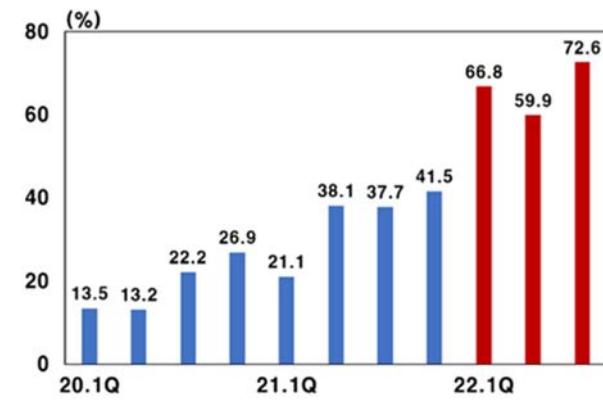
Regular payments to permanent employees

Graph 2

A. Trend



B. Diffusion index



Source: Labour force survey at establishments.

2. Labour markets and wages

The rise in regular payments to permanent employees has been highly associated with a tight labour market and inflation expectations. The growth rate of regular payments to permanent employees maintained a positive relationship with the job openings rate between 2013 and the fourth quarter of 2020, and has not deviated largely from this positive relationship since 2021 (see Graph 3.A). To quantify the effects of labour market tightness and inflation expectations on the growth rate of regular payments to permanent employees, we estimate a wage Phillips curve as follows.

$$\pi_t = \alpha + \beta \pi_{t-1} + \beta x_t + \gamma E_t(\pi_{t+4}) + \varphi Z_t + \varepsilon_t. \quad (1)$$

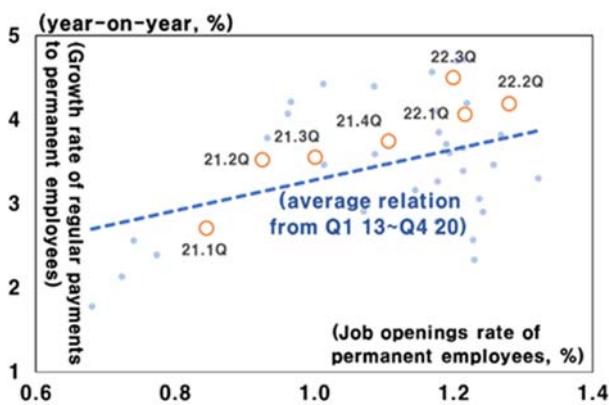
Here, π_t refers to the year-on-year growth rate of regular payments to permanent employees, x_t denotes the job openings rate as a measure of labour market tightness, $E_t(\pi_{t+4})$ represents consumer expectations of inflation in the following year and Z_t is other control variables such as the 12-quarter moving

average of the growth rate of labour productivity and the growth rate in the population that are 15 years of age or older.

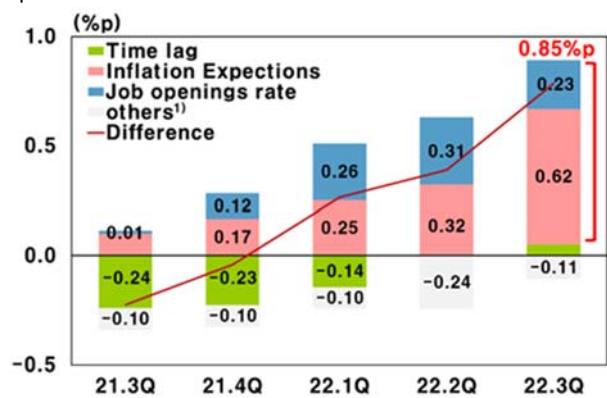
Payments to employees

Graph 3

A. Growth rate of regular payments vs job openings rate



B. Decomposition of growth rate in regular payments to permanent employees: differences from the fourth quarter of 2019.



¹ Others includes the labour productivity growth rate, the population growth rate and an error term contribution.

Sources: Labour force survey at establishments; author's calculations.

Using the estimation results of the wage Phillips curve, we decompose the growth rate of regular payments to permanent employees into four factors: time lag, inflation expectations, job openings rate and other. The "other" category includes the labour productivity growth rate, the population growth rate and an error term contribution. Compared with the fourth quarter of 2019, the rise in regular payments to permanent employees in the third quarter of 2022 is largely attributed to the rise in the job openings rate and in inflation expectations. The growth rate of regular payments to permanent employees in the third quarter of 2022 increased by 0.85% due to the job openings rate and to inflation expectations, compared with the fourth quarter of 2019 (0.23% by the job openings rate, 0.62% by the expected inflation rate). It was cut back by 0.11% from other factors, too (see Graph 3.B). This result indicates that high inflation expectations and the tight labour market are the main sources contributing to wage growth.

3. Pass-through from wages to prices

As wages and prices have risen together with the recovery from the Covid-19 shock, concerns about a wage-price spiral have been growing in Korea. In this chapter, we investigate the pass-through from wages to consumer prices and assesses the likelihood of emerging wage-price spirals in the near future.

Wages and consumer prices

To estimate the effects of wage growth on consumer price inflation, we estimate a VAR model including three variables: consumer price inflation (%, yoy, headline), wage growth rate (%, yoy, regular payments to permanent employees) and the GDP gap.

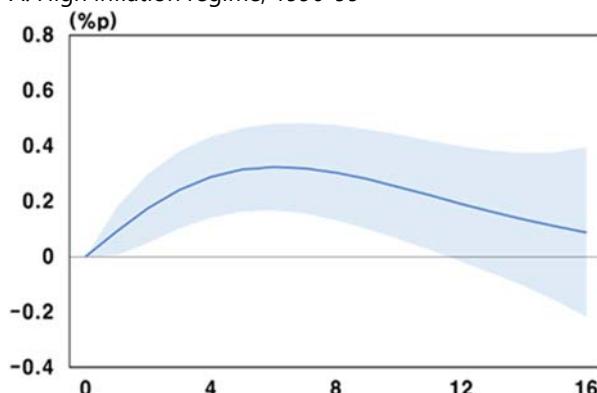
$$Y_t = B_0 + B_1 Y_{t-1} + \dots + B_p Y_{t-p} + A_0 \varepsilon_t \quad (2)$$

The sample period is from the first quarter of 1990 to the third quarter of 2022 and the lag length is set to one quarter, based on the Akaike information criterion (AIC).

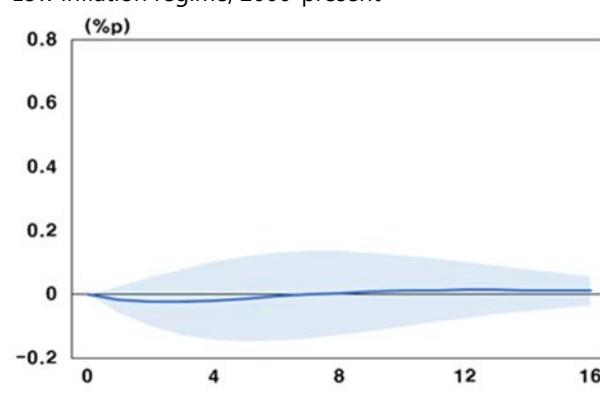
The impulse responses of CPI inflation to wage growth

Graph 4

A. High inflation regime, 1990-99¹



Low inflation regime, 2000-present¹



¹ The shaded region is the 68% confidence band.

Source: Bank of Korea.

According to the results of impulse responses, the effects of nominal wage growth on CPI inflation differ depending on the inflation level. In a high inflation regime (the 1990s), the impact of wages on prices is statistically significant. Meanwhile, in a low inflation regime (since 2000), the pass-through from wages to CPI inflation is relatively weak and not significant. Although inflation shows an upward trend, considering the recent slowdown in inflation, it is difficult to say whether or not a high inflation regime has returned. This indicates that there is little evidence of an emerging wage-price spiral in the wake of the pandemic (see Graph 4).

Likelihood of a wage-price spiral emerging

Considering current macroeconomic conditions and the Bank of Korea's outlook, the possibility of an emerging wage-price spiral in the near future does not seem high, largely due to the following four factors. First, as labour market tightness is expected to alleviate this year, workers' bargaining power is likely to weaken compared with last year. According to employment forecasts from the Bank of Korea, the number of employed people is expected to increase by 90,000 this year, which is very low compared with last year's 816,000. Moreover, the job openings rate has shown a downward trend from 1.3% in June 2022 to 1.1% in November 2022 (see Graph 5.A).

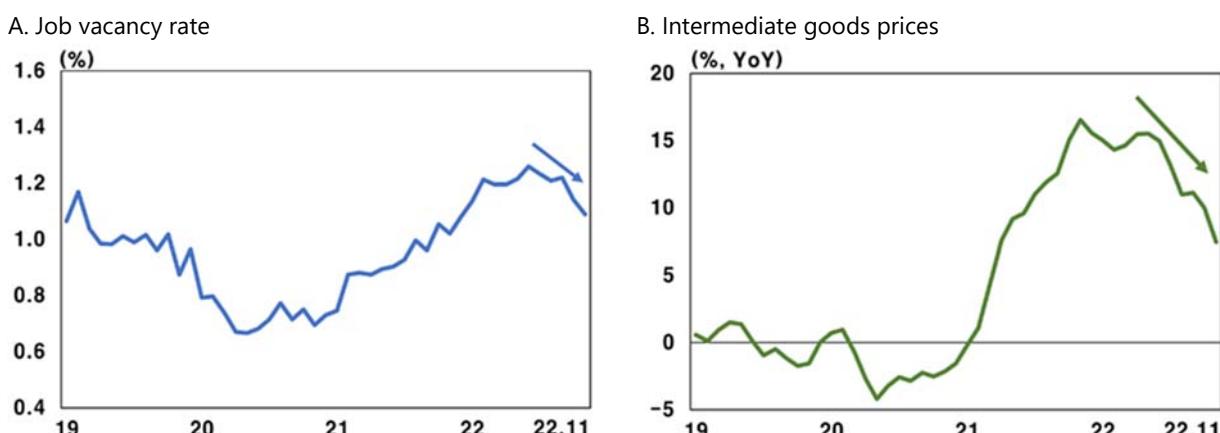
Second, short-term (one year) consumers' inflation expectations are also showing a downward trend mainly due to contractionary monetary policy and the possibility of an economic slowdown. A fall in inflation expectations will operate as a factor in lowering prices and wages. In addition, long-term (five year) professionals' inflation expectations have anchored at approximately 2%.

Third, institutional characteristics of Korea do not look conducive to wage-price spirals. Automatic wage indexation and cost of living adjustment clauses are less active, and the union membership rate in the private sector was only 11.3% in 2020.

Fourth, intermediate goods prices, which showed a large upward trend until November 2021, have shown a downward trend since 2022 (see Graph 5.B). This shows the possibility that the degree to which wages transfer to prices has decreased compared with when wages and intermediate goods prices rose together.

Job vacancies and intermediate goods prices

Graph 5



Source: Labour force survey at establishments; KOSIS.

4. Phillips curve is still alive: regional-level evidence

According to recent studies, there are two identification problems that can occur when the Phillips curve is estimated using time series data. First, inflation expectations and labour market conditions are correlated to cost-push shocks (error term of the Phillips curve), causing an endogeneity problem in the estimating equation. Next, if a central bank conducts an optimal monetary policy under the theoretical assumption that the Phillips curve holds, the inflation rate observed in actual data reflects only the impact of cost-push shocks (Hazell et al (2022); McLeay and Tenreyro (2020)). To overcome the identification problems, we estimate the price Phillips curve using region-level panel data and compare the estimation results of the following four equations.

$$\pi_{i,t} = \alpha + \gamma \frac{1}{4} \sum_{k=1}^4 \pi_{i,t-k} + \beta V_{i,t} + \varepsilon_{i,t} \quad (3)$$

poled OLS

$$\pi_{i,t} = \alpha_i + \gamma \frac{1}{4} \sum_{k=1}^4 \pi_{i,t-k} + \beta V_{i,t} + \varepsilon_{i,t} \quad (4)$$

model incorporating region fixed effects

$$\pi_{i,t} = \alpha + \gamma \frac{1}{4} \sum_{k=1}^4 \pi_{i,t-k} + \beta V_{i,t} + \delta_t + \varepsilon_{i,t} \quad (5)$$

model incorporating year fixed effects

$$\pi_{i,t} = \alpha_i + \gamma \frac{1}{4} \sum_{k=1}^4 \pi_{i,t-k} + \beta V_{i,t} + \delta_t + \varepsilon_{i,t} \quad (6)$$

model incorporating both region and year fixed effects

Here, $\pi_{i,t}$ is the CPI inflation (annualised) for region i at time t , α_i is the region fixed effects, $\frac{1}{4} \sum_{k=1}^4 \pi_{i,t-k}$ is the average inflation over the past two years, $V_{i,t}$ is the job openings rate and δ_t is the year fixed effects. In Korea, as there are no data on inflation expectations by region, the average inflation rate over the past two years is used instead. In addition, the dummy variable for the first half is included as an independent variable.

The estimation results show that the slope of Korea's Phillips curve varies significantly depending on whether year fixed effects (to control for cost-push shocks) are introduced. In cases in which neither region nor year fixed effects are considered and only region fixed effects are considered, the slope of the Phillips curve is much flatter (see Table 1).

Estimation results of the Phillips curve using regional data

Table 1

	Pooled OLS	Fixed effects model		
		Region	Year	Region& year
Job openings rate	0.06 (0.08)	0.01 (0.12)	0.35*** (0.12)	0.56** (0.25)
Number of observations	288	288	288	288
R ²	0.12	0.12	0.88	0.89

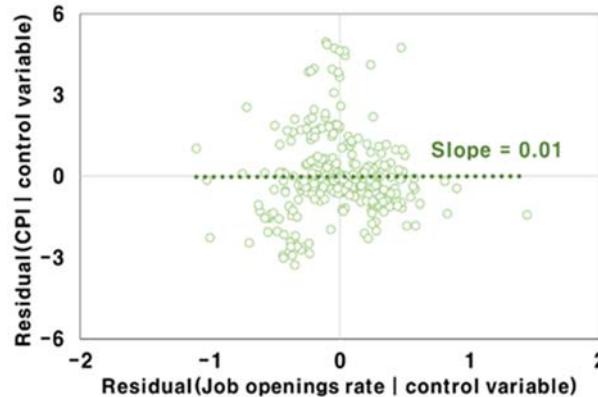
¹ All models include the average inflation rate for the past two years and the dummy variable for the first-half periods. ² Graphs in parentheses are regional cluster standard errors. ³ *** and ** indicate a significance level of 1% and 5%, respectively.

On the other hand, in cases in which both region and year fixed effects are considered and only year fixed effects are considered, the slope of the Phillips curve is relatively steep with statistical significance, exhibiting a remarkable difference in the results when cost-push shocks are not controlled and when they are controlled for (see Graph 6). In particular, if both region and year fixed effects are considered, a 1% rise in the job openings rate can lead to a 0.56% rise in the CPI inflation, indicating that labour market conditions have a large effect on CPI inflation.

Slope of the Phillips curve comparison of scatterplots¹

Graph 6

A. Before controlling for cost-push shocks²



B. After controlling for cost-push shocks²



¹ The horizontal axis shows the residuals of the regression analysis, with the job openings rate as the dependent variable and other variables as the independent variables. The vertical axis indicates the residuals of the regression analysis, with CPI as the dependent variable, and other variables, except for the job openings rate, as the independent variables. ² "Before controlling for cost-push shocks" refers to a model that considers only region fixed effects, and "after controlling for cost-push shocks" refers to a model that considers both region and year fixed effects

Source: author's estimations.

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Inflation and labour markets in the wake of the pandemic

Inflation and labour market dynamics after the pandemic

Headline and core inflation

Headline and core inflation trended higher in 2022, driven by improvements in demand conditions and higher input costs amid elevated global commodity prices and supply-related disruptions. The extent of cost pass-through to consumer price index (CPI) inflation was partly mitigated by price control measures.

Headline inflation increased to 3.3% during the year, with the increase predominantly driven by food-related services and goods (Graph 1). Underlying inflation, as measured by core inflation, also trended higher to 3.0% amid demand and cost pressures.

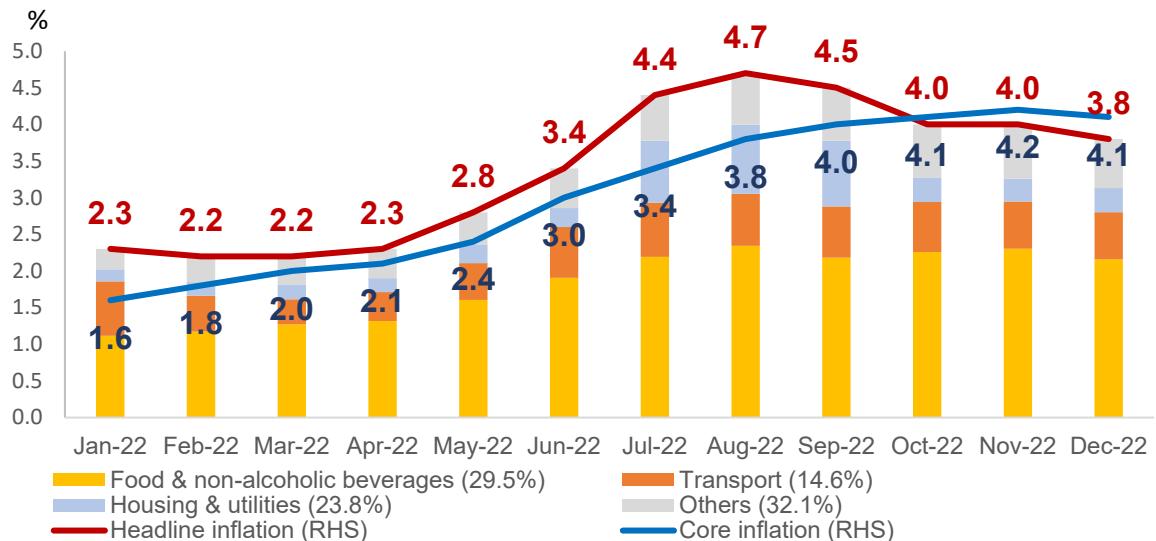
Strengthening demand conditions following the reopening of the economy accelerated the normalisation of core inflation, after a period of subdued demand and reduced profit margins during the pandemic, and contributed to a greater pass-through of cost pressures to CPI inflation.

The confluence of the conflict in Ukraine and pandemic-related exogenous factors¹ led to a surge in global commodity prices and prolonged supply-related disruptions, which continued to drive higher input costs during the year. This was exacerbated by adverse weather conditions, export restrictions in key commodity-exporting countries and higher import prices, following sustained US dollar strength against the ringgit.

Nevertheless, the extent of cost pass-through to CPI inflation remained partly mitigated by government policies, which include price control measures such as retail fuel subsidies and price controls on selected fresh food items.

While headline inflation has gradually eased since its peak of 4.7% in August 2022, it is expected to remain elevated and above its long-term average (2011–19 average was 2.2%), albeit on a moderating trend, given the persistence of core inflation.

¹ Including disruptions in factories and shipping ports due to resurgences of Covid-19 and higher operating costs due to pandemic-containment measures.



Source: Bank Negara Malaysia estimate based on Department of Statistics Malaysia.

Labour market conditions

Slack prevails despite the strong recovery in labour market conditions. While wages improved in 2022, this largely reflected strengthening demand conditions upon the full lifting of restrictions, beginning in the second quarter of 2022. Thus far, wage growth is not assessed to be excessive in the context of the broader economic recovery.

Labour demand steadily increased and was met by forthcoming labour supply as labour force participation rebounded above pre-pandemic levels (69.8% of the working age population in November 2022 compared with 69.1% in the fourth quarter of 2019). Hence, slack remains in the domestic labour market, as reflected by the elevated unemployment rate relative to its pre-pandemic averages (3.6% of the labour force in November 2022 compared with a 2015–19 average of 3.3%).

Wages improved following strengthening demand and were partly supported by the 25% increase in the minimum wage to MYR 1,500 that became effective in May 2022 (8.0% private sector wage growth in the third quarter of 2022 compared with its recent trough in the third quarter of 2021). Nevertheless, the increase in wages remained significantly more moderate compared with the pickup in production activity (14.2% in the third quarter of 2022 compared with the third quarter of 2021).

A comparison of wage growth in the US relative to Malaysia provides further insights into the degree of wage excessiveness. In contrast to Malaysia, wage growth in the United States has been markedly stronger. Private sector wage per worker growth in the United States averaged 4.5% between the first and third quarters of

2022 (2013–19 average was 2.5%), while Malaysia recorded only 2.9% (2013–19 average was 3.6%) in the same period.

There were labour shortages but these were driven by frictions and concentrated in specific jobs and sectors. Hence, shortages have not contributed to broad-based increases in wages. This issue is expected to ease amid a gradual return of migrant workers and as demand normalises.

The Bank's engagements with industry players also suggests that firms deployed multiple strategies to mitigate these shortages, particularly through increasing productivity by arranging for workers to take on more tasks, and accelerating automation and digitalisation for more capital intensive sectors.

Historically, wage growth in the services sector is more highly correlated with the prices of core services (correlation: 0.8), but correlation is low between manufacturing wages and core goods (correlation: 0.4). This reflects that wages constitute a larger share of total costs for the services sector (22% of total costs), but a smaller share of the costs of manufacturing goods (9% of costs). This may warrant close monitoring given the potential persistence of services inflation which has remained high at this juncture, while goods inflation has begun to moderate.

While the increase in minimum wages in 2022 did contribute some additional cost pressure to domestic firms, the size of the impact was largely contained. In particular, the increase in minimum wages was estimated to directly affect less than 15% of the population in employment, and the cascading impact on the wages of other workers was assessed to be gradual.

At this juncture, second-round effects are assessed to be limited while the risk of a wage-price spiral remains remote. Inflation expectations remain firmly anchored, while wage growth has not exceeded increases in prices, due in part to limited collective bargaining power and a lower prevalence of wage-indexation mechanisms in Malaysia.

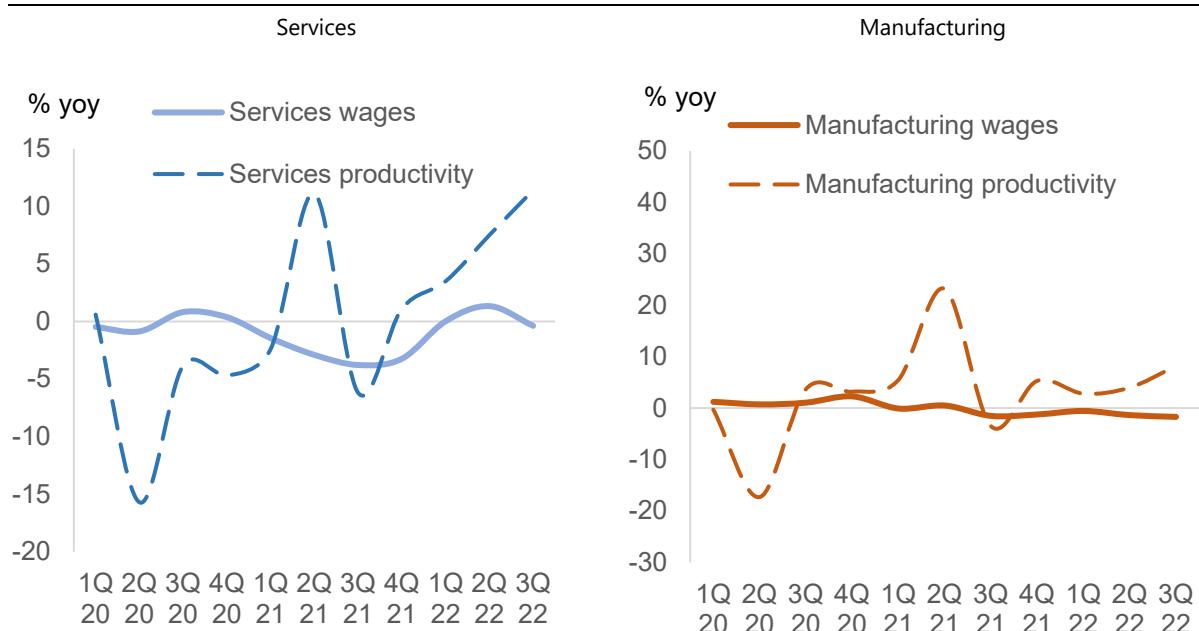
Real wage increases are not outpacing productivity – real wage growth between the first and third quarters of 2022 was 2.9%, while the productivity rate rose by 5.0% (Graph 2) and slack remains in the labour market. Inflation expectations remain firmly anchored. The latest indicators of long-term analyst expectations, including consensus expectations on inflation for the period 2028–32, continue to be broadly consistent with the long-term average (2028–32 consensus is 2.3%).² Over the shorter term, expectations for 2024 also suggest a moderation towards 2.2%.³

² Asia Pacific Consensus Forecast, October 2022.

³ Bloomberg, accessed on 19 January 2023.

Real wages per worker vs productivity in the services and manufacturing sectors

Graph 2



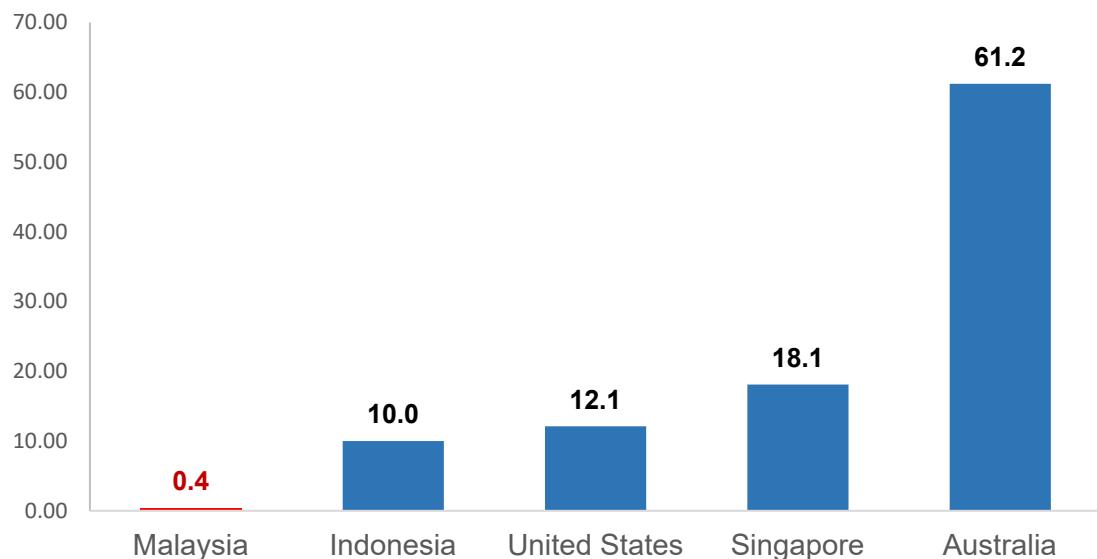
Source: Department of Statistics Malaysia, Bank Negara Malaysia estimate.

Structural features of the domestic labour market, including the low prevalence of collective wage agreements and wage-indexation practices, have partly mitigated the risk of second-round effects. Only a small fraction of wages in Malaysia are covered by collective wage agreements: 0.4% of total employment as of 2019. This is relatively low compared to other economies (Graph 3). Moreover, union membership in Malaysia across government, the private sector and statutory bodies comprises only around 6.3% of total employment, as of 2019. This is in contrast to 9.8% in the US, and other emerging market economies such as Indonesia (13.0% in 2019), India (19.8% in 2017) and Vietnam (49.6% in 2018).⁴

In answering the Bank's regional survey of domestic households and firms, respondents indicated a limited intention to react to the elevated cost of living by seeking or providing, respectively, higher wages. This suggests a limited risk of a wage-price spiral.

⁴ ILOStat, accessed in December 2022.

(% of total employment)



Source: ILOStat.

Policy implications

While the extent of wage-push inflation is assessed as being broadly contained, the Bank has calibrated its monetary policy stance to pre-emptively respond to incipient demand pressures in a gradual and measured manner. Although inflation expectations have remained anchored thus far, the Bank is mindful that the policy trade-off could become much larger if expectations become unhinged. In this situation, the Bank would need to increase interest rates more aggressively, which comes at a greater cost to the economy. For this reason, the Bank has taken a pre-emptive approach in mitigating the risk of excessive demand on price pressures and inflation expectations. Since May 2022, the overnight policy rate (OPR) has been raised by 100 basis points, bringing the stance of monetary policy to a level consistent with firmer growth prospects for the Malaysian economy.

Credibility is also important in mitigating the risks from unanchored inflation expectations, especially as pre-emptive interest rate hikes have been met with unanticipated public dissent as a result of concerns over the higher cost of living. In light of this, the Bank has taken steps to enhance monetary policy communications in managing public sentiments.

The Bank has widened its channels of engagement, supplemented with targeted forms of content. This includes sharing deeper insights with analysts, and more accessible materials and sessions with the media, public and even government

representatives. To manage expectations of further interest rate hikes, communications have been geared towards providing greater assurance on the future policy path, which will be measured and gradual.

Monetary policy needs to be complemented by labour reallocation policies and structural reforms to manage short-term risks to inflation and safeguard long-term growth potential. While the structure of the labour market has led to rigidities in wage growth, greater frictions in the labour market since the Covid-19 pandemic have given rise to concerns over higher wage costs. Continued support for labour reallocation policies during the recovery remain important to facilitate an inclusive recovery and ease risks of escalating wages, however remote. These policies include:

- The JaminKerja initiative – an incentive for employers to hire Malaysians who remain underutilised and labour force segments that may need additional support (eg women, disabled workers and indigenous workers).
- Malaysia short-term employment programme (MySTEP) – a scheme providing employment opportunities in the public sector and government-linked companies, particularly for younger workers and new graduates.
- Various upskilling and reskilling programmes, including the “train and place” programme, a fully-funded apprenticeship programme that guarantees employment.

In addition, structural reforms are being undertaken to generate decent, well paying jobs, preserve economic competitiveness and ensure the sustainability of household incomes going forward. Such reforms aim to:

- attract high-quality investments;
- develop a dynamic and high-calibre workforce;
- accelerate the adoption of technology and digitalisation; and
- strengthen the social security system.

The viability of monetary policy transmission is increasingly dependent on complementary structural reforms. The role of structural reforms in ensuring long-term sustainable growth, and building resilience against shocks, is critical in addressing underlying rigidities and frictions such as persistently higher unemployment and skills mismatches.

Left unaddressed, these structural issues may inhibit efficient transmission of monetary policy actions through the ineffective allocation of resources and a disconnect between labour market outcomes and price-setting mechanisms.

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Overview of inflation and wage dynamics in Mexico in the aftermath of the pandemic

13 February 2023

Inflation in Mexico, as in many other countries, has been severely affected by the confluence of multiple global inflationary shocks of considerable magnitude. These large global shocks have been atypical in nature and have had broad-based impacts on prices across many sectors, causing inflation in many countries to reach levels not seen in several decades.

The surge in inflation observed since 2021 has been driven by various factors. Firstly, supply has been affected by generalised disruptions in production and distribution networks as a result of restrictions to the operation of businesses and interruptions in the production process that resulted from measures adopted to contain the spread of Covid-19. In addition, the unsynchronised re-opening of economies also contributed to the scarcity of some inputs and generalised increases in input prices and operational costs. Second, considerable monetary and fiscal stimulus in advanced economies resulted in a vigorous increase in demand, particularly for goods, in a context in which consumer behaviour was already characterised by a reallocation of expenditure away from services. Finally, the recovery of global economic activity was fast which exacerbated the abrupt increase in demand. In this context, a severe imbalance between supply and demand in several world markets characterised the period of economic recovery, resulting in significant inflationary pressures. The effects of these shocks had not fully dissipated when, in addition, the Russia-Ukraine conflict increased uncertainty worldwide, exacerbated some of the disruptions in supply networks and further increased prices of several products that were already high, particularly food commodities, fertilisers and energy.

The aforementioned context has led to significant external inflationary pressures in Mexico. In particular, throughout 2022 food items (processed and unprocessed) consistently accounted for approximately half of annual headline inflation, which peaked at 8.70% in August and September. Towards the end of 2022, headline inflation showed lower levels led by declining annual rates of non-core inflation. This behaviour was also reflective of the fact that some pressures had begun to revert, such as those stemming from the prices of inputs and the functioning of production and distribution chains. In December, annual headline inflation reached 7.82%, and in its reading for January it was 7.91%. Annual core inflation registered 8.35% in December and 8.45% in January after peaking at 8.51% in November. It is worth noting that the decline in December came after 24 consecutive months of rises, pressured by both goods and services inflation that in turn reflected generalised increases in production costs.

Annual non-core inflation was elevated during the first half of 2022, influenced by pressures that affected the prices of agricultural products. Inflation of this component reached 10.65% in August 2022, but has declined since, and it stood at 6.27% in December of 2022 and at 6.32% in January. The lower levels of non-core inflation observed in the last quarter of 2022 resulted, mainly, from the reduction of

energy and agricultural inflation. Throughout this inflationary episode, energy inflation has been influenced by the federal government's policies that insulate gasoline prices from fluctuations in their international references.

Global inflationary pressures observed last year appear to be easing. As a consequence, inflation in Mexico is expected to show more notable decrements throughout 2023. In the most recent forecasts published by the Bank of Mexico in February 9, 2023, headline inflation is expected to converge to its 3% target by the fourth quarter of 2024, with core inflation also expected to converge to 3% on the same horizon. The foreseen downward trajectories for inflation reflect, in part, the effect of the monetary policy actions that the Bank of Mexico has been implementing. These trajectories also incorporate the expectation that the effects on inflation of the shocks related to the pandemic and the Russian invasion of Ukraine will fade away gradually, so that the imbalance between supply and demand that has been driving the high levels of inflation globally will continue to be resolved. However, new external shocks affecting the path of inflation cannot be discarded and the balance of risks for inflation remains biased to the upside.

Until now, the outlook for inflation has been shaped by the shocks that have affected the global economy. However, it is important to remain vigilant to the possibility that, as external inflationary pressures ease, internal pressures will become more significant. Inflation has remained at high levels for a long period of time and this poses a risk of inflation becoming more entrenched, for example if wage revisions become more tightly linked to observed inflation.

Regarding internal pressures to inflation, a recent concern, both in Mexico and in other countries, has been the extent to which wage increases could become a driving factor of inflation. Business sentiment gathered by the Bank of Mexico suggests that labour costs have not been the main source of pressure on operational costs up to the present, but they are expected to exert more pressure going forward. As Graph 1 illustrates, from the perspective of firms, observed increases in production costs have exerted stronger pressures on prices than labour costs. However, pressures from the latter on operational costs are expected to increase (Graph 2). Therefore, it is important to monitor the evolving state of the labour market and wage dynamics in order to anticipate possible inflationary pressures. This is particularly relevant given that the continuous recovery of the labour market has taken place in the context of an economy that, for the most part, has recovered from the initial shock of the pandemic, which may facilitate the pass-through of increases in labour costs to final prices. For instance, nominal wages for formal jobs (proxied by jobs registered with the Mexican Institute of Social Security (IMSS)) increased 11% annually in December 2022. The average for the same month between 2017 and 2019 was 5.9%, it was 7.9% for December 2020 and 7.5% for December 2021 (see Graph 3).

The measurement of wages for IMSS-affiliated jobs has been affected by a reform to outlaw most forms of outsourcing, enacted in the second half of 2021.¹ Part of the

¹ In April 2021, a reform to the legal provisions that regulate the subcontracting (ie outsourcing) labour regime was approved. The reform eliminates labour subcontracting, understood as a relationship in which a natural or legal person provides their own workers for the benefit of another, with the exception of specialised services or the execution of specialised works, provided that they are not part of the preponderant economic activity of the beneficiary. Originally, a 90-day period had been

explanation for the increase in the annual variation of formal wages is associated with higher reported wages for workers potentially affected by this reform, since direct employers generally pay (or report paying) higher wages than outsourcing firms.² In fact, the annual change in the average wages of this group of workers is estimated to have increased by 13.2% in July 2021, the month of the implementation of the reform, which is significantly higher than the increases of 4.9% for other workers in the same period.³ Note that this does not necessarily mean that workers who are now directly registered by their employers are earning higher wages, as this could just be reflecting a change in the *reported* wage rather than the actual wage. Additionally, this effect is expected to be transitory. Indeed, as the labour market has adjusted to the short-term effects of this reform, this factor's contribution to wage growth has been gradually fading away.⁴

Beyond the effects of the reform on outsourcing, recent data and analysis performed by the Bank of Mexico indicate that there are several factors influencing the magnitude of wage growth in the country. Businesses surveyed by the Bank of Mexico⁵ have confirmed that their latest wage revisions have responded to a number of factors, including changes to the minimum wage, observed and expected inflation, the difficulty of hiring and retaining workers, and the economic conditions in which their businesses operate (see Graph 4).

Regarding the role of the minimum wage, the federal government has maintained a policy aimed at restoring its purchasing power, which in turn has led to minimum wage increases of considerable magnitude. In 2019, the minimum wage increased by 100% in the cities bordering the United States and by 16% in the rest of the country. The minimum wage was further increased by 20%, 15%, 22%, and 20% in 2020, 2021, 2022 and 2023, respectively. In this context, since 2019 workers who are directly impacted by the minimum wage hikes have become an increasingly larger share of all formally employed workers. Thus, the increases for this group explain a large part of the variation in the average wage of formally employed workers. Consistent with this observation, the industries with the largest increases in average wages of formally employed workers have also been in industries with the largest shares of workers that are directly affected by minimum wage increases (Graph 5). In addition to their direct mechanical effects, the large magnitude of the minimum wage increase could also be exerting upward pressures on the average wages of formal workers more generally, to the extent that these changes are used as references for increases to non-minimum wage earners. Although evidence suggests that the

granted for companies to regularise subcontracted workers, recognising their seniority. In July 2021, the deadline was extended until 1 September.

² In the available data it is not possible to categorically identify the workers and firms that were affected by this reform. The workers that are potentially affected by the reform are identified as those who moved simultaneously in groups of 20 or more workers from one employer to another (see Graph 3 and Box 4 in Bank of Mexico (2021)).

³ See Bank of Mexico (2022b).

⁴ Between January 2017 and June 2021, workers who simultaneously change in groups of 20 or more contributed 7% of all observed annual variation to the average base salary in IMSS. This contribution increased to 29% between July 2021 and June 2022, and is back down to 5% for the period between June 2022 and November 2022.

⁵ Encuesta Mensual de Actividad Económica Regional (EMAER). This is a monthly survey carried out by Bank of Mexico among businesses of more than 100 workers.

fraction of the latter group who receive a wage increment similar to the minimum wage revisions has been declining over the years, businesses do report that they use these revisions as a reference to set other wages. However, a factor that may contain the impact of minimum wage hikes on other wages is that since 2017 minimum wage revisions have been split between a nominal adjustment in pesos and a percentage increase. The first is known as the “independent recovery amount” (IRA) and is aimed at recovering the purchasing power of minimum wages without contaminating wage revisions along the rest of the wage distribution. This separation is intended to break the informal association between the minimum wage and other wages.

Wage dynamics may be responding to other factors as well. In this respect, it is important to note that formal indexation of wages to inflation in Mexico is relatively low, which suggests that the contribution of this channel to wage growth is restrained. According to businesses surveyed in the Monthly Survey of Regional Economies (EMAER), while 18.0% of firms report explicit indexation to inflation as a factor considered to determine the magnitude of wage adjustments to non-minimum wage earners, only 6.9% report this mechanism as the most important factor. Moreover, although inflation seems to be used as a reference because its observed level and expectations are reported to be relevant factors for determining wage revisions (Graph 4),⁶ and because they influence workers’ wage demands (Graph 6),⁷ this does not mean that the size of wage revisions has been larger or even similar to observed inflation levels.

There have been signs of tightness in the Mexican labour market in the context of the post-pandemic economic recovery. While in general the labour market has recovered from the effects suffered since the onset of the pandemic, this recovery has occurred with heterogeneity across economic sectors and across workers that differ by age and sex. With seasonally adjusted figures, during the fourth quarter of 2022, both the labour force participation rate and the employment to working age population ratio continued to increase, yet remained slightly below their levels for the first quarter of 2020, prior to the health emergency. In the same period, the national and urban unemployment rates continued to decrease to levels well below those during the first quarter of 2020. For its part, the underemployment rate continued to display a downward trajectory, but remained above its average for 2019. Finally, in the last quarter of 2022, the creation of IMSS-affiliated jobs continued to grow with seasonally adjusted figures, although with some slowdown at the end of the year. In this context, slack conditions, as measured by the unemployment gap, suggest that unemployment between July and September 2022 was below the NAIRU and that it kept widening through November 2022, reaching more negative levels than those observed in early 2020 before the pandemic. Thus, measures of the unemployment gap suggest tightness in the labour market. In a similar fashion, the Bank of Mexico’s indicator of slack conditions in the labour market (which is based on several indicators) has maintained an upward trajectory since June 2020 and is estimated to have been positive since October 2021 (ie indicating tightness), although not statistically different from zero. Firms have mentioned difficulties in hiring and retaining workers as a relevant factor for determining the size of wage adjustments (Graph 4), which also suggests that the labour market may be tight. It should be noted

⁶ EMAER, information gathered in the December 2021 survey.

⁷ Information gathered between 26 September and 20 October 2022.

that assessing labour market tightness may be difficult in such an atypical context. On the other hand, the fact that by December 2022 labour force participation remained below its pre-pandemic levels suggests that there could still have been some slack in the labour market, despite relatively low unemployment rates. While the labour force participation of certain groups, such as prime-age women, has fully recovered to pre-pandemic levels, there are groups, primarily younger and older workers (ie younger than 25 years of age and older than 55), who have been slow to reintegrate into the labour market and who could still do so. In terms of scarring effects, the pandemic has induced a reallocation of employment towards certain sectors and regions.⁸ This could result in stronger wage pressures for some industries and geographical regions with higher labour demand. In fact, businesses in certain sectors and in the northern region of the country report more difficulty in hiring or retaining workers. Tightness may vary across locations, as suggested by the fact that a few local labour markets in the northern region of the country concentrated a large share of the employment reallocation observed between 2020 and 2022.⁹

The potential easing of labour market tightness that the reallocation of workers across sectors and regions could bring forth will depend on certain features of the economy, including the costs that workers face to move from shrinking sectors and regions to growing ones. If these costs are larger, employers may struggle to hire where production is expanding. Small responses in migration and sector-switching to wage differentials suggest that workers face large costs relating to changing sectors and locations, with heterogeneity between sectors, and with changes in location being costlier than changes in sectors.¹⁰ Because the recovery of aggregate demand (that would drive labour demand) and the appeal of jobs in particular sectors (that would drive labour supply) is heterogeneous across industries, it is important to also analyse sector- and state-specific labour market indicators to assess whether particular sectors and/or regions are facing tight labour market conditions. For example, data for Mexico have shown that the declines in employment have been larger in sectors that require more physical proximity or those that are less likely to allow remote work. Going forward, analysing whether workers are moving towards better-paying jobs could also be informative about labour market tightness.

In the medium to long term, labour market tightness could also be determined by other forces, such as those that could affect labour supply. For instance, female labour force participation significantly contracted during the pandemic. While it has mostly recovered to its previous level, and done so fully for prime-age women, the pandemic interrupted the upward trend that it had been displaying. It will be crucial for female labour force participation to increase above its pre-pandemic levels in order to sustain higher levels of long-term GDP growth. In this sense, it will be important to understand the structural factors associated with the pandemic, as well as those that preceded it, that could be affecting both male and female participation rates. Businesses interviewed by the Bank of Mexico report that workers are demanding higher wages to take “less attractive jobs” (see Graph 6). While it is possible that this phenomenon is temporary, more permanent changes in preferences

⁸ See Bank of Mexico (2022a).

⁹ Ibidem.

¹⁰ See Bank of Mexico (2022d).

could have increased reservation wages. Some of these changes may already be shaping the pace of recovery in labour supply. For example, as the pandemic recedes, the need to stay at home to take care of children or the elderly may have diminished. However, the time spent by workers at home with children may have made permanent changes in terms of their preferences regarding time allocation between work and family.¹¹ Other factors could be more industry-specific. For example, preferences may also have changed and workers may be more inclined to choose jobs that are more flexible regarding remote work.

Looking forward, remaining vigilant to the possible impacts of the pandemic on wages, and the labour market more generally, will be important in order to identify inflationary risks in a timely manner.¹² This shock has been atypical and has had different facets, so the direction of its long-term net effect is unclear. On the one hand, long-term labour productivity could be negatively affected by losses in human capital formation due to remote learning and student attrition. On the other hand, new work schemes and higher flexibility in the economy may increase productivity in the long term.

The pandemic may have also affected longer-term trends of technological adoption or automation because firms may have been forced to rapidly adopt new technologies in order to remain profitable. On the one hand, technology adoption and innovation could increase business productivity persistently, and this could increase labour demand in the future. On the other hand, automation, that may have shielded businesses from risks of absenteeism during the health emergency, may imply a decrease in demand for labour as machines substitute workers. This process would affect labour demand heterogeneously across sectors as the scope for automation is different. Up to now, the evidence is inconclusive as labour demand has recovered. Nonetheless, because these changes are bound to be slow, its occurrence may not be completely discarded.

Furthermore, the pandemic may have provided additional incentives for a reconfiguration of global production networks because the disruptions experienced during the period highlighted the risks associated with the international fragmentation of production. In fact, there is some evidence of relocation of production towards Mexico, both anecdotal and through information gathered in business surveys.¹³ While this represents an upward risk for growth, there are some concerns in terms of inflation. The relocation of production could be inflationary in the short run given the inflexibility of infrastructure in the short term. For example, rental prices of industrial units and commercial space may experience price pressure in those areas to which businesses are relocating. Although these pressures could be eased as investment materialises, this would only happen in the medium term. Moreover, in the longer run, the reconfiguration of supply chains and the broader effort to strengthen the resilience of production and to make production more environmentally sustainable could come at the cost of efficiency, which may in turn

¹¹ The fact that the labour force participation and employment to population rates remain slightly below their pre-pandemic levels could be reflecting some of these trends.

¹² For example, it is important to understand whether wage growth is responding to changes in productivity in order to grasp whether it may be inflationary.

¹³ See Bank of Mexico (2022c).

have negative implications for global productivity as cross-country comparative advantages would not be fully exploited, and may in turn translate into higher average prices for certain goods.

In sum, there are several factors that are influencing recent wage revisions in Mexico. Evidence gathered by the Bank of Mexico suggests that the high wage growth that has been observed recently is responding to the concurrence of several factors. In fact, firms that report higher average wage increases have also mentioned that they consider multiple factors in determining their revisions.¹⁴ Some of these factors are more related to the current economic juncture, and have to do with stronger economic activity and the recovery of the pandemic in a context of high inflation. However, there are also more structural factors, such as the longer-term policy aimed at recovering the purchasing power of minimum wages, that have increased the pace of wage growth. Although available information suggests that the mechanisms behind wage increases are multi-faceted, the Bank of Mexico has remained vigilant about all of these trends in order to anticipate possible inflationary pressures. The concern regarding these revisions is twofold. First, wage growth may pose a risk for inflation, particularly at the current juncture because these pressures accumulate on top of generalised and significant increases in production costs, which increases the risk of pass-through to final prices. Second, this context increases the risk of contamination or of a feedback of high wage revisions to inflation. In this sense, the Bank of Mexico has acted forcefully and has increased the reference rate by 700 basis points since June 2021. These actions have contributed to keeping long-term inflation expectations anchored. The Bank of Mexico will continue assessing all incoming information and data to guide its policy going forward.

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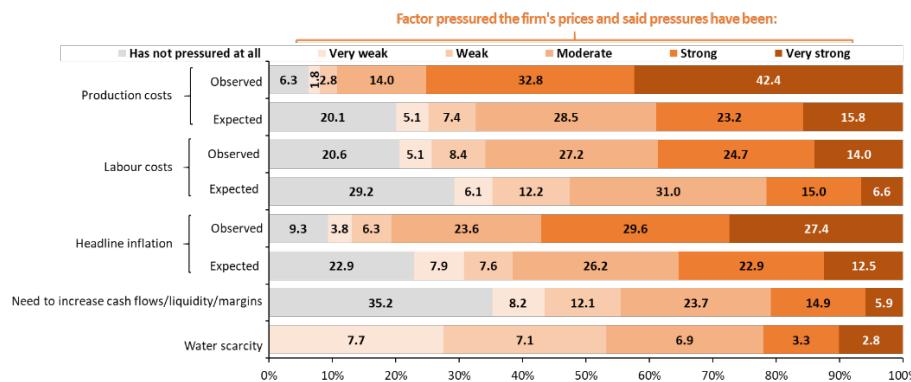
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¹⁴ EMAER, information gathered in the July and August 2022 surveys.

Factors pressuring firms' prices

Graph 1



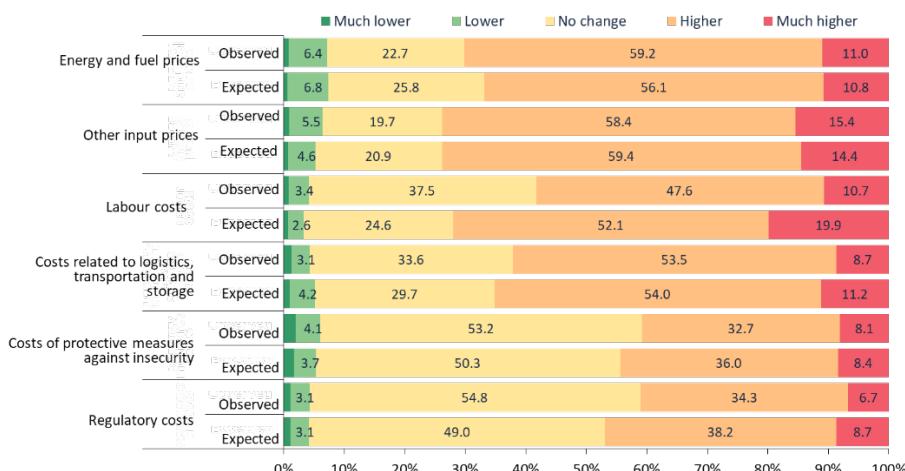
Firms were asked: "From the following factors, please point out how you would grade the pressures each has put in the selling prices of the goods/services provided by your firm." The graph reports the percentage of firms that rated each factor with each score.

Source: Interview programme conducted by the Bank of Mexico between 26 September and 20 October 2022

Observed and expected changes in operational costs

Percentage of firms that reported each category

Graph 2



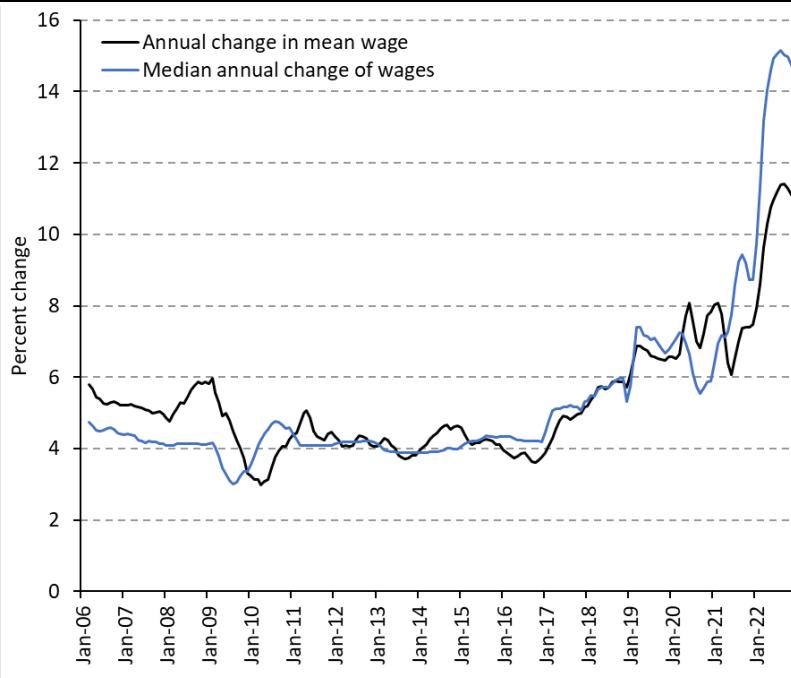
"Observed" refers to the change in pressures observed during the period October–November 2022 relative to July–September 2022. "Expected" refers to changes expected in pressures during the period January–March 2022 relative to October–November 2022.

Sources: Encuesta Mensual de Actividad Económica Regional conducted in December 2022; Bank of Mexico calculations.

Average base contribution wage of IMSS-insured workers

Three-month moving average

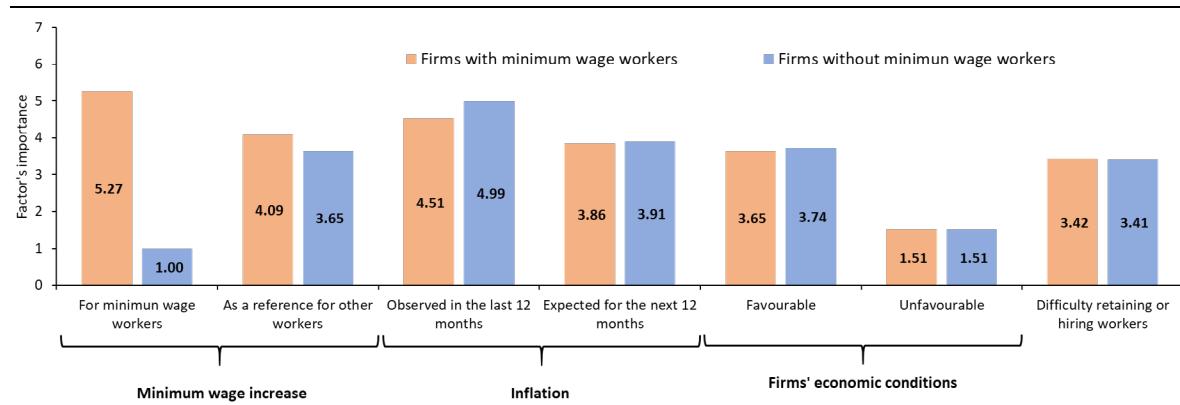
Graph 3



The median of the monthly percentage change of the workers' wage distribution, 12 months apart. The median annual change of wages includes workers that are observed in the current month and 12 months before. Annual change in mean wage includes all IMSS-insured workers. Last observation: December 2022.

The importance of factors in determining the magnitude of the latest wage

Graph 4

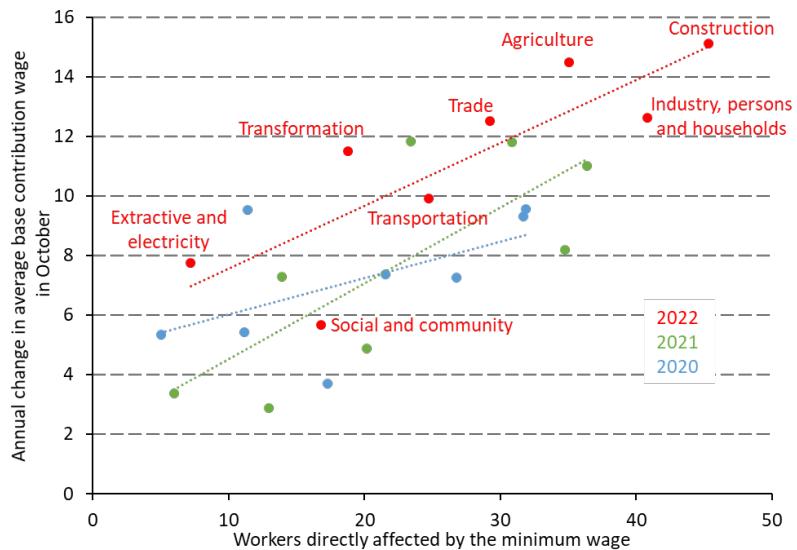


The question asked was: "Rate the importance the following factors played to determine the last wage revision of your firm. For your answer use a scale from 1 to 7, where 1 means the factor did not play a role at all and 7 means it played a significant role." The factors reported in the category "Other" were reviewed and some others were reclassified (those mentioning competition for workers were reassigned to the factor of difficulty retaining or hiring workers). The graph reports the average value assigned by firms that revised wages and rated any factor with an importance above 1. This importance was rated in a scale of 1 (meaning that the factor was not considered) to 7 (the factor was very important).

Sources: Encuesta Mensual de Actividad Económica Regional conducted in May 2022; Bank of Mexico calculations.

Relation between annual percent change in average base contribution wage and percentage of workers directly affected by the minimum wage

Graph 5



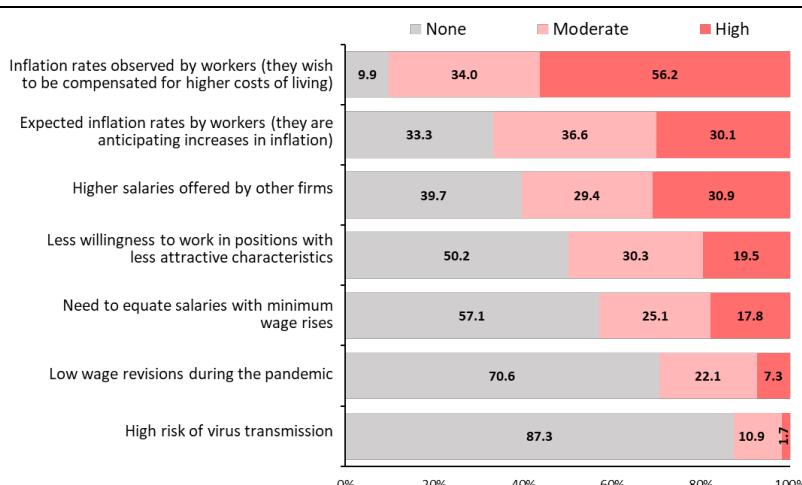
This figure shows the annual change in the Average Base Contribution Wage in October of the corresponding year and the percentage of workers directly affected by the minimum wage (MW) in October of the previous year. The average change in the minimum wage in 2020, 2021 and 2022 was 18%, 15% and 22%, respectively.

Sources: IMSS data; Bank of Mexico calculations.

The influence of factors on workers' demands for wage raises

Percentage of firms that reported each influence level

Graph 6



The question asked was: "In your opinion, how would you rate the influence of the following factors in the demand of workers for salary raises in the last 12 months?"

Source: Interview programme conducted by Bank of Mexico between 26 September and 20 October 2022.

Peru: labour market, wages and monetary policy in the aftermath of Covid-19[†]

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Abstract

Forward-looking agents tend to modify their expectations and behaviour based on the information available in their environment. The way economic agents filter valuable information depends on their individual incentives and cost-benefit analysis. In the Peruvian case, we find that each international shock, such as the Global Financial Crisis and the Covid-19 pandemic, induces different types of behaviour in the labour force. Peru has a higher degree of informality compared with economies with similar per capita income. The informal labour market behaves like a flexible one for wage-setting, as opposed to a formal market with the traditional rigidity setting. Assessing the influence of a labour market with high informality on the economic cycle and inflation dynamics is challenging, as there is a lack of detailed information. Before the pandemic, there was a low correlation between the unemployment rate and economic activity. In the aftermath of Covid-19, labour markets seem to be more forward-looking (or more attentive) and there is also a higher correlation between the unemployment rate and GDP. That is, the shock absorber role of the informal labour market was overcome by the magnitude of the economic contraction induced by the stringent Covid-related lockdown.

JEL classification: C32, E24, E26, E52, J31.

Keywords: labour market, informal market, wages, monetary policy.

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1. Introduction

According to the New Keynesian Phillips curve, agents are forward-looking because there is a period in which prices are rigid. When the opportunity to update prices and wages appears, firms and workers need to consider future conditions in order to fix new prices. These agents then tend to modify their expectations and behaviour based on available information. On the other hand, the sticky information Phillips curve is based on how inattentive rational agents are. The way in which each of these agents filters valuable information depends on each individual's incentives and cost-benefit analysis.

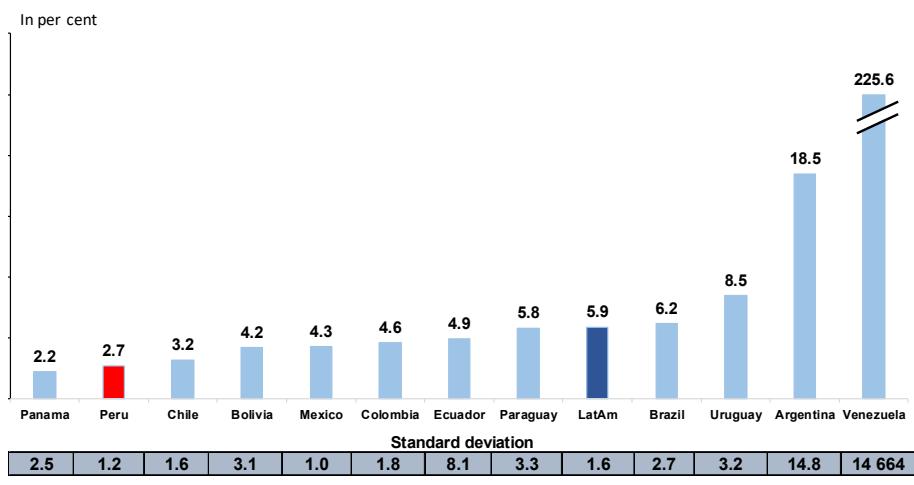
In labour markets, the wage is the relevant price that workers receive for their labour. Wages may be rigid, in which case they affect the conduct of monetary policy. It is also possible that workers are inattentive to their surroundings, which also modifies the effectiveness of monetary policy (Mankiw and Reis (2006)). Two issues have become important in the literature on monetary policy and labour markets: informal markets and wage distribution.

While informal markets lower long-run growth because the provision and allocation of public services are inefficient (see Loayza (1996)), these markets may help to deal with shocks by making it easier to buffer economic activity, but they also weaken the transmission mechanism of monetary policy (Alberola and Urrutia (2020), Castillo and Montoro (2012)).¹ On the other hand, there is some evidence that a monetary policy shock tends to change the wages received by different types of households (Coibion et al (2017), Merrino (2022)).

The Central Reserve Bank of Peru (BCRP) has an inflation targeting (IT) scheme with a 1% - 3% target range (centre at 2%) and the policy interest rate signals its stance. The transmission mechanism mainly works through an operative target (the interbank interest rate) and usually reacts to demand pressures reflected in the output gap. Importantly, the BCRP also seeks to shape inflation expectations among private agents (firms and households) through adequate communication of its policy stance.² Peru's IT regime faces the challenge that around 70% of the employed labour force belong to informal markets. However, this has not prevented Peru from being one of the countries in the region with the lowest and least volatile inflation during the first 20 years of the current century.

¹ In this searching model, the time for accepting a contract is shorter because the informal market makes job opportunities in the formal sector less frequent. In terms of pricing, this implies a less rigid market, which make it more difficult for the central bank to control inflation through changes in the output gap.

² See Carrera (2012) for measuring the flow of information between private agents in Peru.



On the other hand, workers seem to behave differently when an international shock hits the economy. In the aftermath of Covid-19, the behaviour of labour markets suggests that agents are more forward-looking (or more attentive) compared with the Global Financial Crisis (GFC). Figure 2 shows some of Peru's key macroeconomic variables. During the GFC in 2007–9, the output gap was clearly first in the positive zone (2008), as in other emerging economies that were driven by high commodity exports and capital inflows,³ and then shifted into the negative zone during the GFC (2009). Moreover, during this crisis, the BCRP adopted a clear stance, as reflected by the behaviour of the interest rate. The policy rate was raised to 6.5% during the decoupling period as inflation reached pre-September 2008 levels and GDP grew 9% that year. The situation changed dramatically with the GFC and inflation and GDP growth fell to 1% in 2009, and the policy rate reached a then-historic high of 1.25%. The labour market, however, did not show any significant changes in either wages or employment (the unemployment rates in 2008 and 2009 were 4.0% and 3.8%, respectively).

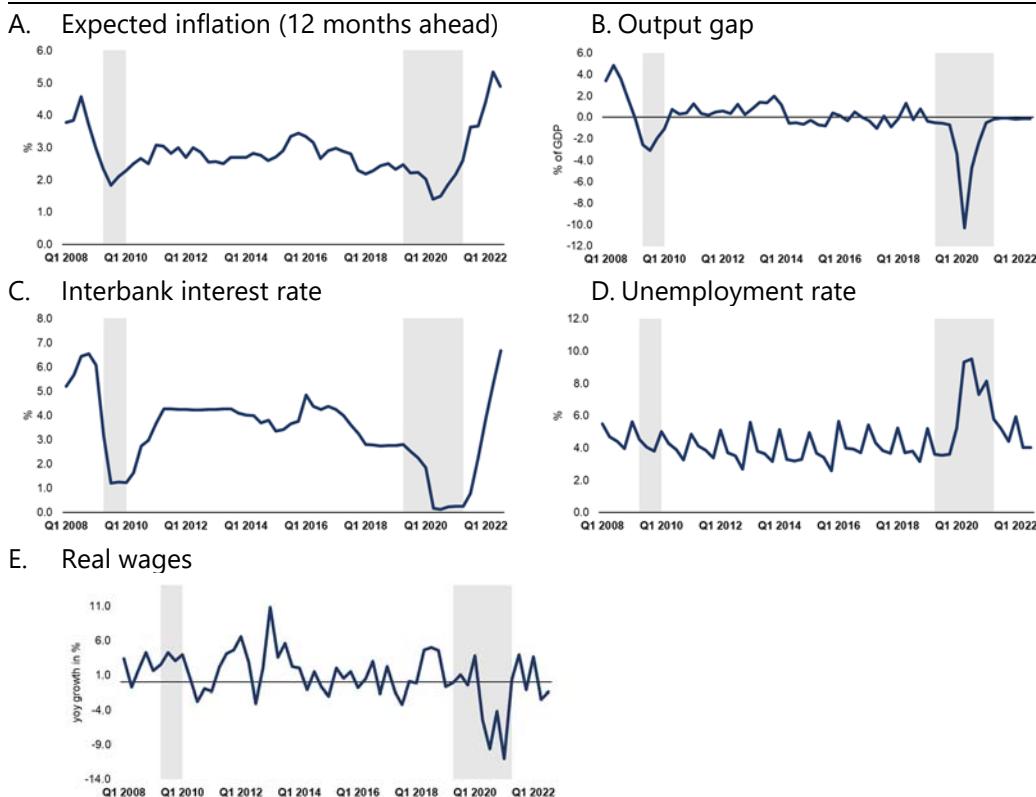
The weak connection of these labour indicators with the economic cycle may be due to some limitations relating to the availability of information – there were no reliable and representative data on the labour market. A labour survey was available but that mainly covered Lima, the capital of Peru. This fact may explain why the BCRP has not been using labour variables in its main economic forecast model, the quarterly forecasting model (MPT), with the exception of the impact of changes in the minimum wage on inflation. Specifically, Castellares et al (2022), using disaggregated data at the industry level, estimate that a 10% rise in the minimum wage increases the consumer price index by 0.73% 12 months later.

³ The period between the third quarter of 2007 and before the collapse of Lehman Brothers was called "decoupling", as cycles in emerging economies became the opposite of those in the US.

However, the response of labour variables to the economic cycle changed considerably during the 2020 pandemic, which prompted the monetary authority to enhance follow-up on developments in the labour market.

Peru: macroeconomic variables

Graph 2



Source: BCRP, INEI, and Sunat.

Peru: macroeconomic indicators during crises

Table 1

	GFC		Covid-19			
	2007	2008	2009	2019	2020	2021
GDP (yoy growth in %)	8.5	9.1	1.1	2.2	-11.0	13.3
Policy rate (%)	5.0	6.5	1.2	2.3	0.2	2.3
Output gap (as % of GDP)	1.7	3.4	-1.9	-0.6	-5.2	-0.1
Unemployment rate (%)	4.3	4.0	3.8	3.6	7.3	4.4
Real wages (yoy growth in %)	na	2.2	3.0	0.0	-3.9	-2.2

GFC= Great Financial Crisis.

Sources: BCRP, INEI, and Sunat.

The remainder of this paper is divided as follows: Section 2 describes the main features of Peru's labour market; Section 3 shows the results of the proposed strategy for assessing the effectiveness of monetary policy over wages; and Section 4 concludes.

2. Labour market characteristics

Peru's labour market has features that distinguish it from other countries in the region. Peru has one of the highest labour participation rates in the region (71.9% in 2021),⁴ mainly due to a higher participation among women (63%).⁵ In addition, it has a low unemployment rate due to a large informal labour market and a lack of unemployment insurance;⁶ ie potential workers who cannot find work in the formal sector accept jobs in the informal sector, thereby avoiding unemployment. Another main feature is the high participation of self-employed workers (41.5%), mostly informal, in the labour market, which may become important in high-inflation episodes (Graph 3). This group of workers can adjust their prices to avoid being affected by the general rise in prices and maintain their real income, market conditions permitting.

According to data from Peru's National Household Survey (ENAHO), 76.8% of workers (13.2 million) in Peru work informally,⁷ one of the highest informality rates in the region and above the informality rate that would be expected given Peru's per capita income.⁸ Labour legislation is usually rigid, which generates high labour costs, making hiring and firing more expensive. In general, there is pressure to raise the minimum wage above workers' productivity, which would result in a reduction in formal employment, moving workers with incomes close to the minimum wage into the informal sector (Graph 4). It should also be noted that only 5.5% of formal dependent workers in the private sector (1.1% of the working population) are

⁴ In Peru, the labour participation rate is estimated considering the population over 14 years of age. According to the World Bank, in 2019 the labour force participation rate in Latin America and the Caribbean, for the population aged between 15 and 64, was 69.6%. In Peru it was 81%, only surpassed by The Bahamas (81.5%).

⁵ According to World Bank data, the female labour participation rate in Latin America and the Caribbean, for the population between 15 and 64 years of age, was 58% in 2019. In Peru it was 74%, surpassed by Saint Lucia and The Bahamas (76%) and Barbados (75%).

⁶ Although there is no unemployment insurance in Peru, there is an additional payment received by workers in the formal sector, called "Compensación por Tiempo de Servicio" (CTS). This mechanism is financed with contributions from employers and provides up to four monthly salaries to workers if they lose their jobs. However, it is not a perfect substitute, and it is losing its ability to provide support in case of unemployment because, in crisis events, withdrawals from this fund have been authorised even for employed people.

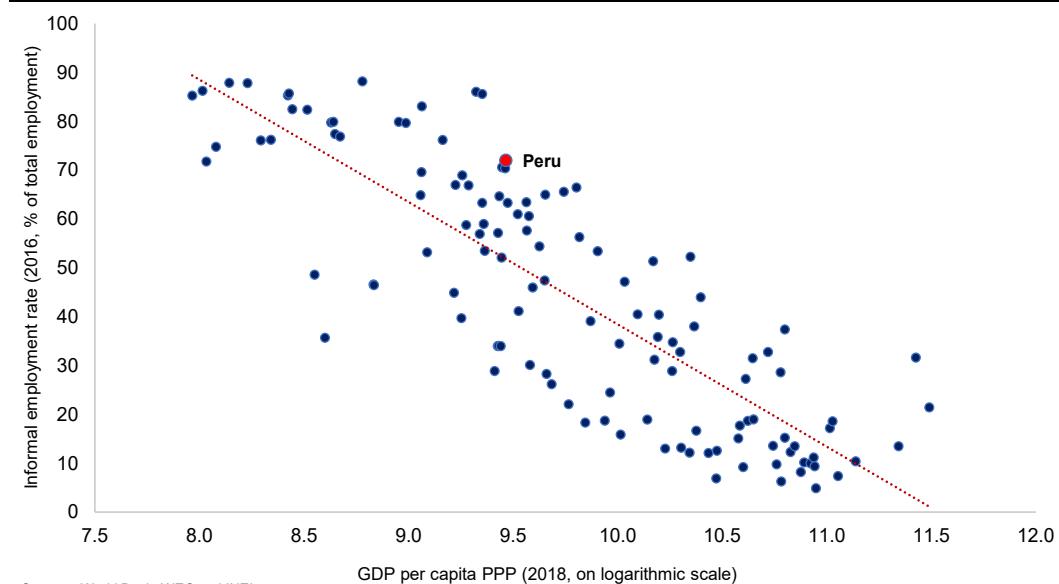
⁷ Informal workers are those who work in the informal sector (companies or people without a taxpayer identification number) and workers in the formal sector whose employers do not pay for health insurance. Dependent workers with health insurance paid by their employers are formal. Self-employed workers who provide a taxpayer identification number in a survey are considered to be formal workers.

⁸ Information from household surveys is not representative of the formal labour market. Administrative record (electronic payroll) data show around 1.9 million more people with formal jobs in 2021 (11% of the working population) than that in the survey data.

registered in a union. Finally, in 2021 there were only 38 strikes involving 209,000 workers (4% of formal dependent workers), who lost few hours of work (on average 14 hours of work per year).

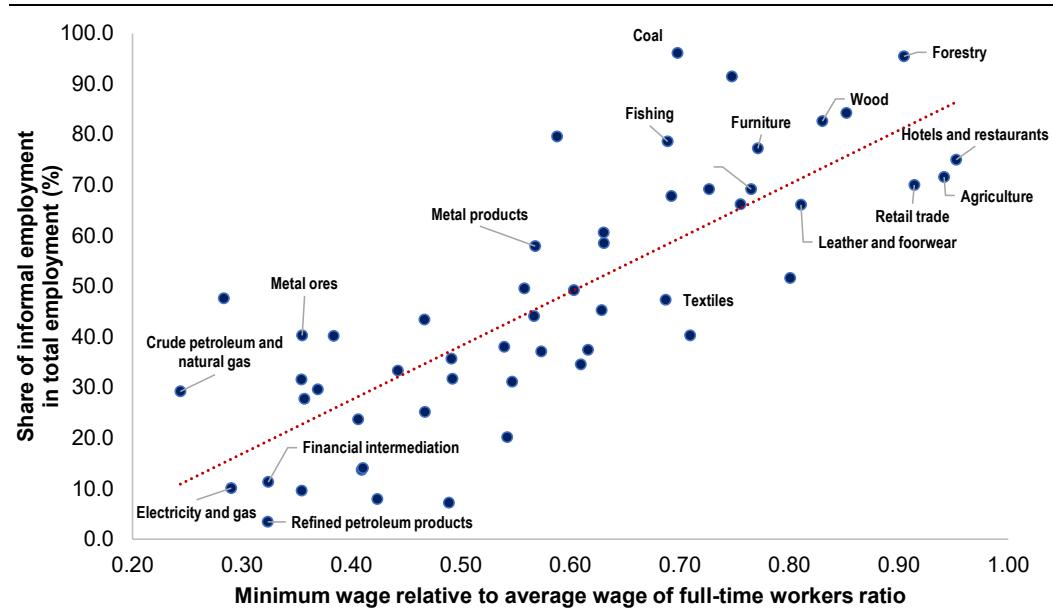
GDP per capita and informal employment by country

Graph 3



Peru: minimum wage and informal employment by industry

Graph 4



Source: ENAHO 2019-2021 (INEI).

Regarding the evolution of the workforce, during the period 2004–19 the working age population (WAP) and the economically active population (EAP) increased 1.7% per year, while the working population grew 1.8% per year. The working population in Peru is primarily concentrated in the services and agriculture sectors (62.2%) and the unemployment rate is relatively low, averaging 4.3% during the period 2004–19.

In 2020, the employment level decreased 13% due to pandemic-related restrictions. These restrictions made it impossible to seek new employment opportunities and reduced the chances of generating income for a great proportion of independent workers. Accordingly, the labour participation rate fell 8.1 percentage points compared with the previous year. This contraction in the employment level occurred mainly in urban areas where service sector jobs are concentrated (49% of employment in 2019). It is worth noting that the decrease in employment affected independent and informal dependent workers the most (a reduction of 16.7%). Finally, despite the strong decrease in employment, the unemployment rate increased just 3.5 percentage points compared with 2019, due to the sharp drop in labour participation. In 2021, with the resumption of most activities and fewer Covid-related restrictions, employment returned to its pre-pandemic level in the fourth quarter.

Peru's labour market usually adjusts more by the number of workers and working hours (the percentage of workers with second jobs has recovered strongly in the last three quarters) than by prices (wages). The participation rate has recovered to pre-pandemic levels and unemployment rates are very close, but real wages are lagging behind. By the second quarter of 2022, income was lower by 6.8 % in real terms compared with the same period in 2019 (Graph 5). The reduction has occurred mainly in the informal sector, especially among independent workers.

Employment indicators

Table 2

	2015	2019	2020	2021	2022		Var % annual			2022 3Q
					3Q	2019	2020	2021		
A Working age population	23.1	24.5	24.9	25.3	25.7	1.5	1.5	1.5	1.5	1.5
B Economically active population	16.5	17.8	16.1	18.1	18.4	2.1	-9.7	12.8	2.4	
C Participation rate	71.5	72.7	64.7	71.9	71.5	0.4	-8.1	7.2	0.7	
D Working population	15.9	17.1	14.9	17.1	17.6	2.1	-13.0	14.9	3.8	
a. Formal dependent employment ¹	4.6	5.1	4.9	5.1	5.4	2.8	-4.3	4.8	5.6	
b. Informal dependent and self-employed	11.3	12.0	10.0	12.0	12.2	6.6	-16.7	19.8	2.9	
E Unemployed (B – D)	0.6	0.7	1.2	1.0	0.7	1.6	71.1	-13.7	-21.5	
F Unemployment rate (E/B)	3.6	3.9	7.4	5.7	4.0	0.0	3.5	-1.7	-1.2	

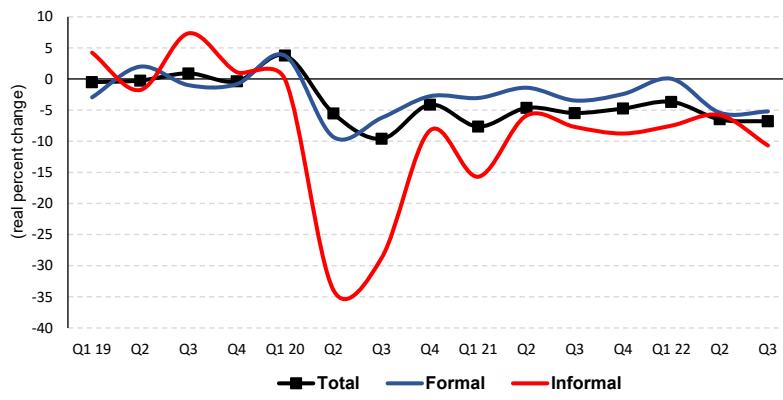
1 Based on the formal employment of the Payroll. Informal dependent and self-employed workers are obtained by difference.

Sources: ENAHO, Sunat.

A noteworthy fact is the significant migration wave into Peru since 2016. Before that year, Peru used to lose labour as a result of migration. It is estimated that close to 0.4% of Peru's working population emigrated each year. However, in 2018 alone, over 815 thousand Venezuelans entered Peru.

Labour income

Graph 5



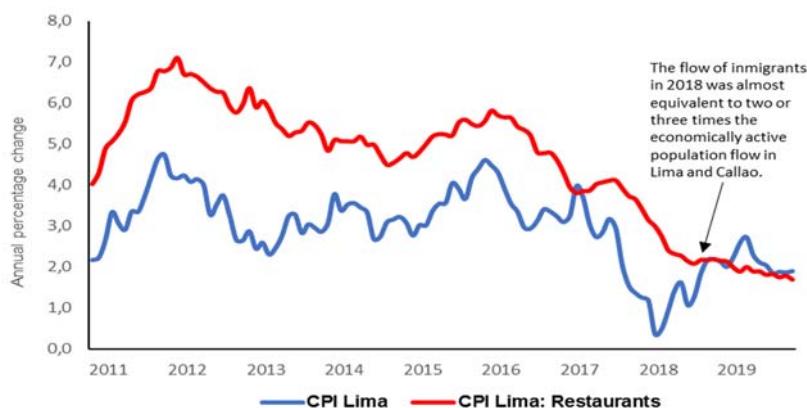
2020 real annual percentage change, 2021 and 2022 real annual change compared with 2019

Source: ENAHO, Sunat.

This number of new residents, although low if measured as a percentage of the EAP, is considerable if compared with the flow of people entering the EAP annually. It is estimated that the flow of immigrants in 2018 was almost equivalent to the EAP flow nationally and was between two and three times the EAP flow in Lima and Callao, which received around 80% of the immigrants that year. These migrants have found work primarily in the services sector and carry out their activities informally. It is worth noting that this flow of new workers may have reduced pressures on salaries, primarily in services industries such as restaurants, which is why food-away-from-home prices increased less in Lima and Callao, the main centres of migration, compared with the rest of the country. Accordingly, growth in the price index for restaurants has been lower than overall inflation since 2019 (Graph 6).

Consumer price indexes

Graph 6



Source: INEI.

Table 3 summarises the characteristics of the wage distribution by deciles in 2019 (pre Covid-19) and 2022 (post Covid-19) based on the ENAHO. Nominal wages

tended to increase for households in all deciles. Regarding educational levels, higher-wage households usually include members with college degrees and lower-wage households include members with only some years of school education. This stylised fact remains valid in the aftermath of Covid-19. Regarding financial inclusion, more households in each decile were able to gain access to financial services to cope with the Covid-19 event. Moreover, the participation of households in informal labour markets increased after the pandemic, with the exception of households in the first and third deciles which had already been among the groups with the highest participation rates.

In sum, after Covid-19, workers earn a lower real wage, have more access to financial institutions, and participate more in informal labour markets.

Summary statistics of the decile of the wage distribution

Table 3

Decile	Wages		< HS		HS		Some college		College		Financial inclusion		Dependent workers		Informal labour	
	Soles		% of workers		% of workers		% of workers		% of workers		% of workers		% of workers		% of workers	
	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022	2019	2022
1	199 (29)	188 (22)	66.8	62.0	21.9	24.7	4.6	6.1	6.7	7.2	22.5	31.5	14.5	13.0	96.5	95.5
2	515 (26)	517 (25)	48.8	51.0	32.0	30.4	9.2	9.3	10.0	9.4	21.2	31.2	39.5	34.1	93.6	94.4
3	788 (49)	832 (57)	39.3	33.3	35.2	36.3	12.0	15.8	13.4	14.5	26.2	46.3	54.8	59.6	89.4	84.7
4	960 (90)	1 002 (78)	22.7	27.9	35.9	38.5	17.0	15.0	24.3	18.5	52.3	56.8	78.1	73.0	65.5	72.4
5	1 124 (98)	1 161 (99)	27.4	23.3	35.7	40.4	14.7	13.5	22.2	22.6	50.2	61.5	73.1	72.4	64.9	69.9
6	1 315 (136)	1 387 (203)	25.3	22.5	39.1	35.7	14.0	16.3	21.3	25.4	53.8	66.3	72.0	76.1	59.4	62.3
7	1 570 (151)	1 621 (203)	20.8	25.2	35.8	40.7	12.8	14.3	30.5	19.8	57.4	64.3	72.3	73.2	53.7	63.6
8	1 961 (204)	1 973 (231)	15.0	18.7	28.8	31.7	11.0	14.5	45.1	35.0	70.0	73.5	73.9	76.7	41.5	52.9
9	2 606 (299)	2 604 (340)	10.8	11.2	23.3	23.4	11.7	11.6	54.2	53.8	79.2	85.0	74.5	76.1	29.2	32.4
10	5 372 (1119)	5 128 (1083)	7.2	6.8	16.6	17.8	8.4	9.6	67.8	65.8	88.8	93.1	70.4	75.4	17.3	19.8

HS = high school education.

Wages are nominal. Standard deviations are in brackets. Estimates are for those workers who work 30 hours or more per week. 2019 statistics correspond to the end of the year survey, and 2022 statistics to the January–September average. Estimated labour informality without taking account the administrative records (electronic payroll).

Sources: ENAHO (2019, 2022).

3. Monetary policy and labour markets

As has been mentioned in the previous sections, adjustments to macroeconomic conditions in Peru's labour market have occurred mainly through the number of workers rather than wages. Additionally, it is only during the pandemic that a greater sensitivity and responsiveness of the labour market to the economic cycle has been identified, a characteristic that was not previously observed. Thus, in this section we focus on evaluating the response of wages to monetary policy shocks.

Households may experience a decrease in their wages when a contractionary interest rate shock hits the economy, in line with Di Giorgi and Gambetti (2017), Coibion et al (2017) and Merrino (2022); ie, heterogeneous households respond differently to a shock. In the case of the Peruvian economy, we argue that the labour force became more forward-looking because of the Covid-19 event.

In this paper, a monetary policy shock consists of unpredictable movements of the policy interest rate, which within a structural model is equivalent to variations of the interest rate that cannot be explained with a Taylor rule. When the economy reaches its capacity to meet the demand from individuals, firms, and government (overheating), the central bank typically responds with an unanticipated policy rate increase to curb aggregate demand, in turn preventing a surge in inflation.

A specific aspect of our study is that the labour market is segmented between formal and informal sectors. The key difference among these sectors is the flexibility of labour contracts and the productivity of workers. Specifically, the informal labour market is more flexible and less productive than the formal sector. This feature ends up reducing the transmission of a monetary policy shock to the inflation rate, as workers have an incentive to take job offers faster, which reduces the impact on inflation.⁹

3.1 General strategy

We use different samples for identifying the effects of Covid-19. For the pre-Covid years we consider the 2007–19 sample period, and we use the full 2007–22 sample to assess how the Covid-19 event affected Peru's labour market response. In line with Coibion et al (2017) and Merrino (2022), we estimate the impulse responses from the interest rate to real wages by local projections and confidence error bands (Jordá (2005) and (2009) and Lütkepohl et al. (2015)).^{10 11}

⁹ After being laid off, workers have three options: unemployment, formal employment and informal work. As workers have an incentive to enter the formal sector, they will accept any such offer faster; hence, wages absorb most of the effect.

¹⁰ The extended sample adds the information of years 2020–22 in which the policy interest rate was set at its lowest possible value as a response to the pandemic. This may look like there is no major policy variation during those years; however, the approach used here still identifies monetary policy shocks. These correspond to changes in the state of the economy (that may have produced negative policy rates through a Taylor rule) and the implementation of other complementary policies undertaken by the Central Reserve Bank of Peru (as changes in the reserve rate or liquidity injections through Reactiva Peru).

¹¹ Jordá (2009) makes the case that after expanding the sample in the study of Stock and Watson (2001), his impulse responses are virtually identical to those in the original study given the absence of major events. The sample used in Stock and Watson (2001) is 1960–2000 while in Jordá (2009) is 1960–2007. So that, in our estimations, changes in impulse responses after extending the sample must be associated with a major event such as the pandemic.

We first analyse the case of aggregate wages and then estimate the response of two types of workers: formal and informal.

3.2 Data

Quarterly data on wages have been constructed from household surveys (ENAHO) and administrative records; ie the electronic payroll ("Planilla Electronica") compiled by Peru's tax authority (SUNAT). For 2007-12 and 2013-22, salaries of formal sector employees are drawn from ENAHO and SUNAT, respectively. For workers in the informal sector, wages are estimated based on ENAHO. Aggregate wages are the weighted averages of formal and informal sector wages.

3.3 Estimation setup

We follow Jordá (2007) to estimate the response of real wages to an interest rate shock via local projection. Compared with the standard VAR approach, local projection is more robust to misspecification of the VAR reduced form.¹² However, the calculation of the structural responses still requires computing contemporaneous correlations from the reduced form shocks.

As for the identification, we follow Pesaran and Shin (1998) and estimate generalised impulse responses for an unrestricted VAR. Under this approach, shock orthogonalisation is not required and the results are invariant to the ordering of the variables in the VAR. In this paper, we define \mathbf{y}_t as a vector composed by the seasonally adjusted unemployment rate, 12-month expected inflation, output gap, nominal depreciation rate, the interbank interest rate and a measure (or measures) of wages.¹³ As a result, the first step of the approach requires the estimation of the following structural VAR system:

$$\mathbf{y}_t = \mathbf{B}_0 + \sum_{\ell=1}^p \mathbf{B}_\ell \mathbf{y}_{t-\ell} + \mathbf{A} \mathbf{e}_t \text{ with } \mathbf{e}_t \sim N(\mathbf{0}, \mathbf{I}), \quad (1)$$

where \mathbf{A} is estimated as in Pesaran and Shin (1998). As we are interested in gathering the responses to interest rate shocks, we will keep only the corresponding column from \mathbf{A} . Let's denote this column as \mathbf{a}_r .

The impulse-response function is computed by projecting different leads of \mathbf{y}_t onto the hyperplane generated by $\{\mathbf{y}_s\}_{s=t-1}^{t-p}$. That is, we first need to estimate the following \mathbf{H} regressions:

$$\mathbf{y}_{t+h} = \beta_0^h + \sum_{\ell=1}^p \beta_\ell^h \mathbf{y}_{t-\ell} + \mathbf{u}_{t+h} \text{ with } \mathbf{u}_{t+h} \sim VMA(h) \text{ for } h \in \{0, \dots, H\} \quad (2)$$

For estimating the impulse-response function, Jordá (2007) calculates the difference of two conditional forecasts. One forecast corresponds to the realisation of the shock at moment $t-1$ (i.e., $E[\mathbf{y}_{t+h} | \{\mathbf{y}_{t-1} + \mathbf{a}_r, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p}\}]$) while the other forecasts are computed without considering the shock (i.e., $E[\mathbf{y}_{t+h} | \{\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p}\}]$). Hence the impulse response function is defined as:

$$IRF_r(h) = E[\mathbf{y}_{t+h} | \{\mathbf{y}_{t-1} + \mathbf{a}_r, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p}\}] - E[\mathbf{y}_{t+h} | \{\mathbf{y}_{t-1}, \dots, \mathbf{y}_{t-p}\}], \quad (3)$$

¹² For instance, the data generator process may be a vector autoregressive moving average (VARMA) or a nonlinear model.

¹³ On the first specification the measure of wages is the log-change of aggregated wages. We also estimate a specification that uses simultaneously the log-change of formal and informal wages as measures of wages.

which leads to:

$$IRF_r(\mathbf{h}) = \boldsymbol{\beta}_1^h \mathbf{a}_r. \quad (4)$$

The focus of this paper is the response of our measure of wages to an impulse in the interest rate. Hence, we estimate the impulse response function as in $\mathbf{e}_w' \boldsymbol{\beta}_1^h \mathbf{a}_r$ (for all $\mathbf{h} \in \{\mathbf{0}, \dots, \mathbf{H}\}$), where \mathbf{e}_w is a column vector of zeros with one in the position of our metric of wages.

Jordá (2005) shows that the residual in equation (2) follows a VMA(h) process; hence, we are required to compute confidence intervals that are robust to this process. We then build error bands as in Lütkepohl et al (2015) by applying Scheffé's method to approximate simultaneous confidence coverage, and obtain the percentile bound for the 16th and 84th percentiles.

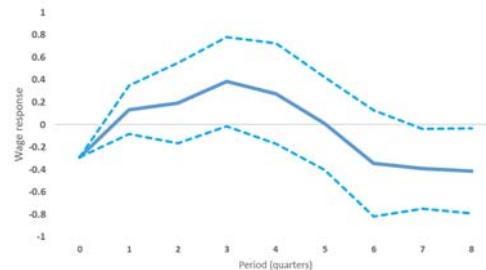
3.4 Impulse responses by local projections

Following Jordá (2005) and Lütkepohl et al. (2015), we find that the Covid-19 event made wages more sensitive to an interest rate shock. When we use information for aggregate wages, the initial response (Graph 7.B) almost duplicates that in the period prior to the Covid-19 event (Graph 7.A). Moreover, in the new scenario, the wage response switches from negative to positive after one year, which is consistent with a labour force that internalises the policy shock.

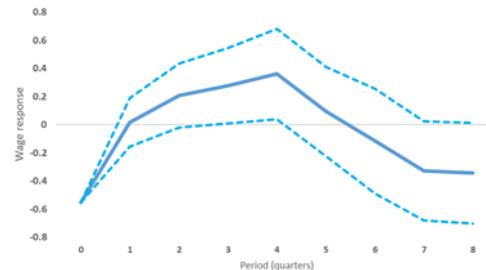
Response of wages to an interest rate shock

Graph 7

A. 2007–19



B. 2007–22



Note: Solid line is the impulse response calculated by local projections. Dashed lines are marginal error bands (percentile bounds for 84th and 16th percentiles).

Source: Authors' own calculation.

The effect of an interest rate shock on formal labour market wages usually last three quarters. After the pandemic, the initial response of wages to this type of shock becomes stronger and gradually disappears thereafter (Graphs 8.A and 8.B). On the other hand, dynamics for wages in the informal sector seem to be similar before and after the pandemic (Graphs 8.C and 8.D).¹⁴

Two points to highlight in this exercise are: (i) the initial wage response to an interest rate shock, both before and after the pandemic, is stronger in the informal sector than in the formal labour market; and (ii) in the aftermath of Covid-19, the wage response in the formal sector becomes closer to that in the informal sector.

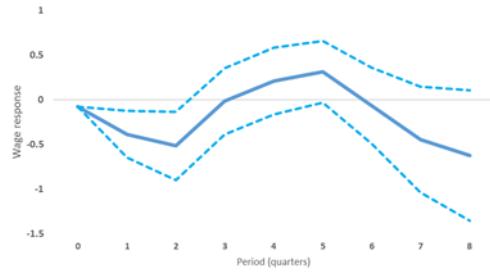
¹⁴ The previous result has some similarities with that in Jordá (2009) in which impulse response tends to be unaffected after extending the sample in absence of major changes.

We argue that these results are consistent with firms in the formal sector being hit harder than informal ones during the Covid-19 event. In this scenario, the informal sector absorbs a substantial part of the unemployed force from the formal sector. If so, the response from aggregate wages tends to mirror those in the informal sector.

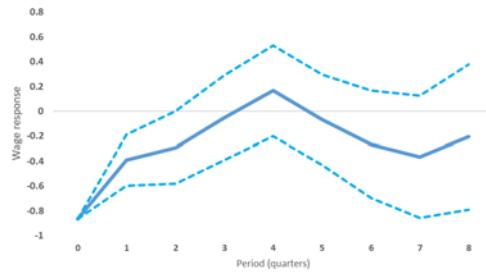
Response of wages to an interest rate shock

Graph 8

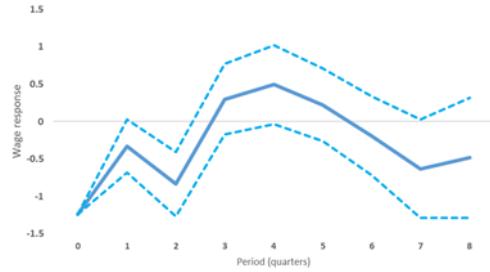
A. Formal labour market 2007–19



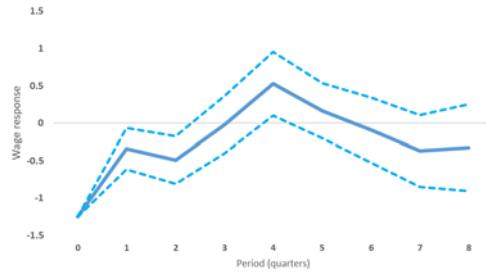
B. Formal labour market 2007–22



C. Informal labour market 2007–19



D. Informal labour market 2007–22



Note: Solid line is the impulse response calculated by local projections. Dashed lines are marginal error bands (percentile bounds for 84th and 16th percentiles).

Source: Authors' own calculation.

3.5 Summary

We find that wages respond in different ways to an interest rate shock. Specifically, the response tends to differ for the formal and informal sectors, in line with Coibion et al (2017) and Merrino (2022), where a policy rate shock induces a change in the wage distribution. This is also in line with the theoretical framework in Alberola and Urrutia (2020), where the informal sector provides a flexible margin of adjustment to the labour market when a shock hits the economy.

The mechanism described in Alberola and Urrutia (2020) is based on the waiting process for accepting job offers. In the absence of informal labour markets, a worker with a job offer from the formal sector has two options: either accept it or wait for another offer (in the expectation of obtaining a higher wage rate, see Walsh (2005)). With the presence of an informal labour market, the probability of receiving a new labour contract offer is much lower. This is because workers from the informal sector want to move into the formal sector and this increases the potential costs of waiting. Under these conditions, workers need to accept job offers faster (particularly those working in the informal market). Firms are able to hire workers on an informal basis, thereby

dampening the response of employment in the formal market and causing monetary policy to become less effective in controlling inflation.¹⁵

We emphasise that the Covid shock has affected supply and demand for labour at the same time, so that workers face a new labour market setup. This, over time, is forcing them to be more forward-looking. There is a cost and a benefit from updating information, absent in the modelling strategy proposed by Alberola and Urrutia (2020), which may add to the effectiveness of monetary policy in the presence of informal markets.

4. Concluding remarks

Our results suggest that wages in labour markets became more reactive to an interest rate shock in the aftermath of Covid-19. Moreover, wages of formal workers tend to behave in a similar way to the wages of informal workers (who represent most of the employed labour force). In general, our results seem to be in line with a more forward-looking type of worker facing both lower supply and demand for labour.

After the Covid-19 event, workers earn lower real wages, participate more in informal labour markets and have more access to financial institutions. These facts are consistent with workers with the ability to be more aware of labour conditions. The bottom line is that this profile also suggests agents might become more forward-looking about future conditions.

There are some avenues to improve research and estimations. First, in line with Alberola and Urrutia (2020) and Carrera (2011), the formal sector may be exposed to a credit cost channel, which is closely monitored by the BCRP as part of the monetary transmission mechanism, and therefore should be incorporated into the analysis. Second, estimating the VAR system for workers in each decile of wages would contribute to fine-tuning the distributional effect of an interest rate shock, as in De Giorgi and Gambetti (2017).

Finally, it is important to highlight that labour market information has, so far, not been relevant for inflation forecasting, with the exception of the impact of minimum wages on inflation. This is due to a number of factors: the quality of the data is questionable; there are only short series available at the national level; and administrative data on formal employment are only available in respect of relatively few years.

¹⁵ See also Castillo and Montoro (2012).

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Labour market conditions and wage developments in the aftermath of the pandemic: implications for monetary policy in the Philippines

Introduction

The Covid-19 pandemic had extensive economic ramifications across economies, and the Philippines is no exception. The domestic labour market was one of the sectors that was most affected by the combined health and economic crises that hit the country. The unemployment rate spiked to a record high in 2020 arising from business closures and government mandated lockdowns, while the underemployment rate likewise deteriorated. At the same time, the labour force participation rate (LFPR) and the number of employed individuals dropped steeply. Nominal wages were stagnant at the height of the pandemic but began to rise above historical averages two years post-pandemic. Meanwhile, real wages have declined in the same period as inflation has been rising since the 2020 pandemic year. The Bangko Sentral ng Pilipinas (BSP) is mindful that labour market conditions in the wake of the pandemic could have a domino effect on domestic demand and wage growth, and consequently impact the inflation outlook.

This paper presents the developments in labour market conditions, wages and inflation in the Philippines from the onset of the pandemic in the second quarter of 2020 until the aftermath of the pandemic in 2022.¹ The current state of domestic labour market slack based on the deviation of the unemployment rate from the non-accelerating inflation rate of unemployment (NAIRU) is also briefly presented. The subsequent sections of this paper discuss the impact of wage adjustments on the inflation outlook, as well as the link between past inflation and wage growth. This paper concludes with arguments about why the risk of a price-wage spiral remains low in the Philippines, along with the BSP's monetary policy response given the country's post-pandemic labour market and wage conditions, and inflation environment.

Labour market conditions

Two years since the onset of the pandemic, labour market conditions have recovered as most sectors of the economy reopened in 2022 amid increased vaccination and the relaxation of containment measures implemented by the government, as well as

¹ The timeline of events leading up to the pandemic suggests that April 2020, which represents the second quarter of 2020, saw the onset of the pandemic in the Philippines. The pre-pandemic period in this paper refers to data as of January 2020 which represent the first quarter of 2020. The first confirmed case of a Covid-19 patient in the Philippines was recorded on 30 January 2020. The first Covid-19 fatality case was recorded on 2 February 2020. The first case of local transmission was recorded on 7 March 2020. The former president, Rodrigo Duterte, signed Proclamation No 922 on 8 March 2020 declaring a state of public health emergency in the Philippines, after which lockdowns and community quarantine measures were implemented.

improved business sentiment which led to the reopening of business establishments and a resurgence in employee hiring. The latest labour market indicators show that the unemployment rate is now below its pre-pandemic level, while the employment and labour force participation rates have exceeded pre-pandemic levels. In addition, underemployment is broadly similar to the pre-pandemic level (Table 1). Overall employment gains have been consistently recorded in the last several months. Nevertheless, recovery in employment appears to be uneven across sectors of the economy.

Key employment indicators

Table 1

Rates in %; levels in millions	2020	2021	2022				
	Jan	Jan	Jan	Apr	Jul	Oct	Nov
Employment rate	94.7	91.2	93.6	94.3	94.8	95.5	95.8
Employed	42.54	41.25	43.27	45.63	47.39	47.11	49.71
Unemployment rate	5.3	8.8	6.4	5.7	5.2	4.5	4.2
Unemployed	2.39	3.96	2.95	2.76	2.60	2.24	2.18
Underemployment rate	14.8	16.0	14.9	14.0	13.8	14.2	14.4
Underemployed	6.3	6.59	6.43	6.40	6.54	6.67	7.16
Labour force participation rate	61.7	60.5	60.5	63.4	65.2	64.2	67.5
People in the labour force	44.93	45.21	46.22	48.39	49.99	49.35	51.88

Source: Philippine Statistics Authority.

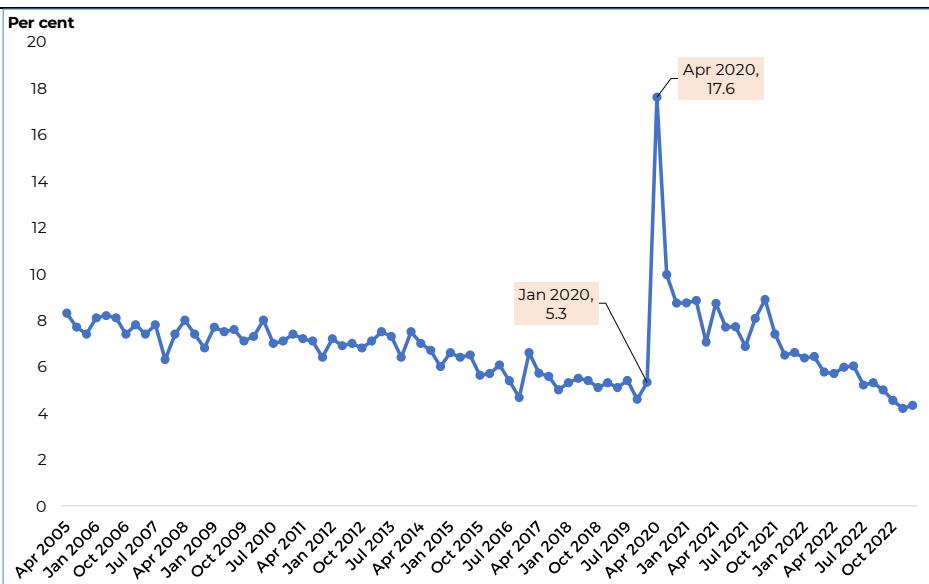
Unemployment

Business establishment closures and government mandated lockdowns resulted in a double-digit unemployment rate in the second quarter of 2020. From 5.3% in January 2020, the unemployment rate rose sharply to 17.6% in April 2020 (Graph 1). In terms of levels, the number of unemployed people nearly tripled in April 2020 to approximately 7.2 million, from approximately 2.4 million in the January 2020 pre-pandemic period. Unemployment remained high for the remainder of 2020, with the unemployment rate recorded at 10.0% and 8.7% in July 2020 and October 2020, respectively. With the recovery underway, unemployment has dropped to its lowest level in November 2022 at 4.2%, largely attributed to the reopening of the economy.

Unemployment rate

April 2005–November 2022

Graph 1



Source: Philippine Statistics Authority.

Labour force participation

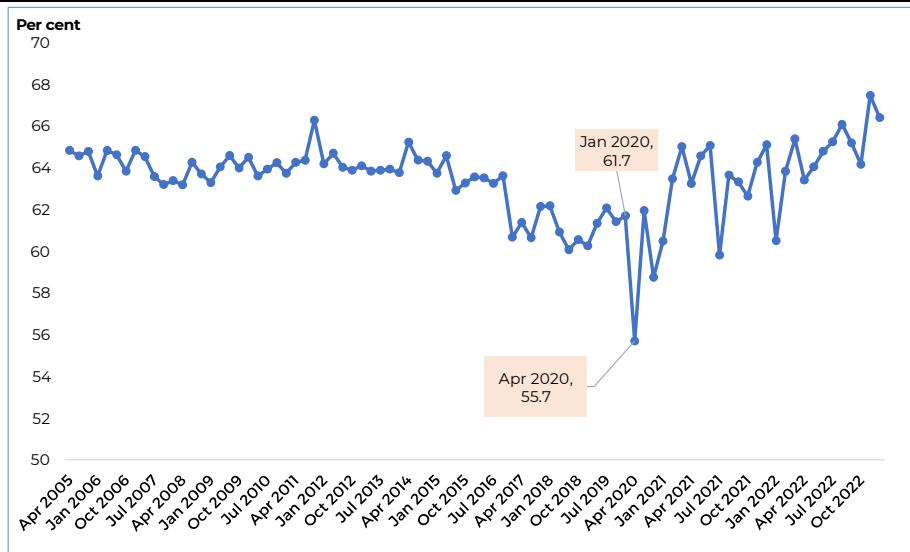
The country's labour force participation rate² registered a sharp decline during the pandemic at 55.7% in April 2020 from 61.7% before the pandemic (Graph 2). The decline in LFPR shows that a large proportion of the workforce were not actively seeking work during the pandemic as lockdowns and community quarantine measures imposed by the government restricted workers' mobility and therefore their ability to report for work. Nonetheless, the labour force participation rate has fully recovered in 2022, surpassing its pre-pandemic level at 67.5% in November 2022.

² Labour force participation rate is the ratio of the number of people that are either employed and unemployed over the number of the population aged 15 years and older, excluding overseas Filipino workers.

Labour force participation rate

April 2005–November 2022

Graph 2



Source: Philippine Statistics Authority.

Employment

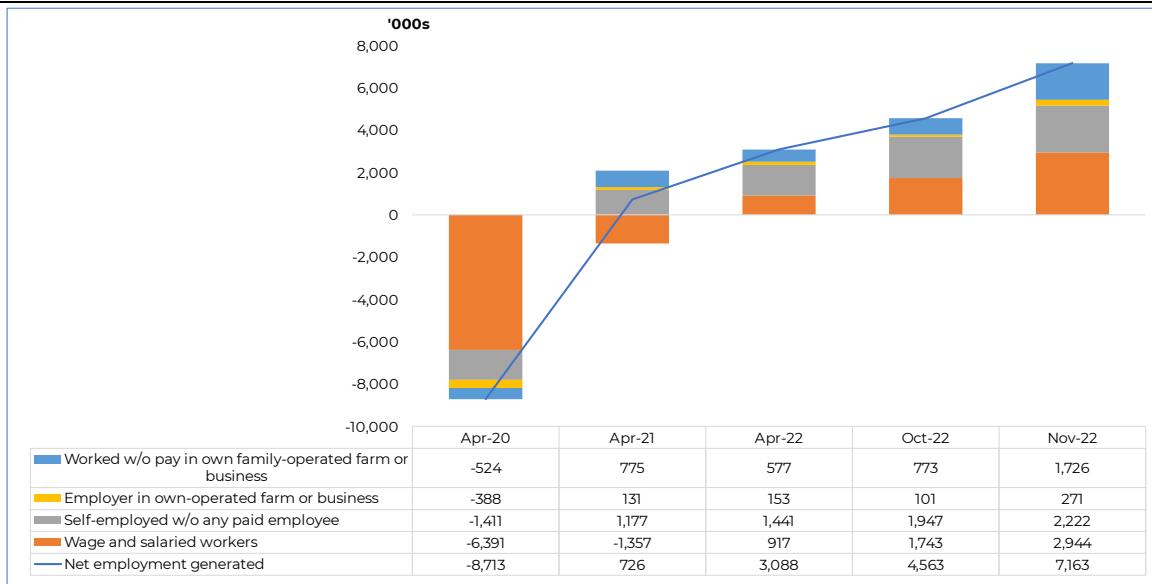
Employment levels have generally rebounded from the pandemic. Two years after the pandemic, employment gains have been registered across worker classifications (Graph 3). The quality of jobs has improved, as reflected in the increased employment of wage and salary workers, although most of the employment gains are from self-employed workers without any paid employees; and workers without pay in family-operated farms or businesses. A modest gain in employment has also been recorded for employers in own-operated farms or businesses. However, there is some heterogeneity in the pace of recovery of employment across industries and occupation types. Employment gains were registered in the majority of industries but were most notable for wholesale and retail trade, and the repair of motor vehicles (Graph 4). However, industries that are highly reliant on face-to-face interactions such as transportation and storage have continued to post employment losses to date. By occupation, employment gains primarily came from services and sales workers, and elementary occupations (Graph 5).³ All other types of occupations registered employment gains except for managerial jobs and armed forces occupations.

³ Elementary occupations involve the performance of simple and routine tasks which may require the use of hand-held tools and considerable physical effort.

Contribution to employment gains vis-a-vis Jan 2020 pre-pandemic period by class of worker

April 2020, April 2021, April 2022, October 2022 and November 2022

Graph 3

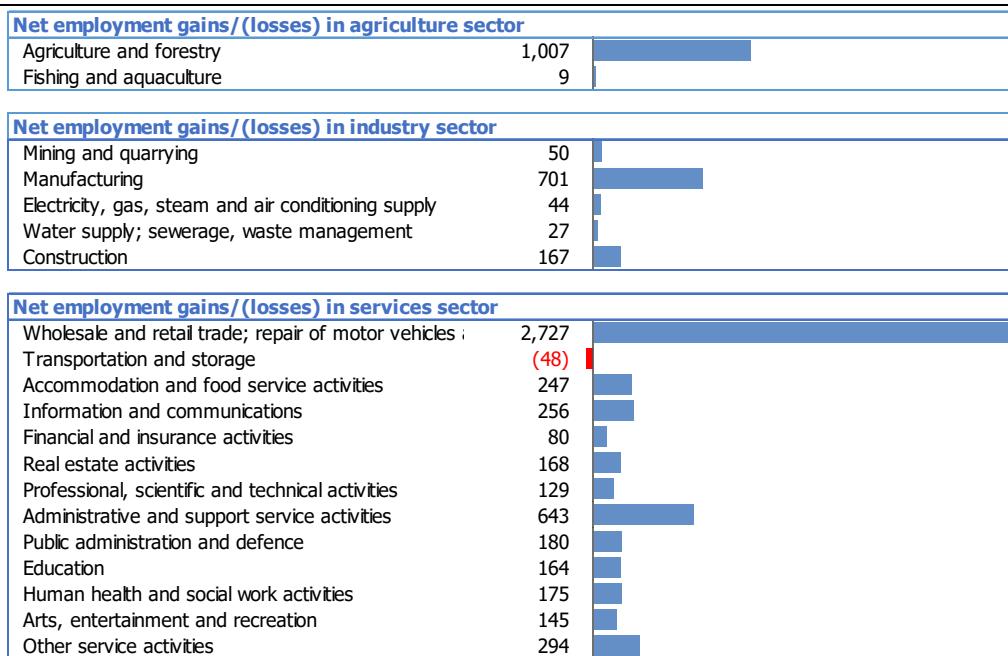


Sources: Philippine Statistics Authority; BSP staff calculations.

Contribution to employment gains vis-a-vis January 2020 pre-pandemic period by sub-sector

November 2022; in thousands

Graph 4

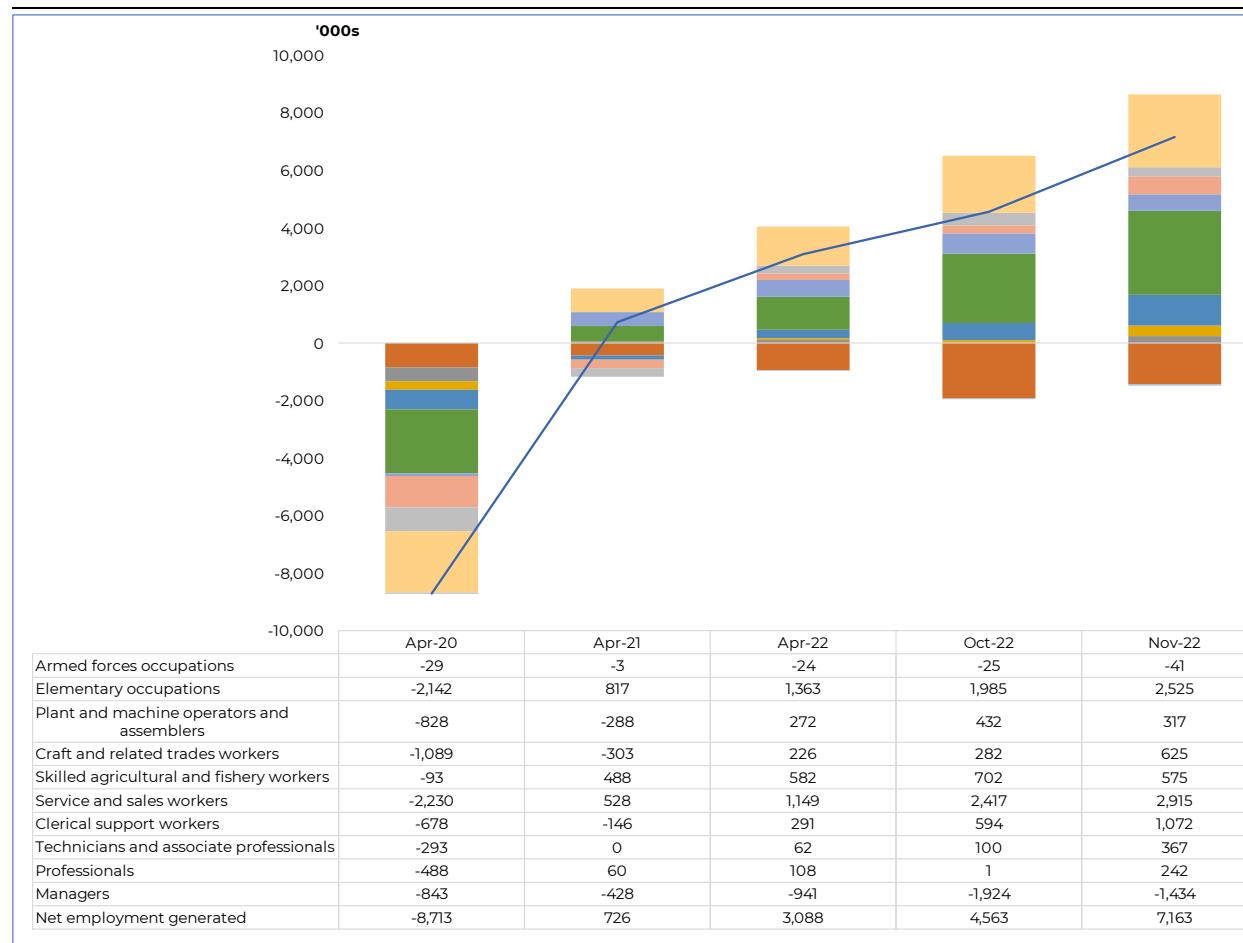


Sources: Philippine Statistics Authority; with BSP staff calculations.

Contribution to employment gains vis-a-vis Jan 2020 pre-pandemic period by type of occupation

April 2020, April 2021, April 2022, October 2022 and November 2022

Graph 5



Sources: Philippine Statistics Authority; with BSP staff calculations.

Underemployment

The quality of labour of the employed deteriorated during the pandemic as the underemployment rate⁴ rose to 18.9% in April 2020 from 14.8% in the pre-pandemic period (Graph 6). Of the total underemployed, approximately 86% are visibly underemployed – those who worked for less than 40 hours and wanted additional hours of work. The underemployment rate validates the decline in mean weekly hours worked during the same period. The average hours worked by employed individuals dropped to 35 hours a week in 2020 from a range of 40 to 42 hours prior to the pandemic (Graph 7). In 2022, the average weekly hours worked bounced back to

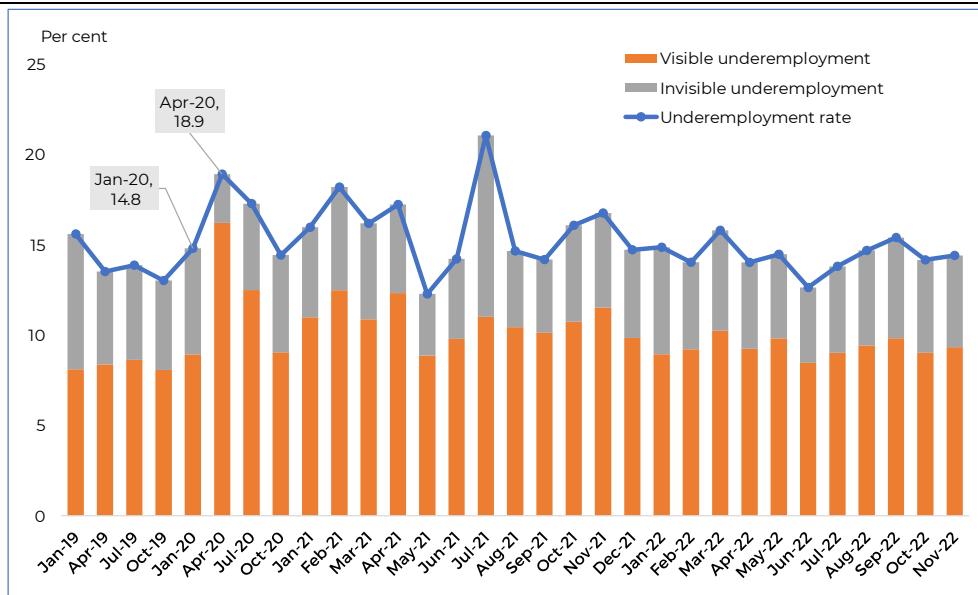
⁴ The underemployment rate is the ratio of the number of employed people who express a desire for additional hours of work in their current job or an additional job, or to have a new job with longer working hours.

approximately 40 hours and the underemployment rate declined considerably to 14.4%. Correspondingly, the share of visible underemployment to total underemployment decreased to approximately 65% in November 2022 – higher than approximately 60% in the pre-pandemic period.

Underemployment rate, visible underemployment and invisible underemployment

January 2019–November 2022

Graph 6

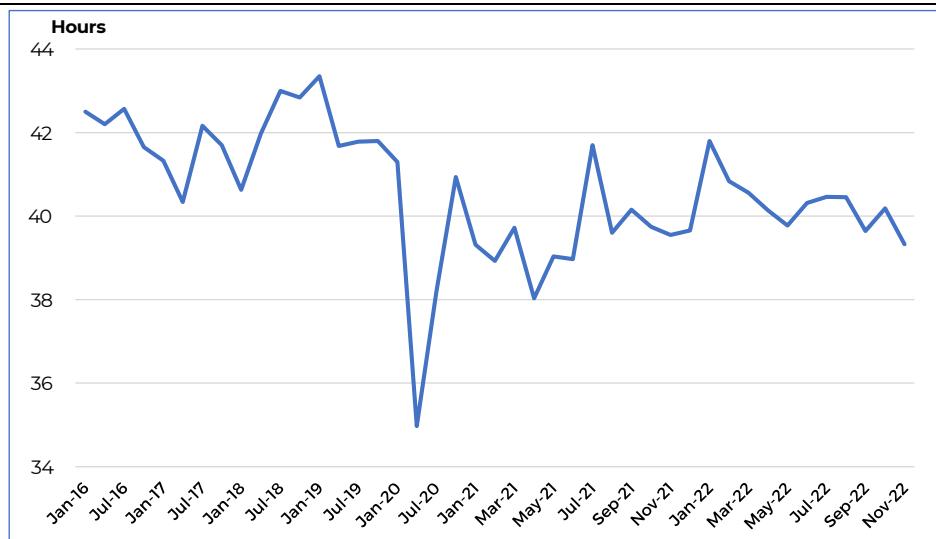


Source: Philippine Statistics Authority.

Average weekly hours of work of employed people

January 2016–November 2022

Graph 7



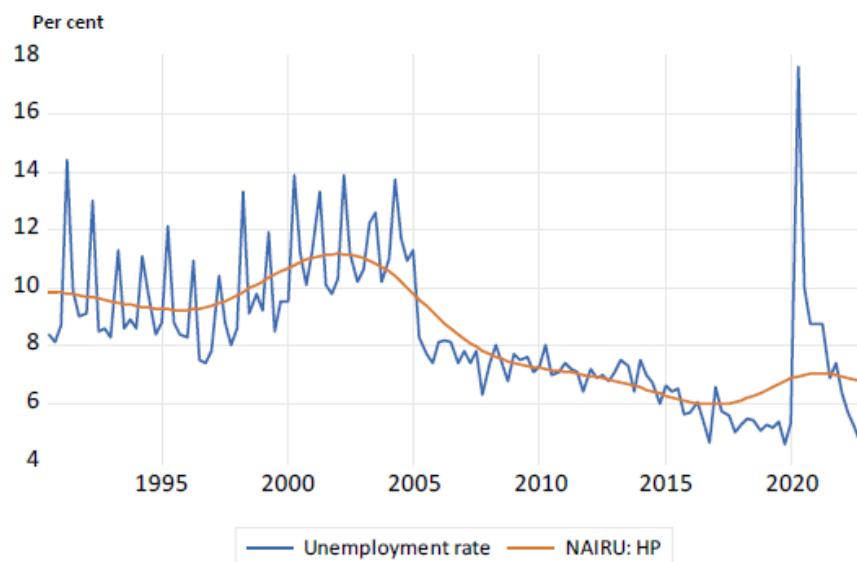
Source: Philippine Statistics Authority.

Labour market slack

There has been a tightening in the labour market as employment conditions have improved two years after the pandemic. Preliminary estimates on the unemployment gap, which is the difference between the observed unemployment rate and the NAIRU,^{5,6} yielded less labour market slack, which could fuel excessive growth in wages. Compared with the actual unemployment rate in recent periods, NAIRU estimates using the Hodrick-Prescott filter and the Kalman filter indicate a negative unemployment gap in the last five quarters (ie from the third quarter of 2021 to the third quarter of 2022).⁷ This suggests that the unemployment rate in the Philippines has fallen below the NAIRU in recent quarters and thus could exert upward pressure on inflation (Graphs 8 and 9).

NAIRU estimate using HP filter vs unemployment rate

Graph 8

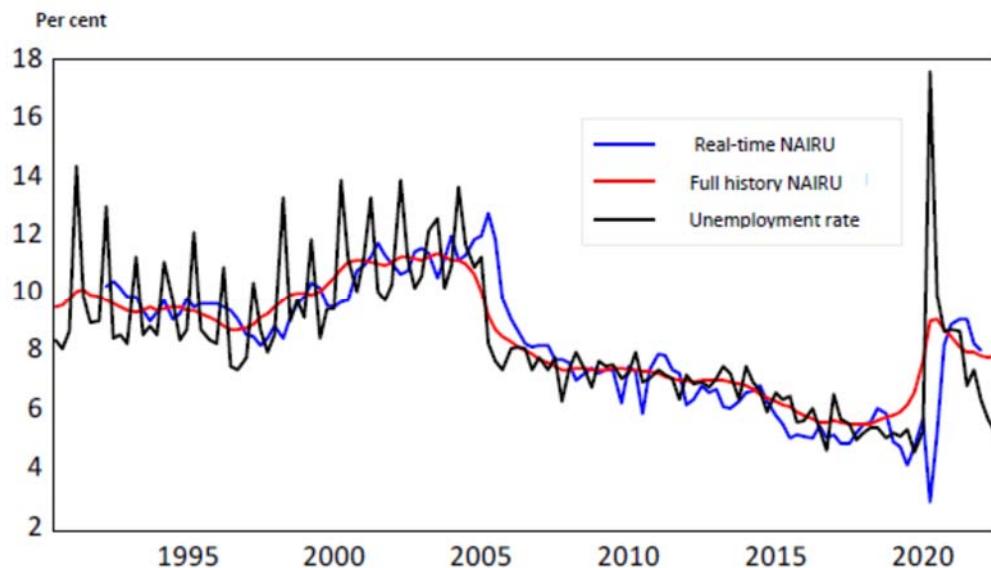


Source: BSP staff calculations.

⁵ The NAIRU is the rate of unemployment that is consistent with a stable rate of inflation. When the actual unemployment rate is above the NAIRU, excess capacity exists in the labour market, which tends to lower wage inflation and consequently inflation. Conversely, when the unemployment rate is below the NAIRU, there is tightness in the labour market, which causes wages to go up, leading to higher inflation.

⁶ V Españo, R Lemence, J Armas and J Tabin, "Estimating a time-varying NAIRU and unemployment gap: evidence from the Philippines", forthcoming.

⁷ Two ways of estimating the NAIRU are used in the study. The first method is the Hodrick-Prescott (HP) filter, a purely statistical univariate approach which decomposes the unemployment rate into its trend and cyclical components, with the trend serving as the NAIRU estimates. The second approach is via the Kalman filter whereby an unobservable state of the system, eg NAIRU, is estimated using known or observable data, eg the unemployment rate. The advantage of the Kalman filter over the HP filter is that the former utilises more economic variables such as inflation, supply-side factors and inflation expectations in the estimation.



Source: BSP staff calculations.

Inflation dynamics

The Philippine inflation environment since the pandemic year of 2020 has turned out to be challenging as global and domestic factors have pushed the average inflation rate above the 2–4% target band for 2021 and 2022.⁸ Inflation rose in 2021 as global demand gradually recovered, pushing international oil prices higher while domestic prices of agrifood products also increased amid the onset of African swine fever (ASF). This was magnified by adverse weather conditions and by the rise in global commodity prices. In 2022, domestic inflation further intensified as the geopolitical conflict in Ukraine led to higher global commodity prices, while domestic production shocks (eg avian influenza and typhoons) also contributed to the increase. The sustained increase in prices led to broadening price pressures with core inflation averaging near the upper end of the target in 2022 as a result of the spillover of higher food and energy prices to the services sector. Consequently, wage and transport fares were adjusted upwards while survey-based inflation expectations also rose. Looking ahead, staff estimates indicate that the output gap is projected to turn positive in 2023, largely reflecting the sustained expansion in 2022. This, in turn, could further support rising inflationary pressures in the near term.

⁸ Average headline inflation was at 4.5% year on year in 2021 using the 2012-based CPI series. Using the 2018-based series, headline inflation was 3.9% and 5.8% for 2021 and 2022, respectively.

Wage developments

Developments in minimum wages are monitored closely by the BSP and form part of the information incorporated in baseline inflation forecasts. Minimum wage determination in the Philippines is the primary responsibility of the National Wages and Productivity Commission (NWPC) and the Regional Tripartite Wages and Productivity Boards (RTWPBs). Minimum wages per region⁹ are reviewed periodically given petitions for wage increases and the presence of supervening conditions, such as extraordinary increases in the prices of petroleum products and basic goods and services.

Nominal wages

Nominal minimum wages¹⁰ grew in 2022 after being stagnant in 2020 and 2021 at the height of the pandemic. During the pandemic, regional wage boards¹¹ were not able to start the minimum wage determination process and deferred the approval of new wage petitions in 2021 as the pandemic disrupted business activities, rendering firms unable to afford to increase the pay of their workers. Prior to the pandemic, nominal wage growth was 3.1% on a yearly basis¹² but the start of the pandemic arrested the subsequent approval of new wage orders. In 2022, nominal wage growth returned to its pre-pandemic trend (Graph 10.A). However, the sharp rise in inflation in 2022 caused second-round effects, in particular wage hike petitions. By March 2022, the Secretary of the Department of Labor and Employment instructed the different wage boards to review minimum wages amid elevated prices of oil and other prime commodities due to rising global oil prices and the ongoing conflict in Ukraine,¹³ as well as due to the long lag since the last wage adjustment. By July 2022, all 17 wage boards had approved new wage increase orders. The average increase in minimum wages for the 17 regions is 13.1%, higher than the five-year national average of 5.6%. The higher average increase in 2022 was partly to compensate for the wage freeze during the pandemic. Minimum wages remain highest in the National Capital Region and lowest in MIMAROPA¹⁴ region (for non-agriculture workers) and Region VII (for agriculture works and retail/service establishments).¹⁵

⁹ The Philippines is politically divided into 17 regions. Minimum wages in the Philippines are set by each region's respective wage boards.

¹⁰ The BSP closely monitors minimum wage hikes in wage per day terms. Based on the Philippine Statistics Authority's integrated survey on labour and employment, 23.6% of total employment in establishments employing 20 or more workers are minimum wage workers.

¹¹ Minimum wages in the Philippines are set by each region's respective wage boards.

¹² For the years 2011–19, the compounded annual growth rate (CAGR) of nominal wages for the Philippines was 3.1%, while the CAGR for the National Capital Region was 3.2%.

¹³ See "Bello orders minimum wage review", *Republic of the Philippines Department of Labor and Employment*, 9 March 2023, www.dole.gov.ph/news/bello-orders-minimum-wage-review/.

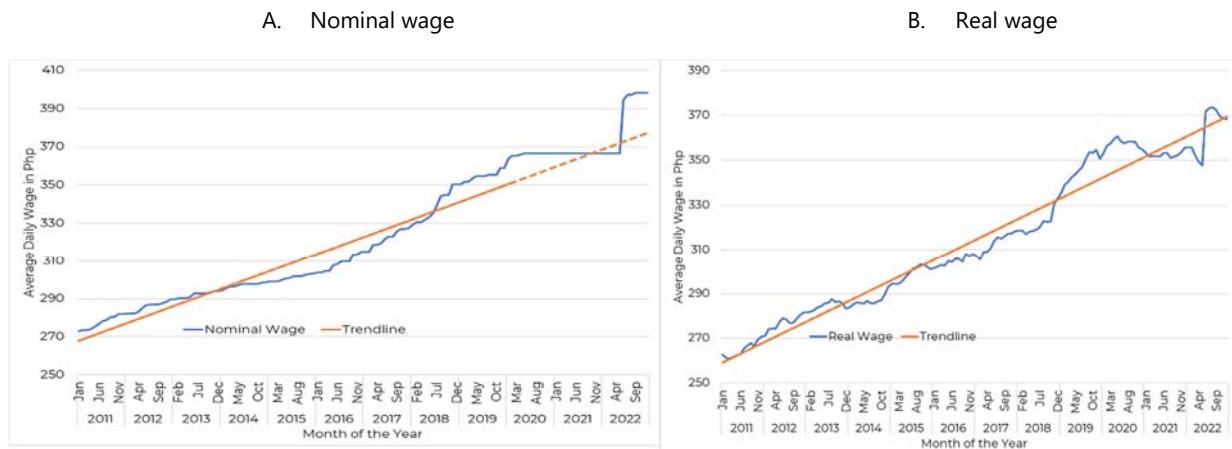
¹⁴ MIMAROPA is an acronym combination of the region's constituent provinces: Mindoro, Marinduque, Romblon and Palawan.

¹⁵ The difference in minimum wage and rate of increase across regions may be attributed to changes in the cost of living in these areas as well as factors such as employment generation and investment growth.

Comparison of average nominal and real wage against pre-pandemic trendlines

January 2011 to December 2022

Graph 10



Source: BSP staff calculations.

Real wages

Despite the increase in nominal wages, real wages have declined relative to pre-pandemic levels. Real wages largely followed their pre-pandemic trend before deteriorating from the third quarter of 2020 (Graph 10B) amid the impact of Covid-19 on businesses and households, a pause in wage petition approvals and, more recently, rising inflation pressures. Inflation was elevated during the pandemic year and accelerated towards 2022 amid supply shocks following the Russia-Ukraine conflict and higher global crude oil prices.

Wage growth and inflation

Wage adjustments and inflation outlook

The approved minimum wage adjustments in 2022 have led to an increase in the short-term inflation outlook of the BSP. Most regional wage boards announced the approved wage orders in May 2022 with effective dates ranging from June to July 2022. Incorporating the adjustment in minimum wages, the BSP's baseline inflation forecast in May 2022 for 2023 was revised upwards by 0.2 percentage points to 3.9%. The inflation forecast for 2023, however, also accounted for the higher GDP growth forecast, as well as a slight increase in international oil prices for the period.

Wages respond to past inflation

Evidence from the Philippines suggests that while minimum wage hikes, on average, increase the regional CPI, the impact is relatively small and may not result in wage-push inflation.¹⁶ Moreover, using Granger causality between wages and prices, updated estimations from a 2011 study¹⁷ on the Philippines using monthly data from 2011 to 2022 shows that it takes a month for wage changes to impact inflation before dissipating (Table 2). This confirms that minimum wage hikes in the country would most likely have a one-off impact on inflation. On the other hand, inflation was found to Granger cause wage growth. The updated results of the Granger causality test in Table 3 show that the impact of inflation on wage growth appears to persist for several months. The result that inflation causes wage growth with a lag of one month is consistent with observations in the domestic labour market wherein workers immediately start to lobby for higher wages when faced with increasing prices. It is also interesting to note that even on longer time periods, inflation still has an effect on wage growth which may be partially explained by the wage determination process in the country. Based on the omnibus rules on minimum wage determination in the Philippines, no new wage order may be issued within a period of 12 months from the current wage order taking effect. Hence, inflation one year ago effectively influences minimum wage settings for the current period.

Granger causality test – wages on inflation

Table 2

Number of lags in months	p-value
1	0.091
6	0.849
12	0.932
18	0.832

Null hypothesis: wage growth does not Granger cause price inflation.

¹⁶ See F Cacnio, "The price effect of minimum wage: evidence from the Philippines", *Bangko Sentral Review 2017*, www.bsp.gov.ph/Media And Research/Publications/BS2017 03.pdf

¹⁷ See F Cacnio, "Do higher wages cause inflation?", *Bangko Sentral ng Pilipinas Economic Newsletter*, no 11-01, January–February 2011, www.bsp.gov.ph/Media And Research/Publications/EN11-01.pdf

Granger Causality Test – Inflation on Wages

Table 3

Number of lags in months	p-value
1	0.001
6	0.008
12	0.065
18	0.008

Null hypothesis: Price inflation does not Granger cause wage growth.

Source: BSP staff calculations.

Conclusion

With the improvement of domestic labour market conditions post-pandemic, there are concerns about the tightening in the labour market which could induce rapid wage growth and fuel inflation, thus causing wage-price spirals. While the domestic labour market appears to have little slack, the BSP expects that this would not induce rapid growth in wages as there is still ample room for employment levels to rise without significantly contributing to inflationary pressures in the near term. This is supported by the results of a study by Españo et al which indicates reduced sensitivity of inflation to the unemployment gap, and increased importance of other factors – inflation persistence and expected inflation – in explaining movements in inflation in recent times.¹⁸ Given this, the risk of a wage-price spiral is limited for the Philippines as inflation expectations remain within target in the medium term.

At the same time, the wage determination process in the Philippines partly limits the emergence of wage-price spirals. Minimum wages in the Philippines are set by each region's respective wage boards on a 12-month cycle, thus abating the risk of rapid wage growth. The steep wage growth in 2022 was, however, an exception, as minimum wage adjustments have been stalled for almost two years due to the pandemic. Average regional wage increases in 2022 were higher than expected – the last wage adjustments had taken place in January 2020 for most regions.

¹⁸ See V Españo, R Lemence, J Armas and J Tabin, "Estimating a time-varying NAIRU and unemployment gap: evidence from the Philippines", forthcoming.

Other factors that could avert the risk of a wage-price spiral in the Philippines include declining real wages and aggressive monetary policy tightening.¹⁹ As previously cited, real minimum wages in the country have been declining despite the post-pandemic rise in nominal minimum wages. This is due to inflation continuing to outpace nominal wage growth. In terms of monetary policy tightening, the BSP raised its policy rate by a total of 350 basis points in 2022 to contain persistent inflation pressures and manage inflation expectations.

Nevertheless, monetary authorities remain mindful of the risk of elevated price pressures feeding into inflation expectations and price- and wage-setting behaviour. At the same time, the strong commitment and credibility of the central bank would feed into this decision-making process and reduce the risk of medium-term inflation expectations from becoming disanchored. The current monetary policy framework of the BSP (ie inflation targeting) helps mitigate the risk of a wage-price spiral emerging. The BSP has successfully maintained a stable inflation environment over many years and has responded decisively to bring inflation within the inflation target.²⁰

¹⁹ See J Bluedorn, "Wage price spiral risks appear contained despite high inflation", *IMF Blog*, 5 October 2022, www.imf.org/en/Blogs/Articles/2022/10/05/wage-price-spiral-risks-appear-contained-despite-high-inflation.

²⁰ Since the BSP's adoption of inflation targeting as its monetary policy framework in 2002, the BSP achieved its inflation target in the period 2009–2014, and in 2017, 2019 and 2020.

The impact of monetary policy on employment in Poland through the lens of disaggregated data

Marta Kightley and Jacek Suda*

Abstract

The impact of monetary policy actions on the labour market has been at the forefront of central banks' policy decisions. With the growing availability of micro data, the transmission channels of monetary policy can be revisited in a way that captures the heterogeneity of responses of economic agents to monetary policy actions and shocks. We analyse the reaction of employment to the unexpected (surprise) component of monetary policy in Poland, considering heterogeneity with respect to the size of firms. The analysis of disaggregated data shows that monetary policy surprises affect the labour market in general via its impact on larger firms. Neither the unexpected component of changes to policy rates, nor the revision of expectations about future policy rates affect employment levels in small firms in a quantitatively significant way. Our results stress the existence of labour market rigidities and indicate that these rigidities are more pronounced for the smallest firms. From the policymaking perspective, this shows not only the possible distributional effects of policy "surprises", but could also provide some input into possible regulatory changes related to the functioning of financial markets.

JEL classification: D22, E24, E52, J2, L25.

Keywords: monetary policy, labour market, financing constraints, transmission channels, heterogeneous firms.

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The views presented here are those of the authors and do not necessarily reflect the official position of Narodowy Bank Polski.

Introduction

The last 36 months have been one of the most challenging periods in the past three decades of post-transition central banking in Poland. Narodowy Bank Polski (NBP) has repeatedly entered uncharted territory for Polish central banking: addressing the economic repercussions of the Covid-19 outbreak in Poland, providing the backdrop for the financial system during several waves of the pandemic and fighting accelerating inflation following the surge in energy prices that accompanied the war in Ukraine. In the span of only two years, the Polish central bank set the policy rates to (effectively) zero and started an asset purchase programme, only to then embark on a series of interest rate increases at an unprecedented pace.

The period of effectively zero interest rates – the reference rate was promptly lowered to a record 0.1% – was a response to the outbreak of Covid-19 in Poland. NBP also embarked on an asset purchase programme, with both policies concentrated on lowering the cost of borrowing and, in effect, supporting real activity and the labour market situation. The policy rate did not reach such low levels during the Great Recession of 2007–09 (it did not decrease below 3.5%) or during prolonged periods of deflation in 2014–16 (when it was not lower than 1%).

The impact of monetary policy actions on the labour market has been at the forefront of the central bank's policy decisions. While the main statutory objective of NBP is "to maintain price stability", the *Monetary Policy Guidelines* states that monetary policy "is conducted in a way that helps maintain sustainable economic growth and financial stability."¹ This was the main motivation underlying the unprecedented policy actions.

Similarly, the impact of policy actions on the real economy and, in particular, on the labour market, have heavily impacted decisions regarding interest rates. With the inflation rate levelling off, or even slightly decreasing, monetary authorities must decide how much weight to put on the real economy – with particular attention to developments in the labour market – when taking the next policy decisions.

How the policy measures affect the economy is captured by the transmission mechanism of monetary policy. With the growing availability of micro data, many of the results related to these channels have been revisited to include and capture the heterogeneity of responses of economic agents to monetary policy actions and shocks. In the last 20 years, economists have found that traditional transmission channels – including the interest rate, credit and asset price channels, as well as new channels connected to risk-taking behaviour or expectations – are heavily influenced by the presence of heterogeneity. The exogenous and endogenous differences across households and firms, and their access to financial markets, were shown, both theoretically and empirically, to matter for the transmission channel of monetary policy. Examples of such recent studies include Gertler and Gilchrist (1994), Bernanke and Gertler (1995), Ottonello and Winberry (2020), Cloyne et al (2021) for investment, and Kaplan et al (2018), Aulert (2019) and Bielecki et al (2022) for consumption, among others. For example, investments and expenditure on durable goods are more

¹ This statement is present in every annual Monetary Policy Guidelines, see for example Narodowy Bank Polski (NBP) (2020) *Monetary Policy Guidelines for 2020*.

sensitive to monetary policy relative to that on non-durable goods (Erceg and Levin (2006)), and hand-to-mouth households are the most responsive households to the income channel of monetary policy (Kaplan et al (2018)). Analysis based only on aggregate data, which effectively hide the heterogeneity, could lead to biased conclusions. That is to say, if heterogeneity translates into differences in impulse responses, the analysis of aggregate responses could exclusively cover individual effects and, as a result, distort the actual transmission mechanism.

While a considerable body of research related to consumption or investment that incorporates and stresses the importance of heterogeneity exists, there are very few studies analysing the impact of monetary policy and the heterogeneity of responses in the labour market. The importance of the labour market for monetary policy cannot be overstated. On the one hand, the level of aggregate employment translates into the volume of production and the aggregate output. Therefore, slack in the labour market is a key indicator of slack in the economy. On the other hand, labour income is the largest component of total income for most households. This directly affects consumption. Changes in employment or wage income can translate into variation of aggregate demand.²

The extent to which monetary policy can affect employment, unemployment and wages has important economic and sociological implications. Moreover, it does matter whether monetary policy impacts the labour market and wage income *via* extensive (ie employment) or intensive (ie wages) margins. While aggregate data provide some information about the monetary policy transmission channel, labour market analysis with disaggregated data can account for firms' and/or households' heterogeneity, and uncover the actual transmission mechanism.

Furthermore, empirical evidence on the mechanisms through which different firms react to economic policies and economic shocks may provide indirect evidence of rigidities and frictions that affect firms and their decision-making processes.

Finally, from the broader policy perspective, more detailed accounts of the reactions of the labour market to economic policy shocks yield important implications for the design and implementation (including timing) of policies aimed at sustaining employment.

In a recent NBP working paper, Singh et al (2023) examine the impact of monetary policy surprises on the growth rates of hiring, employment and wages in the US. They find that the impulse responses of these labour market variables to monetary policy shocks are highly heterogenous with respect to firms' sizes.³ The paper examines changes in hiring and employment, and the level of remuneration of newly hired employees in small (fewer than 25 employees) and large (more than 500 employees) enterprises in response to monetary policy shocks. The results indicate that an unexpected tightening of monetary policy causes a reduction in the level of employment and in the number of newly hired employees in all firms, but this effect is stronger for large than for small firms. Moreover, the analysis of the employment

² Additionally, the job loss related fall of labour income was found to have a direct implication for personal well-being.

³ Singh et al (2022) show that the firms' responses to a monetary policy shock are also industry-specific eg firms in manufacturing or construction sectors respond qualitatively and quantitatively differently to firms in the services sector.

response to positive and negative monetary policy shocks shows that the response to monetary policy tightening is faster than the response to expansionary monetary policy.

Singh et al (2023) show that monetary policy also affects the level of wages. An unexpected (or stronger than expected) tightening of monetary policy limits the growth of the wages of newly hired employees, and the scale of the decrease in the growth rate is similar in the case of small and large enterprises.

Given the structural differences in labour markets across the United States and Europe, it is important to ask and examine whether these differences also occur in European labour markets. From the Polish central bank perspective, it is vital to know whether such patterns also emerge in Poland, and to what extent small and large firms react to monetary policy actions with respect to employment.

The impact of monetary policy shocks on employment in Poland

We rely on disaggregated data to examine the responses of employment to monetary policy shocks in Poland considering heterogeneity with respect to firms' size.

The econometric analysis is based on quarterly data on employment growth and wage growth, taking into account information on the size and industry classification of enterprises in Poland during the period Q4 1999–Q2 2022. The labour data are taken from the labour force survey (LFS) and cover the entire population of Poland. The LFS reports four size categories; size one is one to nine employees, size two is between 10 and 19 employees, size three between 20 and 29 employees, size four is more than 50 employees. In our analysis, we compare the responses of the smallest firms (up to nine employees) with the largest firms (more than 50 employees) in our sample.

To construct monetary policy shocks for Poland, we employ the high-frequency identification method of Kuttner (2001), Gürkaynak et al (2005) and Campbell et al (2012). We use daily data on changes to interest rates on forward rate agreement (FRA) contracts (expiring in one year or earlier) on Polish interest rates – WIBOR 3M – around the time of Monetary Policy Council (MPC) decisions.⁴ The announcement of the Monetary Policy Council decision includes not only the levels of policy rates following the meeting, but also the press release. The latter presents NBP's economic assessment of the current situation in Poland and indications about the expected inflation and GDP paths over the next year. It may also provide some indication of the current and future monetary policy stance, and contain some additional forward guidance.

To isolate this information effect of the MPC decisions, we follow Gürkaynak et al (2005) and Campbell et al (2012) and extract two orthogonal monetary policy shocks from the high-frequency data. This allows us to distinguish the change in the

⁴ With this definition of a monetary policy shock, a positive shock – corresponding to monetary policy tightening – may be the result of both a larger than expected reduction in interest rates and a smaller than expected reduction in interest rates.

current short-term rate – the target shock – from the change in the expected path of future short rates, the path or forward guidance shock. Additionally, following Singh et al (2023), we take into account the possible asymmetry of the monetary policy stance by separately examining the effects of positive (contractionary) and negative (expansionary) monetary policy shocks. To compute the monetary policy shocks, we use data from the period of January 2005–June 2022.⁵

Table 1 presents the summary statistics of both monetary policy shocks: the target and the path. Interestingly, the standard deviation of the negative target shock is approximately 30% larger than in the case of the positive target shock, while the negative forward guidance shock has a standard deviation twice as large as the positive shock.

Summary statistics of monetary policy shocks (basis points)

Table 1

	Target shock	Path shock
Positive (rate increase)		
Mean	5.9	11.9
Standard deviation	12.7	12.1
Negative (rate decrease)		
Mean	-13.1	-13.3
Standard deviation	16.7	22.5

The table reports mean and standard deviation (in basis points) of the positive and negative high-frequency target and path shocks for the period Q1 2005–Q2 2022.

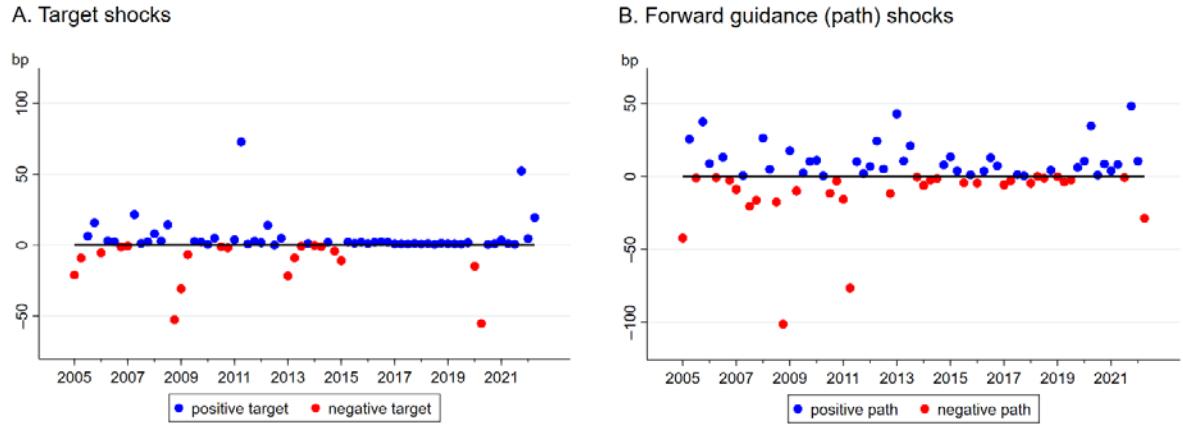
Sources: Bloomberg; authors' calculations.

This can also be seen from Graph 1, which plots the realisations of target (Graph 1.A) and path (Graph 1.B) shocks. Given that the positive and negative shocks have distinct characteristics, they are likely to impact the labour market variables differently. We address this in our empirical analysis by studying the effects of positive and negative shocks separately.

⁵ From 2004 onwards, the inflation target was at 2.5% with a symmetric band for deviations of $+/-1$ percentage point.

Positive and negative target and forward guidance shocks

Graph 1



The graph plots the positive (blue) and negative (red) high-frequency target shocks (A) and forward guidance (path) shocks (B).

Sources: Bloomberg; authors' calculations.

To determine the reaction function of the labour market to monetary policy shocks, we employ the local projection in the panel data approach introduced by Jordà et al (2015).⁶ The equation below describes our baseline empirical specification:

$$\begin{aligned} \Delta_h n_{is,t+h} = & \alpha_i^h + \alpha_s^h + \beta_{s,Target}^h \epsilon_t^{Target+} \mathbb{I}_s + \beta_{s,Target}^h \epsilon_t^{Target-} \mathbb{I}_s \\ & + \beta_{s,Path}^h \epsilon_t^{Path+} \mathbb{I}_s \\ & + \beta_{s,Path}^h \epsilon_t^{Path-} \mathbb{I}_s + \Gamma^h Z_t + u_{is,t+h}^h \end{aligned} \quad (1)$$

where $\Delta_h n_{is,t+h} \equiv \ln N_{is,t+h} - \ln N_{is,t}$ is the cumulative growth rate between t and $t+h$ of the labour market variable, N , in industry i , for firm-size s , h periods after the monetary policy shock in period t . In our analysis, the dependent variable, $\Delta_h n_{is,t+h}$, is the cumulative growth rate of seasonally adjusted employment.⁷ The key independent variables of interests are the positive and negative target, $\epsilon_t^{Target+}$, $\epsilon_t^{Target-}$, and path, ϵ_t^{Path+} , ϵ_t^{Path-} , shocks interacted with the firms' size, \mathbb{I}_s , $s = 1,2,3,4$. To control for the overall economic condition and the tightness of the labour market, we include in Z_t four lags of policy (reference) rate, four lags of the unemployment rate; as well as industry and firm size fixed effects, α_i^h and α_s^h respectively. Such specification allows us to construct the size-specific impulse response functions of employment to asymmetric (positive or negative) monetary policy shocks, $\{\beta_{s,MP\ shock}^h\}_{h=1,\dots,H}$.

To assess the impact of the heterogeneity of the monetary transmission channel on employment, we also consider a simplified specification that abstracts from any form of heterogeneity. The associated equation with this specification is as follows:

⁶ In our specification the cross-sectional dimension of the panel is two dimensional and includes firm size and industry.

⁷ We also estimate impulse responses to monetary policy shocks for the (size- and industry-specific) real wage, but find that they are not statistically significant. Given the quantity of missing data and the reliability of self-reported wage data, we choose not to draw conclusions from these results.

$$\Delta_h n_{t+h} = \alpha^h + \beta_{Target}^h \epsilon_t^{Target+} + \beta_{Target}^h \epsilon_t^{Target-} + \beta_{Path}^h \epsilon_t^{Path+} + \beta_{Path}^h \epsilon_t^{Path-} + \Gamma^h Z_t + u_{t+h}^h \quad (2)$$

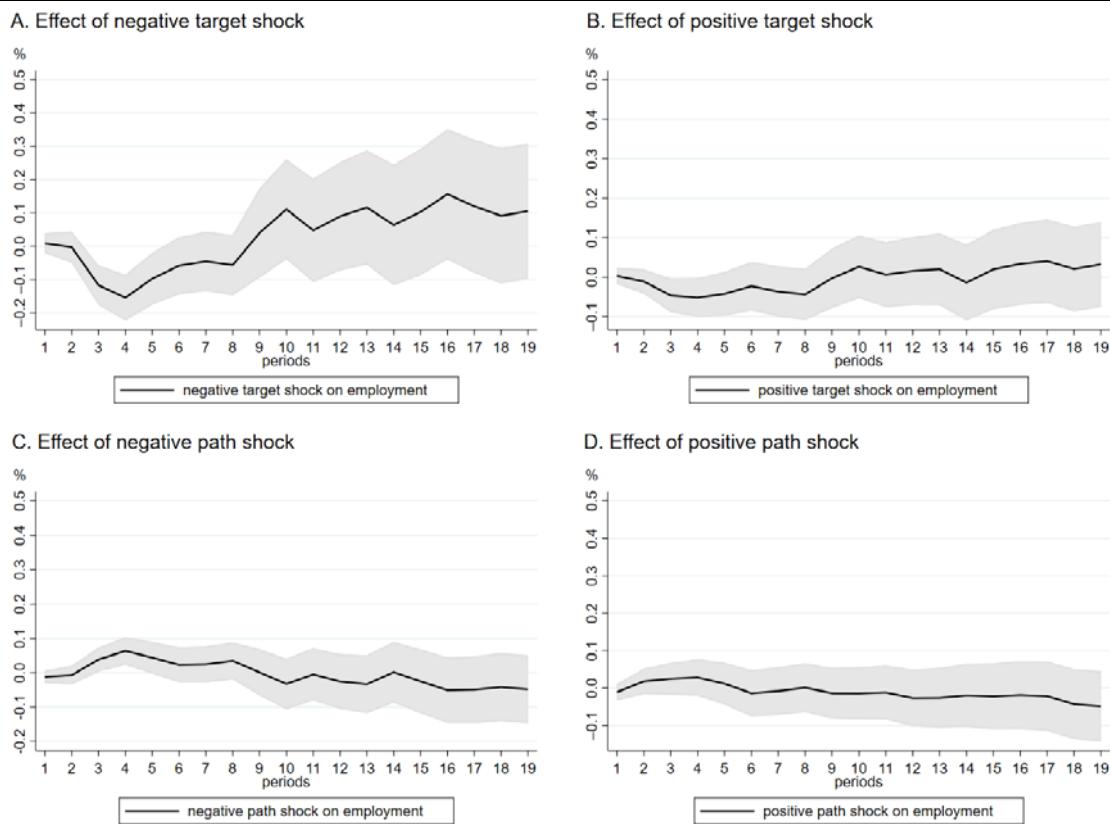
where, now, the dependent variable, $\Delta_h n_{t+h}$, is the cumulative growth rate of seasonally adjusted aggregate employment.

Results

To illustrate the importance of accounting for firms' heterogeneity, we first present the impulse responses of aggregate employment from a monetary policy shock. Graph 2 depicts the series of estimated β_{Target}^h , β_{Target}^h , β_{Path}^h , β_{Path}^h from equation (2).

Responses of aggregate employment growth to positive and negative path and target shock

Graph 2



The graph plots the impulse response functions of aggregate employment growth to a negative (expansionary) target shock (Graph 2.A), positive (contractionary) target shock (Graph 2.B), negative path shock (Graph 2.C) and positive path shock (Graph 2.D). The horizontal line measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

Source: Bloomberg; authors' calculations.

Graphs 2.A and 2.C show that while surprising monetary policy expansion – both in terms of the lower than expected policy rate taking the form of a target shock and the form of a path shock – increases employment in the short term (in the case of the

path shock) and in the medium term (in the case of the target shock), the statistical significance of this reaction is marginal at best. The estimated responses to the tightening of monetary policy (positive target and path shocks in Graphs 2.B and 2.D) yield a statistically insignificant reaction.

This lack of statistical significance coupled with an overall quantitatively low magnitude of responses would lead to the conclusion that monetary policy shocks have little to no effect on the behaviour of aggregate employment. While the policy rate could still be an important factor for the labour market, the impact of “policy surprises” or forward guidance could be very limited.

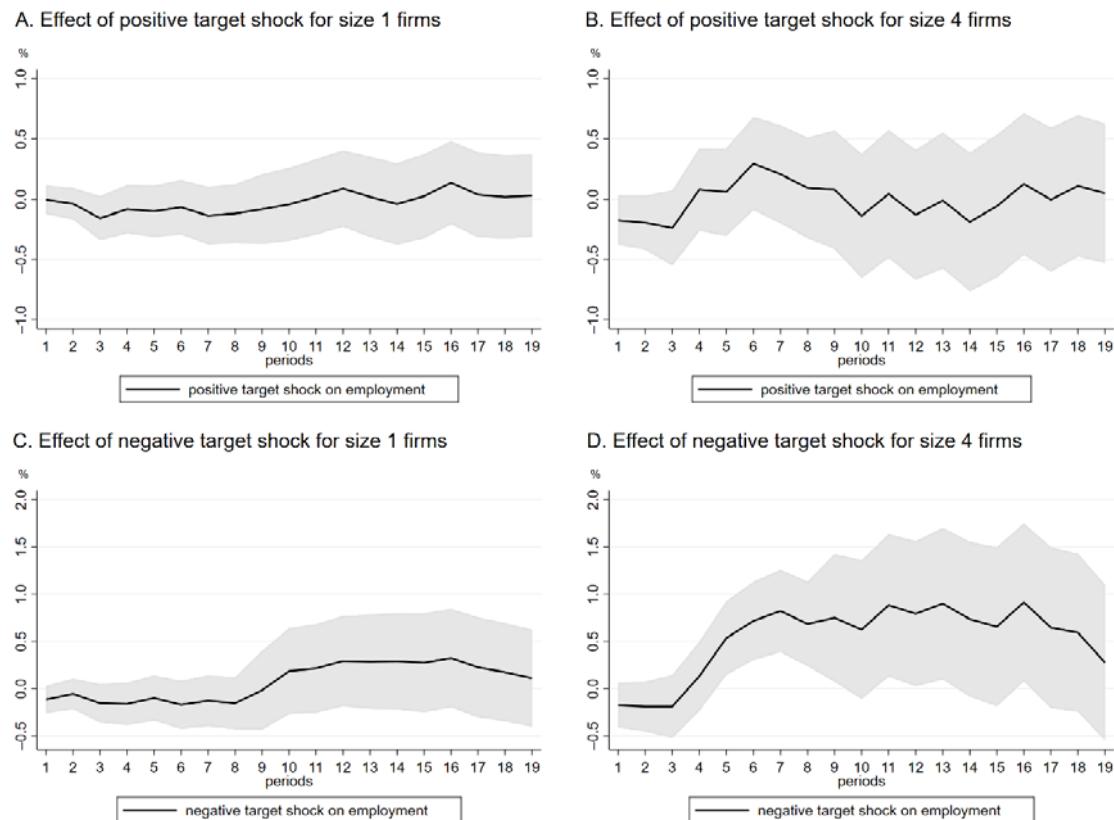
To verify the validity of the results presented in Graph 2 in a more disaggregated setting, we estimate equation (1) and allow the effects of policy shocks to be specific to the firm size. While the interest rate channel of monetary transmission assumes that higher interest rates imply a higher cost of borrowing, the credit channel relies on the tightening of credit conditions. Early empirical evidence for the United States indicated that small firms usually respond more to changes in the cost of financing (see Gertler and Gilchrist (1994) for an early exposition). This implies that higher costs of lending and tighter credit requirements with respect to collateral would make small firms more responsive to monetary policy shocks.⁸ At the same time, Kudlyak and Sanchez (2017) show that it was the large firms that contracted more than small firms during the Great Financial Crisis. Meanwhile, theoretical models have been presented, Ottonello and Winberry (2020) with respect to investment and Singh et al (2023) with respect to employment, in which it is the unconstrained (large) firms that respond more to monetary policy. By taking into account firm size when estimating the reaction of employment to monetary policy shocks in equation (1), we can verify whether these two channels (with respect to policy surprises) affect the labour market.

First, consider the reaction of small and large firms to positive and negative target shocks. We find that contractionary (positive) target shocks lead to a decrease of employment within one year after the shock in both small (size one: fewer than 10 employees) and large (size four: more than 50 employees) firms. These impulse responses are presented in Graphs 3.A and 3.B. Importantly, and in contrast with the results in Singh et al (2023), the impact of the positive target shock is statistically insignificant, and quantitatively the same for small and large firms. Note that these results are consistent with our results for aggregate employment in Graph 2.B.

⁸ See Bernanke and Gertler (1989) for an early exposition of the financial accelerator mechanism.

Response of employment growth to a positive and negative target shock

Graph 3



The top row plots the impulse response functions for the employment growth to a positive (contractionary) target shock for small (size 1 – Graph 3.A and Graph 3.C) and large (size 4 – Graph 3.B and Graph 3.D) firms. The bottom row plots the impulse response functions for the employment growth to a negative (expansionary) target shock for small (size 1 – Graph 3.A and Graph 3.C) and large (size 4 – Graph 3.B and Graph 3.D) firms. The horizontal axis measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

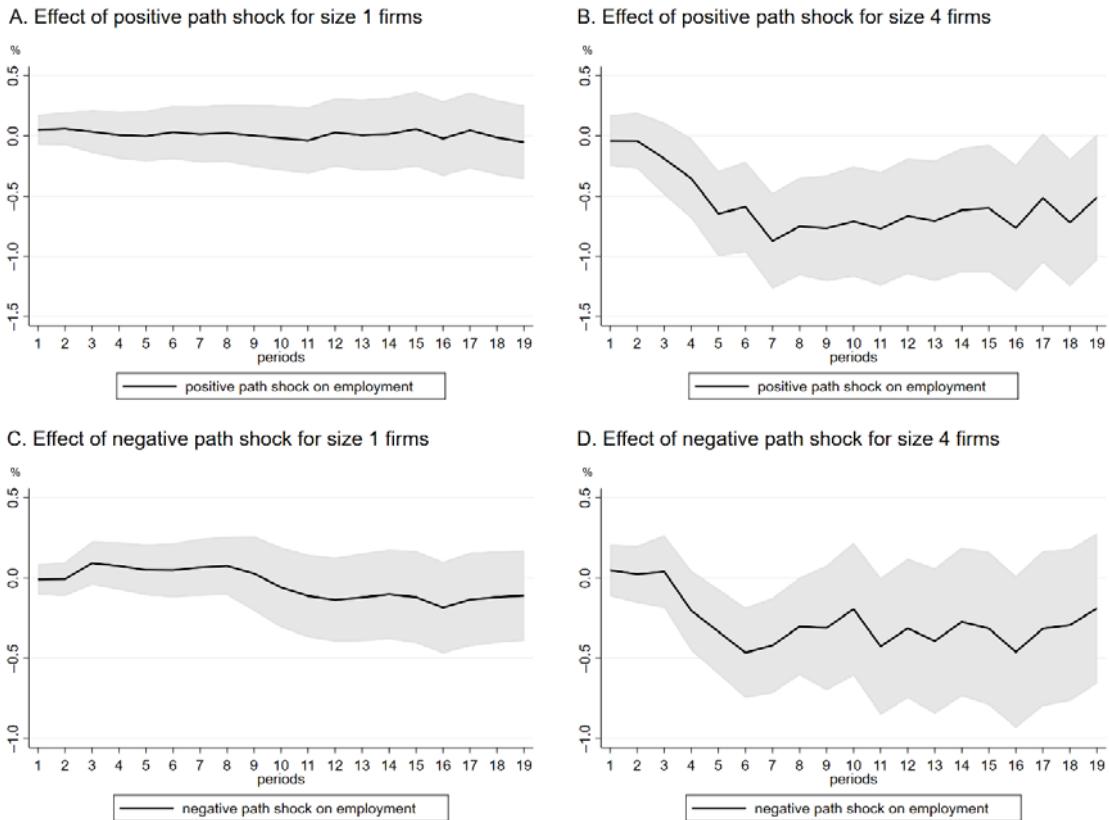
Source: Bloomberg; authors' calculations.

The expansionary (negative) target shock, however, impacts small and large firms differently (see Graph 3.C and Graph 3.D). While the response of small firms is not statistically different from zero (Graph 3.C), employment in large firms increases (Graph 3.D). Not only is the reaction of large firms statistically significant, but its magnitude is also quantitatively important. We find that a negative target shock of one standard deviation increases employment in large firms by over 0.8% six quarters after the shock.

We also find that the difference between small and large firms' impulse responses is statistically significant.

Response of employment growth to a positive and negative path (forward guidance) shock

Graph 4



The top row plots the impulse response functions for the employment growth to a positive (contractionary) target shock for small (size 1 – Graphs 4.A and 4.C) and large (size 4 – Graphs 4.B and 4.D) firms. The bottom row plots the impulse response functions for the employment growth to a negative (expansionary) target shock for small (size 1 – Graph 4.C) and large (size 4 – Graph 4.D) firms. The horizontal axis measures time (in quarters) and the vertical axis measures the response in percentage points. The shaded area is the 68% confidence band.

Source: Bloomberg; authors' calculations.

We turn next to an analysis of the impact of the path shock on employment growth in small and large firms. Given the recent experience of the effectively zero interest rate in Poland and the usage of "forward guidance" as a monetary policy tool, understanding how it affects employment is of the utmost interest for the central bank. As presented in the top row of Graph 4, while a contractionary path shock does not affect the employment of small firms (Graph 4.A) it does significantly decrease the employment growth in large firms (Graph 4.B). According to our estimates, within two years, employment in large firms decreases by almost 1%. With respect to the overall effect of the negative path shock, the firm-size specific employment responses match the aggregate results. While the expansionary (negative) forward guidance shock increases employment in small firms and large firms in the first years following the shock, these impulse responses are not statistically different from zero.

The results depicted in Graphs 3 and 4 suggest that firms do respond to monetary policy shocks, contrary to what one may conclude from a cursory glance at Graph 2, and that the extent to which firms react depends on characteristics that can

be proxied by their size.⁹ In the discussion below we link these results to the form of “financial exclusion” that small firms can experience.

Discussion

The analysis of disaggregated data shows that monetary policy surprises do affect the labour market in general via their impact on larger firms. Neither the unexpected component of the policy rate changes (captured by the target shock) nor the revision of expectations about future policy rates (measured by the path shock) affect employment in small firms in a quantitatively significant way.¹⁰ While these results seem to go against the financial accelerator mechanism, they could, however, be symptomatic of difficulties experienced by micro-enterprises in Poland in gaining access to financial markets.

Such “financial exclusion” was particularly visible during the Covid-19 pandemic. The data presented in the quarterly survey of Polish enterprises – see NBP (2023) for the details – indicated that while close to 20% of medium-sized firms applied for a business loan, only 10% of micro-enterprises decided to apply for such a loan.¹¹ The difference in access to external financing was then increased by the reported outcome of these loan applications. In the case of medium-sized firms, almost 92% of applications were granted. At the same time, only 65% of loan applications by small firms were accepted by banks due to the greater degree of risk associated with these applications. Graph 5 shows that these differences in the effective access to bank loans and financial markets, as reported by firms and measured both in terms of filed loan applications (Graph 5.A) and approved loan applications (Graph 5.B), are persistent.

This difference in effective access to financial markets impedes the transmission of monetary policy. Although the record low nominal interest rate should, in principle, lower the cost of business credit and, in turn, support and stimulate economic activity, the exogenous (from the central bank perspective) variation in access to external financing counteracts such actions. Our results indicate that while larger firms may not be greatly affected by such friction in the functioning of the financial markets, smaller firms could see these problems affecting not only their investments, but also their labour market decisions. From the policymaking perspective, this shows not only possible distributional effects of policy “surprises”, but could also provide some input into possible regulatory changes related to the functioning of financial markets.

⁹ We verified that adding firm-size and industry-fixed effects into our specification, equation (2), does not alter the results.

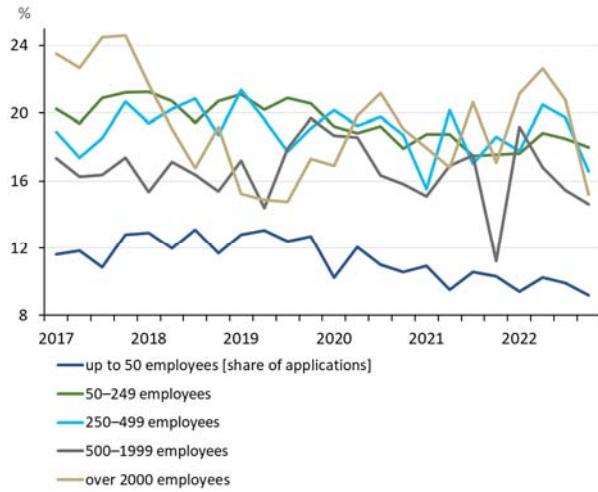
¹⁰ We want to stress that these results pertain to the unexpected part of policy actions.

¹¹ Note that this could also be the result of extensive fiscal policy interventions (in the form of anti-crisis shields) that provided an alternative source of funding for companies during the Covid-19 pandemic.

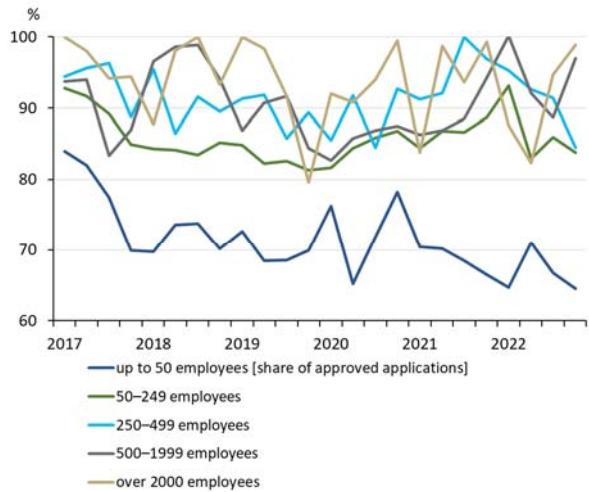
Response of employment growth to a positive and negative path (forward guidance) shock

Graph 5

A. Filed applications(%)



B. Approved loan applications (%)



Percentage of filed (Graph 5.A) and approved loan applications (Graph 5.B) in enterprise size classes (seasonally adjusted) reported by small, medium and large enterprises.

Source: NBP (2023).

Additionally, our results stress the existence of labour market rigidities and indicate that these rigidities are more pronounced for the smallest firms. For many of them, hiring or firing even a single employee implies a significant change. Additionally, the lack of flexibility on the extensive margin is often met by inflexibility in the intensive margin. Given the difficulties in accessing the credit market, it is wages that could provide the necessary buffer for transitory shocks.

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Recent Inflation Dynamics in Singapore

Monetary Authority of Singapore (MAS)

Abstract

This note examines the roles of external price pressures and labour market developments in driving recent high inflation in Singapore. As a small open economy, Singapore has been more affected than most by shocks to global commodity prices over the past two years. Meanwhile, rapid labour market tightening as the economy rebounded in the wake of the pandemic has led to robust nominal wage growth, further contributing to inflationary pressures. This note highlights two phenomena that have contributed to the strongest inflation outturns since 2008 —Singapore's reliance on imported inputs and the sharp contraction of the non-resident workforce during the worst of the pandemic. Overall, this year will see some easing from the surge in imported inflation and very tight labour market of 2021–22, but labour demand is expected to be resilient and exert some continuing inflationary pressures through firm consumer services prices.

Keywords: inflation, labour market.

JEL classification: E31, J21.

Overview of recent economic developments and outlook

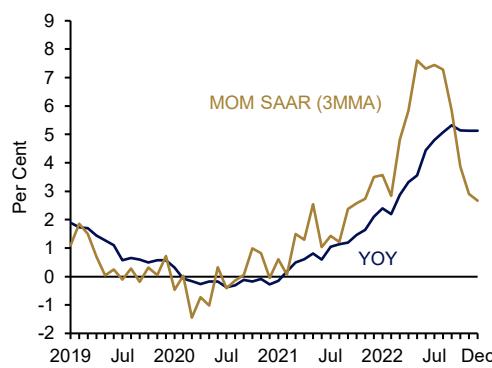
Inflation

Both external and domestic cost pressures led to an increase in MAS core inflation¹ to 5.1% year on year in the third and fourth quarters of 2022, from 3.8% in the second quarter, with year-on-year price increases firming across all broad categories (Graph 1.A). Nevertheless, moderating energy price increases alleviated price pressures somewhat in the final months of 2022, even as conducive domestic demand conditions and a tight labour market led to a continued rise in discretionary goods and services inflation. In December, the three-month moving average (3MMA) of the annualised month-on-month percentage change in seasonally adjusted MAS core consumer price index (CPI) dipped to 2.7%, down further from its peak of 7.6% in May, suggesting that inflation may have peaked. For 2022 as a whole, core and headline inflation averaged 4.1% and 6.1%, respectively, the highest rate of inflation in 14 years.

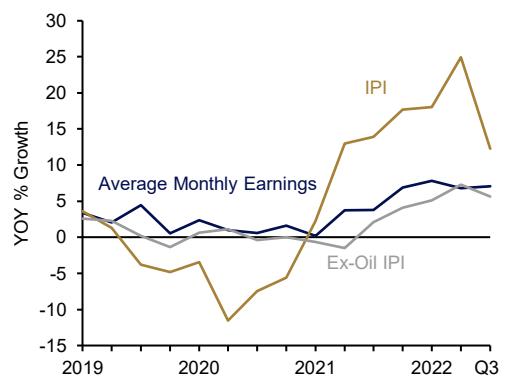
CPI, import and wage inflation in Singapore

Graph 1

A: MAS core inflation



B: Average monthly earnings and import price-indices (IPI)



Source: Department of Statistics.

Sources: Department of Statistics; Central Provident Fund, Singapore.

This year, imported inflation is expected to remain significant across a range of intermediate and final goods. Commodity price levels have come off their peaks but will remain elevated, while higher costs in Singapore's major trading partners – including from tight labour markets – will continue to flow through global value chains. Externally driven inflation in Singapore is therefore forecast to moderate more discernibly only in the latter half of the year.

Domestically, labour market tightness is expected to ease this year even as the labour market on the whole will likely remain strong. Wages, especially for the services sector, will rise at a slower pace than in 2022 but should keep above pre-Covid

¹ The MAS core inflation measure excludes "accommodation" and "private transport" components as these items tend to be significantly influenced by supply side administrative policies that are volatile. Unlike most other economies, the core inflation measure in Singapore includes non-cooked food and energy-related items (electricity and gas).

averages. Rising unit labour costs will therefore continue to drive inflation in 2023, although its contribution should ease, especially in the second half of the year. Consequently, MAS core inflation is projected to stay elevated in the first two quarters of the year before slowing more discernibly in H2.²

Labour market

Labour markets across most advanced economies were notably tight during the period 2021–22, amid the resumption of economic activities and constraints on labour supply. Singapore faced broadly similar conditions, with unemployment falling rapidly as Covid-19 social distancing measures were eased, and various labour market indicators pointed to a very tight domestic labour market by late 2021. The seasonally adjusted resident unemployment rate fell from a peak of 4.7% in the third quarter of 2020 to a low of 2.8% in the second quarter of 2022. Meanwhile, job vacancies surged past pre-Covid levels in 2021 and have remained elevated over 2022, partly as a result of the robust labour demand recovery coinciding with a sharp decline in the non-resident workforce, amid Covid-related border restrictions. Consequently, the ratio of job vacancies to unemployed persons surged to an all-time high of 2.5 in June 2022. While it has since retreated slightly to 2.2 in September, the ratio of job vacancies to unemployed persons remained high compared to the pre-Covid average reading of 1.0.

Labour market tightness has led to strong wage pressures, with resident wage growth stepping up to 7.3% yoy on average during the period January–September 2022 (Graph 1.B). High wage growth in part reflects a catch up in wages to its trend level, after relatively slow wage growth in 2020–21. However, even abstracting from base effects, the momentum in wage growth has been strong, reflecting the tight labour market. With Singapore's GDP growth projected to moderate in 2023, the tempering of labour demand, in combination with recovering non-resident labour supply, should further alleviate labour market tightness. Accordingly, nominal wage growth for resident workers is projected to step down in 2023 as demand and supply in the labour market equilibrate. However, some persistence in wage growth momentum and elevated inflation expectations, together with government policies in 2022–23 to raise wages at the bottom of the income distribution, could keep resident wage growth above pre-Covid rates.

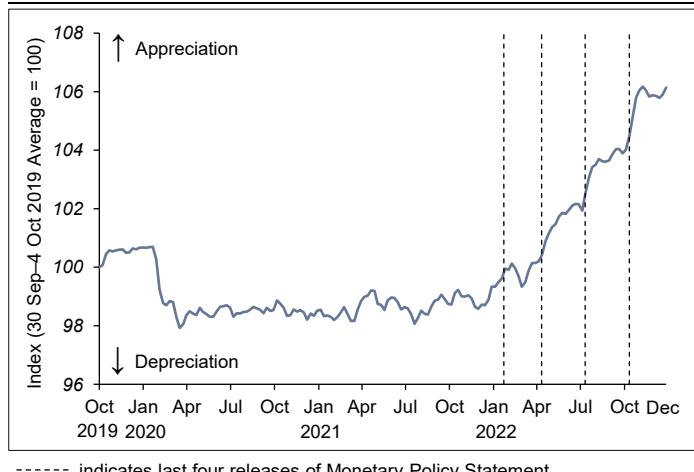
Monetary policy

Congruent with the still strong underlying inflation, MAS further tightened monetary policy, by stepping up the level of the exchange rate policy band in October 2022 (Graph 2). The cumulative effects from the five rounds of monetary policy tightening since October 2021 are expected to slow the momentum of inflation and ensure that price pressures do not become entrenched.

² Excluding the effects of the hike in the goods and services tax (GST) in 2023, core inflation is projected to be lower on average in 2023 compared with 2022.

Singapore dollar nominal effective exchange rate (S\$NEER)

Graph 2



Source: MAS

On the whole, MAS's intermediate target of monetary policy, the Singapore dollar nominal effective exchange rate (S\$NEER) has appreciated by over 7% as of end-2022, since MAS began withdrawing monetary policy accommodation in October 2021. The strengthening of the Singapore dollar has helped to filter off part of the strong imported inflation. At the same time, amid the considerable appreciation of the real exchange rate, an expected rebalancing of aggregate demand with supply will reduce domestic inflationary pressures.

Two drivers of high inflation in Singapore

Singapore's integration into global value chains

Sharply higher global commodity prices have exerted significant price pressures on the Singaporean economy. Singapore has no natural resources and imports almost all of its food and energy requirements. Higher commodity prices have thus had significant direct effects on the CPI.

In addition, MAS's analysis using global input output tables shows that higher agriculture and energy prices worldwide are raising domestic inflation indirectly via a wide range of imported intermediate inputs. In particular, by raising the costs of energy inputs at every stage of the global value chain, global commodity price shocks lead to broad-based and persistent inflation in Singapore – beyond the first order direct effects on domestic food and energy prices. The commodity price shocks are estimated to have accounted for over two thirds of Singapore's year-on-year core inflation in June, far higher than the 25% increase that can be directly attributable to the weight of food and energy-related components in the core CPI basket.

MAS's analysis suggests that indirect channels are a more important propagator of commodity price shocks to inflation in Singapore relative to other economies, in line with Singapore's exceptionally high dependence on international trade. In

particular, inflation in Singapore from global commodity price shocks are primarily transmitted through supply chains involving foreign sectors as intermediaries. In contrast, US and EU inflation appear to be primarily driven by domestic supply chain effects. This suggests that even as the impact of commodity price shocks fade, elevated inflation internationally within industry networks could, via global value chains, keep Singapore's imported inflation firm.

Singapore's non-resident workforce

Similar to most advanced economies, the labour market has been tight in Singapore during the post-Covid economic recovery. However, there have been two salient differences in Singapore's labour market that are relevant for the inflation outlook.

First, total employment has been slow to recover to pre-Covid levels almost entirely because travel restrictions have impeded the return of non-resident workers to Singapore. Labour force participation among the resident population remained high throughout 2020 and rose beyond pre-pandemic rates in 2021–22, in contrast to several advanced economies in which the labour force participation rate declined sharply and was slow to recover. Rather, labour supply constraints in Singapore have primarily been due to restricted inflows of non-resident workers, who saw their share of the total workforce falling from 38% pre-pandemic to 34% by end-2020. Although the inflow of workers has resumed robustly since end-2021 with the relaxation of domestic and international border restrictions, as of September 2022 non-resident employment is still approximately 3% below its pre-pandemic level.

Second, manpower shortages persisted even as resident employment rebounded, as resident workers were imperfect substitutes for non-resident workers in sectors such as manufacturing and construction. Consequently, the shortfall of non-resident workers generated a temporary mismatch between labour demand and labour supply, which in turn led to elevated job vacancy rates. In the United States, the surge in job vacancies has led to suggestions that the Beveridge curve has shifted up, and that the labour market cannot be cooled without a significant increase in unemployment. In Singapore, analysis by MAS finds that non-resident labour supply constraints were an important factor underlying elevated job vacancies during the period 2021–22, in addition to rising matching frictions in the labour market (Graph 3.A).³ One key implication is that as international travel recovers and non-resident labour supply normalises, excess vacancies should fall and the shift in the Beveridge curve should reverse partially, without requiring a large increase in resident unemployment (Graph 3.B).⁴

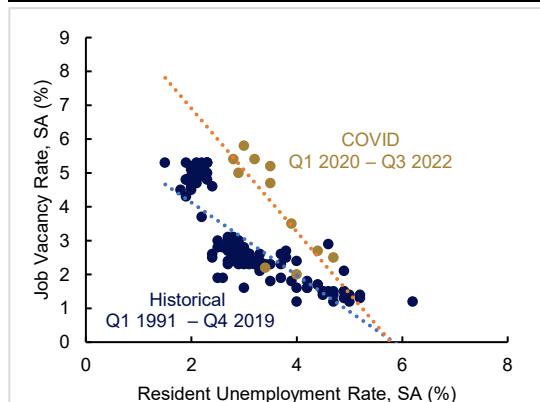
³ The measure of excess job vacancy rate is based on a regression decomposition of the overall job vacancy rate into cyclical demand and foreign labour supply components. The demand component is driven by GDP growth and foreign employment growth in the previous quarter, while the foreign labour supply component depends on the deviation of foreign employment from trend levels.

⁴ Using the linear approximation from Ahn and Crane (2020), the recent shifts in the Beveridge curve were decomposed into four components – dynamics, job separations, non-resident labour supply and matching efficiency.

Shifting Beveridge curve in Singapore

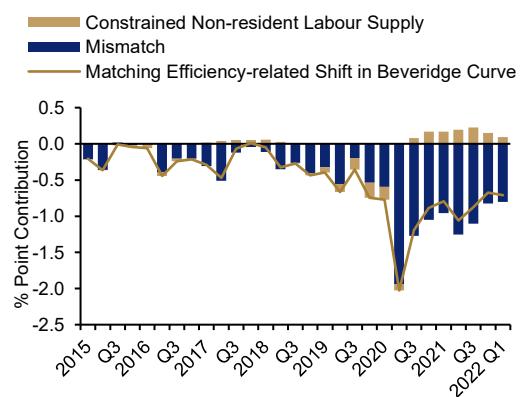
Graph 3

A: A. Beveridge curve



Sources: MOM and EPG, MAS estimates.

B: Decomposition of efficiency-related shifts in the Beveridge curve



Sources: Source: EPG, MAS estimates.

Wage-price dynamics

With labour supply constrained due to the persistent shortfall of non-resident employment relative to pre-Covid levels, nominal wage growth rose above what would be expected given cyclical demand conditions for the economy in 2022. To estimate the pass-through from wage increases to price inflation, a Phillips curve framework was augmented with a variable for "excess wage growth", a measure of wage growth in excess of demand conditions in the economy, which may have arisen because of impairment to non-resident labour supply. The "excess wage growth" variable was in turn estimated as the residual from a *wage* Phillips curve that uses the output gap as a measure of labour market slack.⁵ The modified framework can be summarised by the following equation:

$$\pi_t = \alpha + \sum_{s=1}^S \beta_s \pi_{t-s} + \sum_{m=0}^M \gamma_m \text{outputgap}_{t-m} + \sum_{n=0}^N \lambda_n \text{IPI}_{t-n} + \sum_{k=1}^K \kappa_k \widehat{\nu_{t-h}} + \epsilon_t$$

Under this framework, contributions from demand, imported inflation and excess wage growth average zero in the long run. However, they all contributed to core inflation overshooting in 2022. Nonetheless, the estimated coefficient on the excess wage growth variable is relatively small in magnitude, indicating that the pass-through from labour market to prices is likely to be contained.

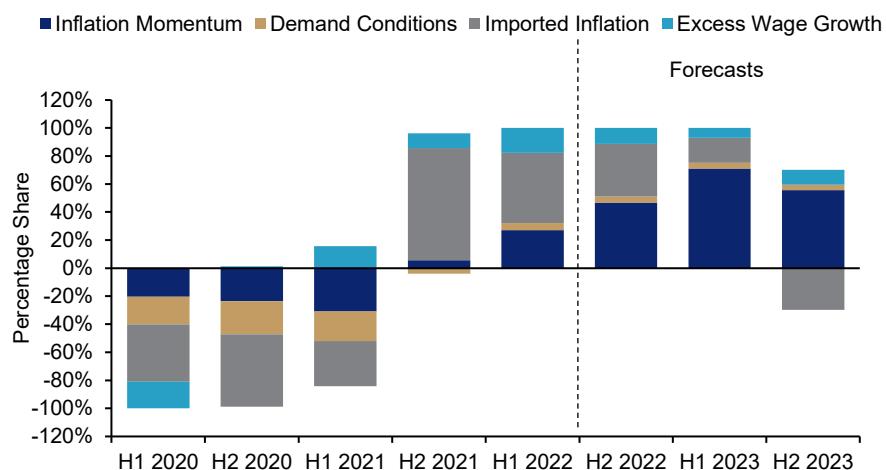
This year, with labour market tightness expected to ease as short-term labour supply shortages resolve, the contribution of excess wage growth to core inflation

⁵ In contrast to observations made for a few advanced economies, MAS internal estimates of the wage Phillips curve suggest that a strong link between the degree of economic slack and nominal wage growth in Singapore remains.

should moderate (Graph 4). Similarly, the strong imported inflation over 2022 is also projected to ease, further helping to dampen inflation. These suggest that standard monetary policy tradeoffs should re-establish prominence, as long as inflation expectations continue to be contained.

Contribution of inflation drivers to excess inflation

Graph 4



Forecasts for 2023 exclude the impact of GST hike.

Source: Source: EPG, MAS estimates.

Conclusion

Inflation in Singapore experienced a "perfect storm" in 2022, with resurgent demand coinciding with domestic and external supply side constraints. Looking forward, amid the synchronised tightening of monetary policy globally, Singapore's GDP growth is expected to moderate to a level slightly below trend in 2023. With labour market tightness expected to ease somewhat as short-term labour supply shortages resolve and commodity prices moderate, core inflation is likely to come down in the second half of 2023. For this year as a whole, inflation is likely to step down from 2022, although it will remain somewhat above the historical norm.

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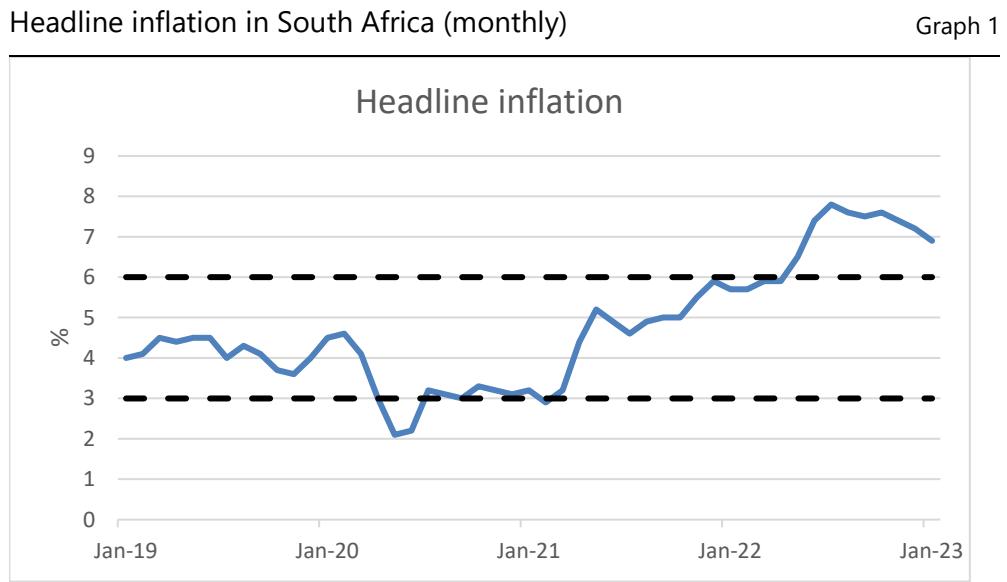
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Inflation and labour markets in the wake of the pandemic

Submission by the South African Reserve Bank – Deputy Governor Naidoo¹

1. What have been the main drivers of inflation since its flare-up? How far has this reflected pandemic-specific exogenous factors (eg uneven reopening of the economy and international supply disruptions) and policies (eg strong fiscal and monetary policy easing)? To what extent have fiscal measures sought to reduce price pressures linked to higher commodity prices (eg subsidies/taxes/price caps)?

South Africa's headline inflation remained subdued throughout the Covid-19 period but breached the upper limit of the 3–6% target range in May 2022 (Graph 1). Headline inflation, reached a 13-year high of 7.8% in July 2022, driven largely by food and fuel price increases, reflecting both high global food and oil prices, as well as a weaker rand exchange rate.



Headline inflation has eased to 7.1% in March 2023. However, food inflation has yet to peak. Meanwhile, core inflation remains sticky, reflecting increased pass-through from high producer prices, rotation of demand back to services and a continued weaker nominal rand exchange rate that has aggravated imported inflation. The output gap has closed, largely a result of the sharp decline in potential growth over the past year due to the increasing intensity of load-shedding.

Much like the rest of the world, South Africa has experienced supply chain bottlenecks since the onset of the Covid-19 pandemic. Bottlenecks initially due to

¹ Various parts of the submission draw from a working paper by Loewald et al. (forthcoming).

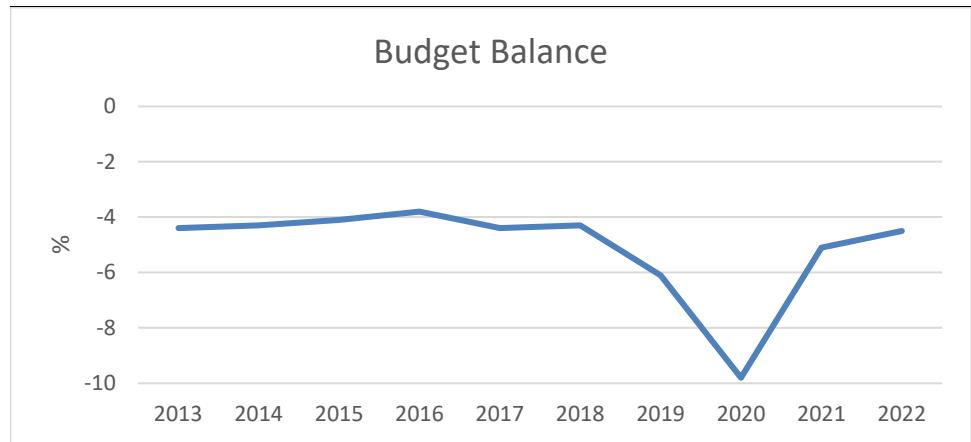
lockdowns were aggravated by the outbreak of the Russia-Ukraine conflict in February 2022, as well as idiosyncratic domestic factors such as the floods in April 2022 and ongoing electricity load-shedding. As a result, South Africa's composite supply chain pressure index remains at historically high levels, despite easing. Going forward, easing global supply chain pressures are expected to feed through to the domestic economy, relieving some price pressures. However, expected drought in the major grains producing regions such as Brazil, United States and Europe and the ongoing military conflict in Ukraine remain a threat to global, and domestic, supply chain networks over the short to medium term.

The South African Reserve Bank (SARB) sharply lowered the repurchase (repo) rate at the onset of the Covid-19 pandemic, cutting rates by a cumulative 2.75% to a low of 3.50%. As the economy recovered, the SARB moved early to begin rates normalisation, which helped to better manage demand growth, avoiding the sharp swings in demand from services to goods and then back to services as observed in other jurisdictions. However, with both inflation and inflation expectations sharply higher since the second half of 2022, the SARB's Monetary Policy Committee (MPC) stepped up the pace of repo rate normalisation over the past year, raising the repo rate by a cumulative 350 basis points in the six MPC meetings spanning from May 2022 to March 2023.

South Africa's fiscal policy similarly sought to cushion the adverse effects of the pandemic, with the budget deficit rising markedly from approximately 6% of GDP in 2019 to 10% in 2020 (Graph 2). Fiscal spending included tax relief, a loan guarantee scheme for SMEs, income support and expansion of social support grants. As the economy has recovered from the Covid-19-induced recession of 2020, most of the fiscal support has been withdrawn, except for the social relief of distress grant which is expected to expire in March 2024. More recently, however, with rising domestic fuel price pressures following the Russia-Ukraine conflict, the South African government implemented a temporary fuel relief instrument to ease fuel price pressures by reducing the regulated price of fuel by ZAR 1.50 per litre between April and August 2022. The relief has since been withdrawn.

South Africa's budget balance (annual)

Graph 2

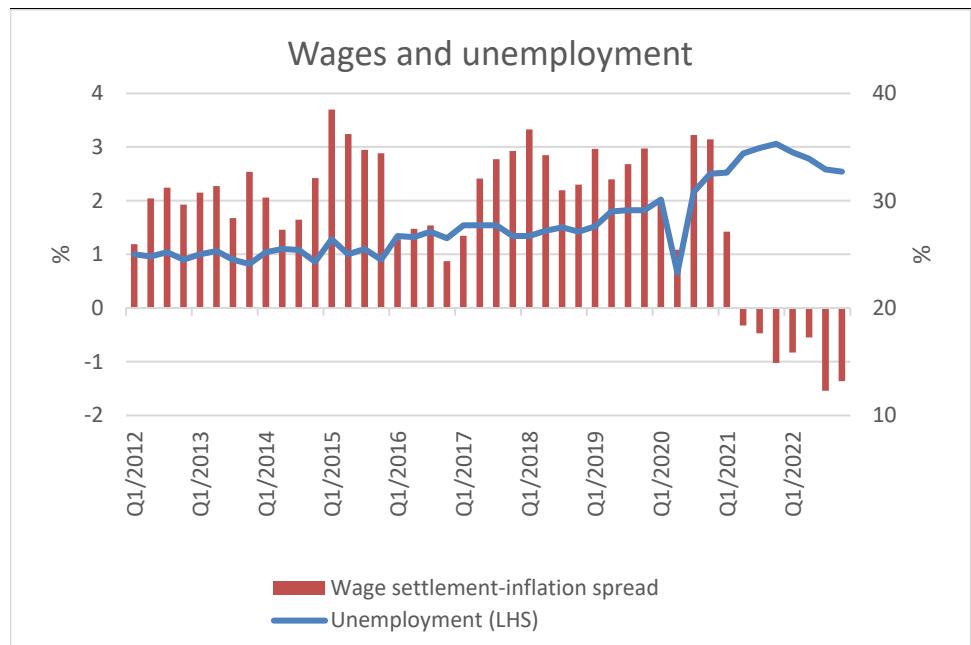


2. Have wage increases matched the rise in inflation? Do you see any evidence of second-round effects through the labour market and of wage-price spirals? If not, do you expect to see them in the near future?

Wage settlements in South Africa generally trended above headline inflation pre-Covid. However, this trend reversed in 2021, as headline inflation accelerated and wage growth dipped below inflation (Graph 3). This is consistent with the mainly external (terms of trade loss) and supply side (electricity shortage) origin of production cost increases, which limits the room for wages and profits.

Wages and unemployment in South Africa (quarterly)

Graph 3

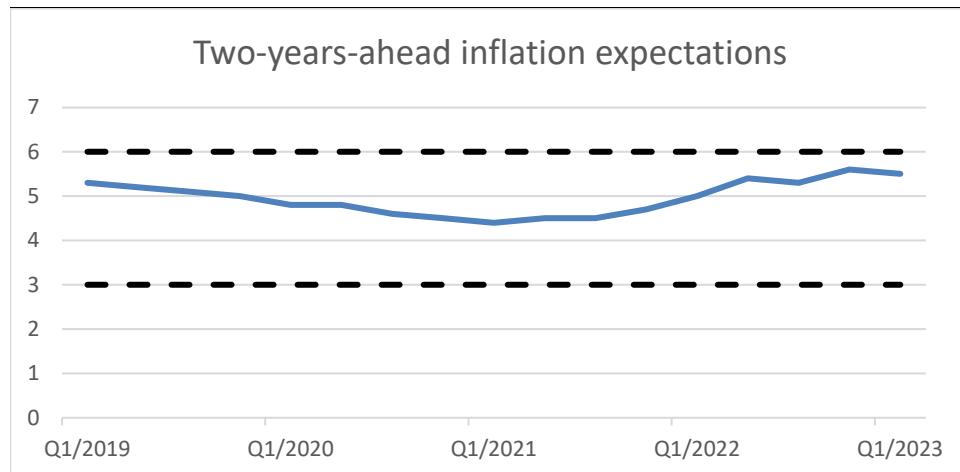


Food and transport costs are a major cost item for most South African workers. High inflation for these components therefore tends to influence wage bargaining, especially in unionised sectors. With currently elevated food and energy prices, the risk of second-round effects has increased. Core inflation has picked up pace over the past few months and is projected to average above the 4.5% midpoint of the target range over the medium term. To date, the rise in core inflation largely reflects the effects of a weaker rand exchange rate, elevated global goods inflation and spillover effects from the high fuel and food inflation, which have pushed transport, and hotel and restaurant inflation sharply higher.

At the same time, inflation expectations in South Africa have shifted markedly higher as inflation has risen. Of concern is that the two-years-ahead inflation expectations have risen from 5.3% in the third quarter of 2022 to 5.6% in the fourth quarter and remained elevated at 5.5% in the first quarter of 2023 (Graph 4). These factors together have heightened the prospect of more enduring second-round effects. At this point the risk of a wage-price spiral is assessed as relatively low as average wages have risen by between 1 and 2 percentage points less than the consumer price index (CPI) in 2022. However, historically wage setting in South Africa tends to be influenced by adaptive expectations, suggesting that wage negotiations may be more difficult in 2023, given the real wage erosion in 2022.

Two-year ahead inflation expectations (quarterly)

Graph 4



3. How much slack is there in the labour market at the aggregate and sectoral levels, including differences between the formal and informal sectors? How even have wage increases been across industries or labour market segments?

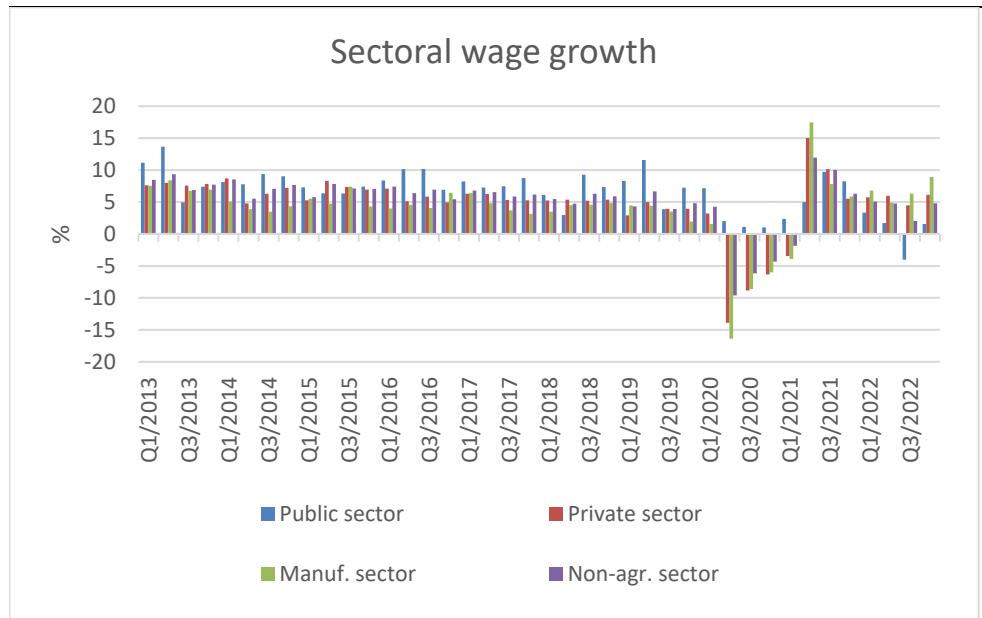
Data from Statistics South Africa's Quarterly Labour Force Survey (QLFS) show that the Covid-19 pandemic has exacerbated South Africa's pre-existing labour market challenges. The official unemployment rate jumped to 35.3% in the fourth quarter of

2021, although it has moderated to 32.7% in the fourth quarter of 2022. Nonetheless, unemployment remains much above the average of 28.7% recorded in 2019.²

Wage increases in 2022 have varied across industries and segments with agreements ranging from 3.0% in the public sector to as high as 13% for private security. These outcomes are not necessarily the result of relative tightness in each industry but rather the result of a combination of the higher price inflation environment at the time of negotiating multi-annual wage agreements and the push by unions to recover lost real wages in the previous year (Graph 5).

Sectoral wage growth (quarterly)

Graph 5



B. Inflation and labour markets: structural aspects

1. What are the key structural features of the labour market that influence wage formation and the inflation process? How have they evolved over time and why (eg policy reforms, globalisation etc)? Importantly, how far has the behaviour and history of inflation itself influenced those features?

Various structural features of the labour market influence wage formation and inflationary pressure. Low educational quality and entrepreneurship reduce the employability of job seekers, while high commuting and other job search costs and social grants drive up reservation wages on the supply side (IMF, 2021; Shah &

² The expanded unemployment rate rose to a record high 46.6% in the third quarter of 2021 but has since moderated to 42.6% in the fourth quarter of 2022; higher than the 2019 average of 38.4%. The divergence between the broad and narrow measures of unemployment is largely explained by discouraged workers. Although the share of South Africa's discouraged workers in the labour force has declined as the economy has recovered, it remains at elevated levels.

Sturzenegger, 2022). On the demand side, regulation and wage bargaining arrangements raise costs above levels needed to clear the labour market (IMF, 2021). This is in large part due to insider-outsider dynamics that reflect monopsony market power, and a widening wage premium for more highly skilled workers in closed-shop workplaces and sectors (Hausmann, 2008).

Despite rising unemployment, wage settlements remained above inflation. The result is that job-shedding and rising capital intensity, rather than real wage rebalancing, has become the primary way in which South African firms maintain productivity growth (Nattrass, 1999; Bhorat, et al., 2009). One driver of these insider-outsider dynamics comes from a regulatory framework that create incentives for bargaining structures to negotiate wages or prices as entry barriers for new suppliers or smaller enterprises and stifles dual-level bargaining. Another driver is from sheltered public sector wages that command a large and significant wage premium (Kerr & Wittenberg, 2021).

There has also been a significant increase in returns to higher education over the past decade, with wages advancing faster for higher skills in the economy. Poor educational outcomes, low levels of skilled worker immigration and employment equity policies further increase the skills premium (Hausmann, 2008; Loewald, et al., 2021). Progress in addressing the skills mismatch in South Africa has, to date, been limited. Recently, however, the government has moved to ramp up skilled immigration into the country, with the first step of gazetting the skills gaps completed.

Minimum wages in the country also play an important role in the wage formation process. In late 2018, a national minimum wage was enacted, which stipulates a minimum hourly wage for work, regardless of skill or sector. Prior to 2018 minimum wages were set at the sector level. Bhorat et al (2021), provide an analysis of the national minimum wage policy in South Africa, focusing on its impact on wages, employment and hours of work. The findings suggest that the national minimum wage has had no statistically significant impact and there is no evidence of a reduction in employment.³

Although there is no strict indexing of wage increases to inflation (see also question 4 below), inflation dynamics do influence wage formation in South Africa. When inflation is high (using both recent past and current inflation), unions fight more aggressively to secure wage increases loosely 'indexed' to inflation, with the goal of protecting real wages. On the other hand, when inflation is low, unions are less likely to demand inflation-linked increases but would rather negotiate for above-inflation increases.

³ Caution needs to be taken when drawing inferences from the results given the short-time frame of the analysis (a 12-month period).

2. What is the role of the informal sector in the labour market and its relationship to the formal sector (eg wage spillovers across the two sectors)?

South Africa's informal sector is relatively small compared with peer emerging markets, accounting for just 18.5% of total employment (Stats SA, 2023).⁴ The small informal sector partly explains the high unemployment in South Africa as the unemployed are not absorbed by the informal sector.

Nearly two thirds of informal sector workers in South Africa are men. The QLFS data show that a high proportion of workers in the informal sector work in the trade, community and social services, as well as construction industries, and that more than half of informal workers are concentrated in three of the nine provinces in the country, namely: Gauteng (31.6%), Kwa-Zulu Natal (13.9%) and Limpopo (11.5%) (Stats SA, 2023). Other features of the informal sector in South Africa include racial bias, lower levels of educational attainment and lower income levels (Blaauw, 2017, p. 348).

There is evidence of linkages between the informal and formal labour markets in South Africa Ince (2003), Valodia et al (2006), Davies and Thurlow (2010), and Nackerdien and Yu (2019)). For example, Ince (2003) who investigated backward and forward linkages by informal clothing manufacturers in Durban found that manufacturers in the informal economy sourced their inputs in the formal economy and that garments produced in the informal sector often ended up in formal retail stores.

3. How centralised is the bargaining process? How has the nature of wage bargaining changed over time? Has centralisation helped or hindered inflation control?

Godfrey, et al. (2007) and Godfrey (2018) show that South Africa's bargaining system is partially centralised at a sectoral level and is uncoordinated. The scope of centralisation has shrunk over time with low levels of unionisation in certain sectors and generally, but highly centralised in other, large sectors. However, the legal framework sets a low bar for the imposition of agreements negotiated by a portion of many sectors' businesses and workers to all other firms and workers in a sector. This provides strong incentives for larger, more productive firms to reach agreements that are uneconomic for smaller firms. They use collective bargaining to limit domestic competition from less capital-intensive rivals and generally push up productivity in the economy in a level sense if not dynamically (Hausmann, 2008). The number of union members has grown over the last decade, but this has been driven by the public sector, and membership is becoming more splintered.

In a broad sense, the bargaining system generates wage and price outcomes inconsistent with inclusive growth. Instead, South African economic agents choose, directly and indirectly, to deepen the capital intensity of production at the expense of labour. However, most South African workers (approximately 70%) are not unionised, and for these workers, wage negotiations take place at the firm/plant level.

⁴ Stats SA defines the informal sector according to the international standard agreed at the International Conference for Labour Statistics. See definitions from Stats SA (2023, p.19).

4. How important are implicit and explicit wage indexation mechanisms? Have these changed over time? Has policy deliberately tried to reduce them?

The level of inflation plays a role in wage negotiations, primarily as a reference point, however, price setting remains above the inflation target in key sectors reflecting the microeconomic inefficiencies that constrain employment and growth. No formal wage indexation mechanisms are used (Mihaljek and Saxena, 2010), but agreements are typically set for three years and pegged against inflation plus a productivity buffer (Bassier, 2021). In the past, public sector wages were indexed to inflation. However, in 2020 the Constitutional Court supported the government's decision to backtrack on the last leg of a three-year collective agreement on grounds of affordability, which has helped government in its fiscal consolidation efforts. However, in 2023 public sector unions successfully negotiated for an above inflation increase in wages for the next two years. Inflation is generally used in cost-of-living adjustments (COLA) which can be included in employment contracts. The National Treasury prepares public entity guidelines for costing and budgeting for employees' compensation. In these guidelines, COLA can be indexed to CPI, for example: the 2023 medium-term expenditure framework guidelines indicate CPI adjustment for the year 2024/25.

5. What is the role of minimum wages or other salaries determined by the government? More generally, what role does the public sector play in the economy-wide wage bargaining process?

The national minimum wage is a recent development in the South African labour market, with its enactment into law having come into effect in 2019. The National Minimum Wage Act notes the "huge disparities in income in the South African labour market" and identifies a need to address both poverty and inequality. The first impact is that of elevating the wages of those previously earning below the set minimum wage. Research looking into the early effects of the introduction of a minimum wage in South Africa has found that in most cases, the introduction of a minimum wage has had a negligible impact on both the level of employment and the number of hours worked despite imposed wage increases.

Beyond determining and adjusting the minimum wage, the government also gets indirectly involved in the wage bargaining processes of other sectors of the economy through its participation in the National Economic Development and Labour Council (NEDLAC). In addition, the Department of Employment and Labour plays an oversight and coordination role over the various bargaining councils in the country. The most notable feature of this oversight function as far as wage setting is concerned is the ability of the minister of employment and labour to extend bargaining council collective agreements to non-parties to the collective agreement that are within a particular bargaining council's scope; thereby affecting the wage level of the entire sector. This aspect is concerning as the extension may force some firms to implement wage increases above their productivity growth rates, which could result either in employment loss and a higher entry barrier for new suppliers or pass-through of the higher costs to consumers through higher prices.

The government is also a major employer and thus influences wages and salaries through public sector wage agreements. The public sector commands a large and significant wage premium that contributes to undermining competitiveness in low skill exposed sectors (Bhorat, et al., 2009). Public sector wage growth has outpaced

that of the private sector adding to wage pressures economy-wide, fuelling administered price inflation, and reducing fiscal resources available for other purposes, like public investment (National Treasury, 2020; National Treasury, 2022).

6. How important is domestic and cross-border inward and outward migration in explaining labour market and wage dynamics?

Domestic migration patterns in South Africa have exhibited rural to urban migration, particularly to the larger provinces with more active economies, particularly Gauteng, Western Cape and KwaZulu-Natal. Wage data in South Africa are not disaggregated by province. This makes it difficult to make inferences regarding the impact this migration has had on wages.

From a cross-border migration perspective, the South African labour market is particularly affected by brain drain, which is characterised by a high incidence of the emigration of skilled people out of the country. This movement results in a net transfer of human capital and scarce resources to other countries. Some of the impacts of this movement are lower economic growth, forfeited tax revenues and the loss of potential skills in the next generation as emigrants tend to emigrate with their children (Waller (2006), Leipziger (2008)). The outward migration of skilled individuals also has the potential to further worsen unemployment because skilled and unskilled workers are complementary, particularly if skilled individuals engage in entrepreneurial activities that employ unskilled labour.⁵

With respect to inward cross-border migration, studies have found that migrants were more likely than South African citizens to be employed. As such, the unemployment rates for migrants were significantly lower than that of South African citizens. However, the analysis also found that the employment conditions of migrants tended to be more informal, precarious and with fewer benefits than those of South African citizens (Budlender, 2014; Fauvelle-Aymar, 2014).

7. Do you expect the pandemic to have long-lasting effects on the labour market and, through this, on the inflation process (eg labour supply, technology/automation etc)?

Labour supply has steadily increased as pandemic restrictions have eased and had recovered fully to pre-pandemic levels by the third quarter of 2022. By the fourth quarter of 2022 the unemployment rate was just 2.6 percentage points higher than in the first quarter of 2020 (pre-pandemic). The domestic labour market has not experienced the post-pandemic labour supply constraints that have caused concern in the United States and parts of the eurozone for at least two reasons. First, South Africa did not experience a form of "great resignation" during the pandemic. Second, the level of fiscal support accorded to furloughed workers was much less generous compared with advanced economies. This meant that people returned to the labour market as soon as it was safe to do so. As discussed above, the structural features of the South African labour market have not changed much – skilled labour is still in

⁵ According to Yu (2022), for every migrant that leaves South Africa there is a potential loss of 10 unskilled jobs.

short supply and union-determined wage settlements remain a robust feature of the labour market and thus price formation processes.

The use of information and communications technology (ICT) rose during the pandemic, with more jobs allowing for either fully working from home or hybrid modes of work. This aspect of the post-pandemic labour market is likely to become a permanent feature of the South African labour market and has the potential to weaken centralised wage bargaining in those sectors in which remote working is possible.

A trend that has emerged in patterns of employment in the post-pandemic recovery phase is that of rapid growth in part-time employment, while full-time employment has grown more slowly. This possibly reflects hesitance by employers to employ on a full-time basis given the high levels of uncertainty in the economy.

While automation poses a potential risk to employment outcomes, particularly given the low skill base of the majority of the workforce, to date there have been no notable disruptions to the labour market or wages. However, this risk should be monitored closely going forward.

8. How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglocalisation) to affect labour markets, wages and inflation?

South Africa has a youthful population, with a median age of 27 years in 2022 (Worldeconomics.com).⁶ The working age population has grown faster than the number of available jobs for several years, resulting in growing youth unemployment. This largely reflects sharply lower GDP growth, particularly over the past decade. The unemployment rate among the youth (those between 15 and 34 years of age) is especially high, averaging 50.5% in the fourth quarter of 2022, compared with the national unemployment rate of 32.7% in the same period. High youth unemployment often results in youth withdrawing completely from the labour market, which partly explains the wide gap between the narrow (official) unemployment rate and the broader unemployment rate. Significant structural reforms are required to improve the school-to-job transition and create sufficient dynamism in the economy to absorb those currently unemployed as well as new entrants to the labour market.

As discussed above, to date there have been no notable disruptions to the labour market or wages resulting from automation. The domestic labour market is relatively insulated and the impacts of globalisation/deglocalisation are likely to remain minimal in the near term.

⁶ South Africa's Median Age | Data | Demographics on World Economics

C. Use of labour market indicators in the policy process

1. What are the key labour market indicators that your central bank monitors? How is this information presented to the policy board?

The SARB's Monetary Policy Committee (MPC) focuses on a wide array of labour market indicators to inform its policy decisions, though the forecasting model relies primarily on unit labour costs (ULC). In Table 1 below, the labour market indicators of interest to the SARB are disaggregated into two key pillars: (i) labour force participation and (ii) wage costs.

Labour market indicators

Table 1

Labour force participation indicators	Wage cost indicators
<ul style="list-style-type: none">• Government and private sector employment levels.• Labour force participation (both official and expanded definitions).• Number of unemployed people, using the expanded definition (as well as the rate).• Number of discouraged workers.	<ul style="list-style-type: none">• Nominal salaries per worker (both public and private sectors).• Total government salaries.• Total private sector salaries.• Total salaries (in both nominal and real terms).• ULC.

The above indicators form important research areas in the SARB and help to inform expected household consumption growth, as well as price pressures. These indicators are presented in the form of historical trends and recent developments. The historical trend is a good way of capturing long-run trends and demonstrate whether indicators have deviated from trend. From these trends, as well as any new developments that may arise, one can predict baseline assumptions over the forecast horizon while recent developments are particularly helpful with respect to the starting points of the forecast.

2. How do labour market indicators enter forecasting and other economic models presented at policy briefings? Has this changed in recent years? Does this depend on the level of inflation?

The SARB uses the quarterly projection model (QPM) as its main forecasting model. In this model, the labour market price pressures are captured via the real ULC gap, which measures compensation relative to productivity. ULC is used to project services inflation over the medium term. The QPM uses the output gap instead of the unemployment rate, in part, because unemployment in South Africa is largely structural in nature.

In addition to the QPM, the SARB also uses a macro econometric (dubbed "the core") model to inform its policy decisions. The core model similarly uses unit labour costs to capture the pricing decisions of firms and their ultimate impact on wage growth. Unit labour costs are calculated as the ratio of total compensation of employees to real GDP at market prices. The average remuneration per worker equation is modelled as a function of inflation expectations and productivity, suggesting that workers will be compensated for inflation and rewarded for increased

productivity. In addition to these variables, the unemployment rate (which captures labour market pressures) is also used to explain workers' average wages.

In line with best practice and in the quest to better capture economic relationships and dynamics, some key changes have been made to the SARB's models over time. Over recent years, model development changes have been predominantly within the SARB's QPM model.

Prior to adopting unit labour costs, wage pressures were captured through the real wage gap – a measure of the deviation of the average real wage from its equilibrium. A forecasting performance test of various labour market indicators on core inflation was conducted and it was found that unit labour costs were a better predictor of inflation than average wages. Moreover, further motivation for the change was that real unit labour costs are easier to interpret, in contrast to average real wages which need to be adjusted for medium-term productivity in the QPM.

3. How important are disaggregated data in analysing labour markets and what role do they play in the policy process?

Employment and wage dynamics by sector and industry are both important inputs into both the modelling and policy process. From a monetary policy perspective, the structure of the South African labour market means that unemployment is often a poor indicator of wage pressures.

4. Do you refer to labour market indicators in communicating monetary policy? If so, to which ones?

Monetary policy at the SARB is communicated through two primary channels, namely, the monetary policy statement (MPS) which is published together with the monetary policy decision and the monetary policy review (MPR) which is published twice each year. ULC dynamics as well as nominal wage demands and real wages in relation to productivity growth and the impact on inflation are regular features of the communications, particularly in the MPS. The MPR, on the other hand discusses both the above and broader labour market developments such as employment growth, evolution of total worker compensation, etc.

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Labour market structure and wage dynamics in Thailand

Country note for Annual Meeting of Emerging Market Deputy Governors
16–17 March 2023

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Key takeaways

- The Thai labour market usually has a low and stable unemployment rate, along with sluggish wage growth. This is attributed to four key features: (i) high demand for low-skilled workers; (ii) flexibility of labour supply; (iii) a small share of wage earners; and (iv) low bargaining power of workers.
- During the pandemic, traditional indicators were not sufficient for monitoring Thai labour market developments. Hence, new indicators were introduced eg under-employed workers and income losses.
- Wage growth in Thailand can be explained by labour market slack, inflation, employees' characteristics and the minimum wage. The impact of each factor on particular groups of employees varies significantly.
- The chance of a wage-price spiral occurring in Thailand is small due to the small share of wage earners with low bargaining power; remaining slack in the labour market; the low share of labour cost to total cost of production; and limitations on the ability of firms to mark up prices.

The Thai labour market was hit hard during the pandemic as 20% of total employment was in tourism-related sectors. Despite the increase in labour market slack, the informal sector has played an important role in absorbing shocks in the labour market. At the onset of surging inflation and economic recovery, concerns for entrenched inflation grew in many economies (Bluedorn et al (2022)). However, the occurrence of a wage-price spiral is not a primary concern in Thailand, given a number of distinct features in the Thai labour market. In this paper, we review these specific characteristics of the Thai labour market, which have affected employment and wage dynamics as well as the wage-price spiral mechanism, and highlight how the Bank of Thailand (BOT) has monitored labour market developments since the pandemic.

¹ The authors are grateful to the Bank of Thailand's executives including Dr Piti Disyatat, Dr Sakkapop Panyanukul, Pranee Sutthasri and Narumon Pulpakdee for their helpful advice and input.

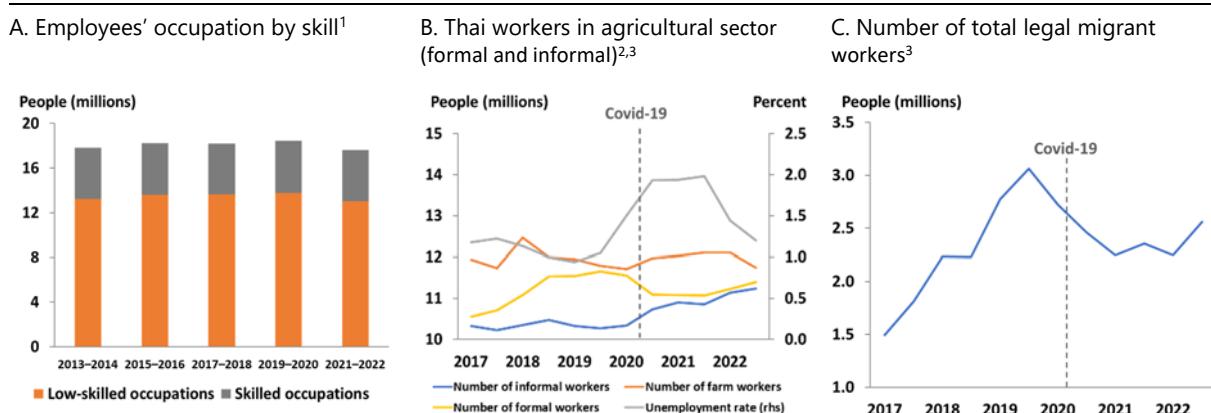
Thai labour market structure

The Thai labour market has four key distinguishing features that imply different employment and wage dynamics, as well as different policy responses, compared with other countries.

First, a high share of workers are concentrated in low-skilled occupations. Around three quarters of employees work in low-skilled occupations such as construction workers, drivers and janitors, which is high compared to the OECD countries' average at 57.8%.² Besides, this structure has not changed for a decade, including throughout the pandemic (Graph 1.A). Since these occupations do not require a high level of education, workers can switch jobs easily, generating a degree of labour market flexibility.

Salient features of the Thai labour market

Graph 1



¹ According to International Labour Organization (2012), low-skilled occupations include those which require a secondary education degree or lower, while skilled occupations require a tertiary level degree or more.

² According to Lathalipat and Chucherd (2013), non-farm informal sector workers comprise two groups: self-employed workers and private employees in small firms with fewer than five workers. The number of non-farm informal sector workers accounts for 40% of total non-farm employment (average of 2021). Formal workers refers to insured persons under the social security system that are employees in private companies.

³ Data are represented on a semi annual basis.

Sources: National Statistical Office (NSO); Foreign Workers Administration Office and BOT calculations.

Second, labour supply in Thailand is relatively flexible, reflecting two main features:

- The Thai labour market has been able to absorb adverse economic shocks through the informal sector, particularly in agriculture. For example, whereas formal employment declined sharply during the pandemic, the number of farm employment and non-farm informal workers increased significantly (Graph 1.B). As a result, the unemployment rate increased only modestly during the pandemic as many workers maintained their employment status. However, these workers

² Share of employees whose education is below the upper-secondary level to working age population in 2021 (OECD data).

still faced compensation losses from working in lower-paid jobs, experiencing uncertain income streams and an absence of social security benefits.

- Legal migrant workers³ are an essential source of labour supply in labour-intensive sectors especially those characterised by the three Ds – difficult, dirty and dangerous – in which Thai workers hesitate to work such as agriculture, fishing, construction and food manufacturing (Graph 1.C).

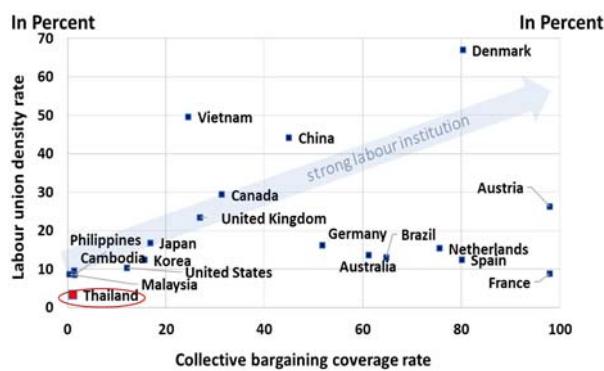
Third, wage earners only account for 44% of total employment, which is relatively low compared to other countries.⁴ Thai employment is mainly comprised of three groups: wage earners, farm workers (which account for 31%) and non-farm self-employed workers, as well as employers (which account for 25%). Wage earners are non-farm employees who either earn daily or monthly wages.

Lastly, Thai workers have low bargaining power relative to many countries, as reflected by the low collective bargaining coverage rate⁵ and labour union density rate (Graph 2.B). In addition, work contracts rarely include explicit wage indexation (eg cost of living adjustment (COLA) in European countries). Labour bargaining power and explicit wage indexation have been important factors driving wage growth in other countries. The absence of these features may partly account for the fact that cumulative wage growth (during the period 2000–21) in Thailand has been lower than cumulative productivity growth, unlike in most OECD countries in which workers' wages increased faster than productivity (Graph 2.B).

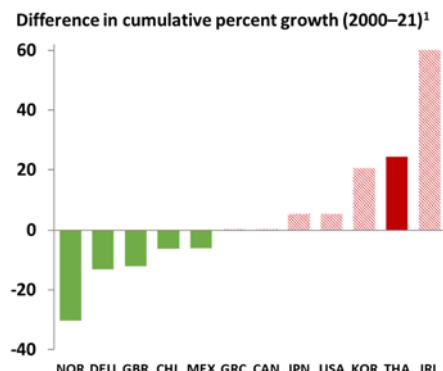
Thai labourers have low bargaining power

Graph 2

A. Labour union density and collective bargaining coverage rate



B. Productivity wage gap



¹ NOR = Norway, DEU = Germany, GRR = United Kingdom, CHL = Chile, MEX = Mexico, GRC = Greece, CAN = Canada, JPN = Japan, USA = United States, KOR = South Korea, Thai = Thailand, IRL = Ireland

Sources: CEIC; ILO; World bank and BOT calculations.

³ Total legal migrant workers account for approximately 8% of Thailand's total workforce.

⁴ Share of wage earners to total employment in the United States, Germany and the United Kingdom are 92%, 90% and 85%, respectively (based on the US Bureau of Labor statistics, the UK Office for National Statistics and DEstatis).

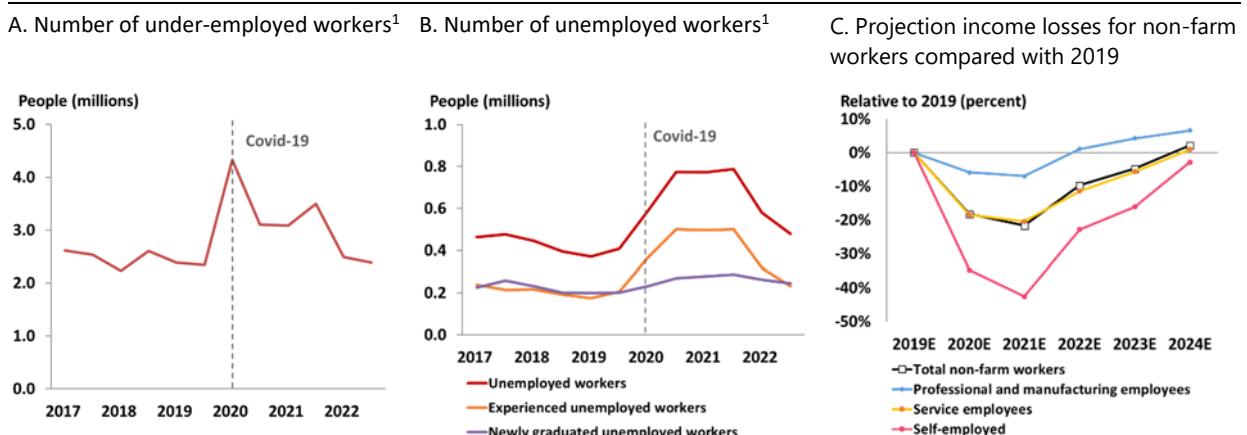
⁵ Collective bargaining coverage rate represents the share of employees covered by one or more collective agreements, in percent (based on ILOSTAT data).

Monitoring labour market developments since Covid-19

During the Covid-19 outbreak, the Thai labour market was severely impacted in a number of dimensions (eg working hours, availability of jobs and labour income losses). However, traditional indicators, such as the unemployment rate, did not fully reflect the underlying picture in terms of labour market slack. Additional indicators were hence utilised to gauge labour market conditions, such as the number of under-employed workers⁶ and labour income loss projection.⁷

Some slack during the pandemic

Graph 3



¹ Data are illustrated on a semi-annual basis and seasonally adjusted.

Source: NSO and BOT calculations.

The number of under-employed workers reached a historical high in the second quarter of 2020 (Graph 3.A). Some businesses, particularly in the services sector and among self-employed workers, were forced to temporarily shut down due to containment measures, while many workers' working hours were also reduced. At the peak, the number of the under-employed was more than five million workers with the number of unemployed around 0.8 million workers. The latter resulted in an almost doubling of the unemployment rate to 2.0% with about one third of unemployed workers being new graduates (Graph 3.B).

Consequently, aggregate labour income was estimated to have declined very substantially in 2020 (Graph 3.C). In addition, the income losses were uneven across different sectors and occupations. Self-employed workers, and workers in tourism-related sectors were heavily affected by a sharp decline in foreign tourists and stringent containment measures.

⁶ "Under-employed workers" is traditionally defined as workers who work less than 35 hours per week and would prefer to work more; however, BOT has defined "under-employed workers" as employed workers who work less than 24 and 20 hours per week for non-farm workers and farm workers, respectively. This definition arose from evidence of businesses' adaptations such as temporary shutdowns and working on alternative days, which significantly impacts workers' working hours.

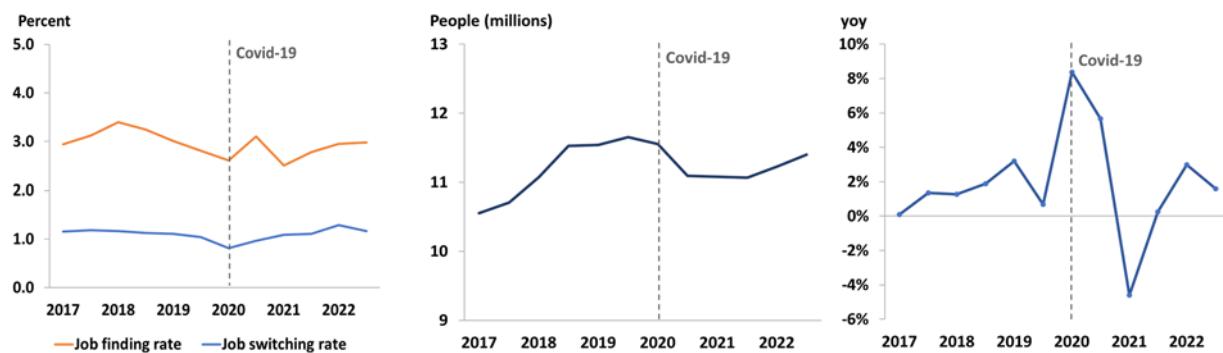
⁷ BOT proposed labour income loss projections to track changes in aggregate labour income of each occupation, especially self-employed workers whose income is not reported in the official data.

In late 2021, the Thai labour market started to recover following the relaxation of containment measures. Unemployed workers have either been able to return to their previous jobs or find new ones (Graph 4). At the same time, wage inflation has been an area of concern in light of labour shortages in some labour-intensive sectors. These shortages stemmed from the fact that many workers resettled in their hometowns during the pandemic lockdown and have since switched to farming or to being non-farm self-employed workers. Relocation of workers back to key economic areas has thus been slow. Furthermore, migrant workers who returned to home countries, mainly in Myanmar, were unable to come back due to border restrictions and political upheaval. As a result, employers bid up wages to attract workers in some areas and industries. In the second quarter of 2022, hourly wage growth rose to 3.8% year on year. Subsequently, the easing of border controls and restrictions facilitated inflows of around 0.8 million migrant workers, helping to ease wage pressure in the third quarter of 2022 (Graph 4.C).

The recovery of employment in the formal sector from the pandemic

Graph 4

A. Job finding and job switching rates¹ B. Insured persons under the social security system² C. Hourly wage growth³



¹ Job finding rate is the ratio of the flow from another activity into employment to the total number of insured people under the social security system. Job switching rate is the ratio of employed workers changing jobs to total number of insured people under the social security system and data are seasonally adjusted. ² Insured people under the social security system refers to employees in private companies and data are seasonally adjusted. ³ All data are on a semi-annual basis.

Source: Social Security Office (SSO); NSO; BOT calculations.

In other countries, such as the US, a tightening of the labour market has been associated with a shrinking supply of labour (Pickert and Saraiva (2022)). This has not been the case in Thailand. Even though the number of employees in the formal sector has almost returned to pre-pandemic levels, the unemployment rate is higher than it was before the pandemic.

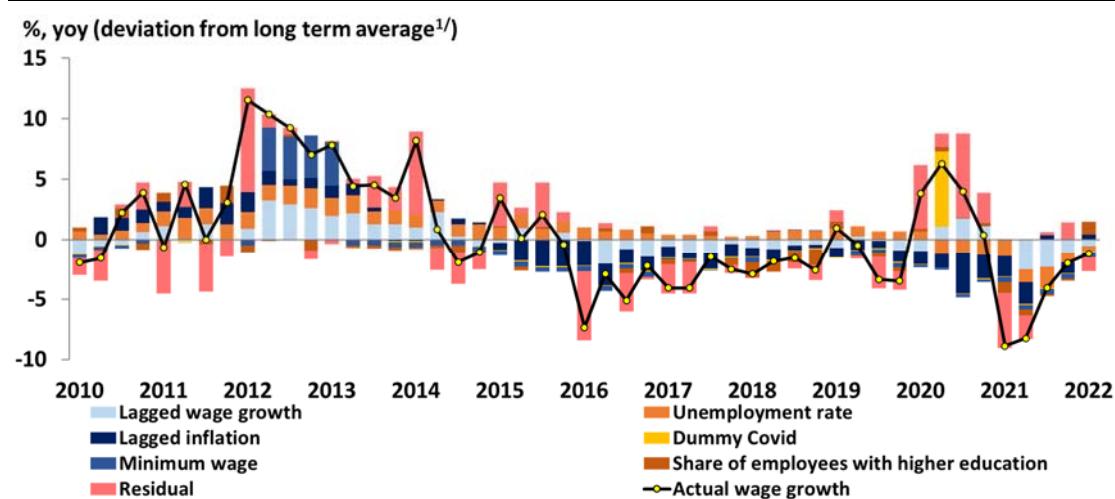
Going forward, we expect Thai labour market conditions to continuously improve along with the recovery in tourism and the broader economy. This is reflected by our forecast of the unemployment rate and labour income returning to their pre-pandemic levels in the fourth quarter of 2023 and in 2024, respectively.

Drivers of wage growth in Thailand

Overall, Thailand's average wage growth has been driven by several factors, namely labour market slack, inflation, the educational background of employees and, to some extent, the minimum wage (Graph 5). It should be noted that wages for various groups of employees, categorised by income level and economic sector, respond differently to those factors.

Contribution to Thai workers' wage growth²

Graph 5



¹ Average in Q1 2001–Q1 2022. ² Dependent variable is year-on-year of wage per hour of employees. Sample is of quarterly frequency in Q1 2001–Q1 2022, results from two-stage least squared (2SLS) controlling for lagged wage growth, lagged inflation, unemployment rate, minimum wage growth, share of employees with higher education and dummy at the peak of Covid-19 (Q2 2020), using two quarters lagged Dubai oil price growth as an instrumental variable (IV).

Sources: ILO; NSO; OECD; International Federation of Robotics; Ministry of Commerce; Ministry of Labour; Office of the National Economic and Social Development Council; BOT calculations.

Cyclical factors have played an important role in determining wage growth over the past two decades. For labour market slack, a 1% increase in the unemployment rate is associated with a 1.8–2.1% decline in nominal wage growth, which is higher than other countries (Hong et al (2018); Cormier et al (2019); Kiss and Van Herck (2019)). This probably reflects the fact that variation in the unemployment rate in Thailand is generally quite low.⁸ Thereby, a full 1% change in the unemployment rate indicates a radical movement in labour market conditions. The low and stable unemployment rate reflects the high mobility of Thai workers in finding new jobs rather than being unemployed.

At the same time, a 1% increase in inflation is associated with an increase in wage growth of 0.5–0.8%. This pass-through of inflation to wages in Thailand mainly reflects reaction to past inflation (adaptive expectations) rather than expected future inflation. However, this is likely to be non-linear depending on the level of inflation. When

⁸ The absolute value of quarter-by-quarter changes in the unemployment rate in the past two decades are distributed towards zero. Median and mean are just 0.1%, the maximum increase is only 0.9%, that occurred during the peak of Covid-19.

inflation is low, the transmission should be small as inflation might be neglected by stakeholders. On the contrary, employees will weight inflation more when it remains high out of concern for sustaining purchasing power and their standard of living (Boissay (2022)).

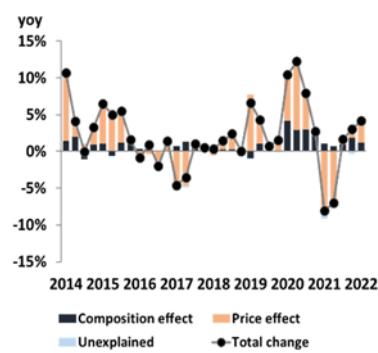
Moreover, employees' composition in terms of age, gender, education, skills and economic sectors account for 23% of total wage growth on average in the past decade (Graph 6.A). In terms of employee characteristics, education level has been the main contributor (Graph 6.B), as wage growth corresponds to an increasing share of highly educated employees. A 1% increase in the share of employees who graduated elementary school or higher increases wage growth by 1.1–1.3%.

The minimum wage setting also affects average wage growth. A 1% increase in the minimum wage is associated with a 0.1% immediate and 0.46% cumulative increase in average wage growth within one year (see Box A). This was not the case in 2012 when the minimum wage was raised by a historically large amount resulting in large adjustment in average wage growth. But after that, minimum wage adjustments were subdued. Thus, in the past decade, the minimum wage has only trivially contributed to wage growth (Graph 5).

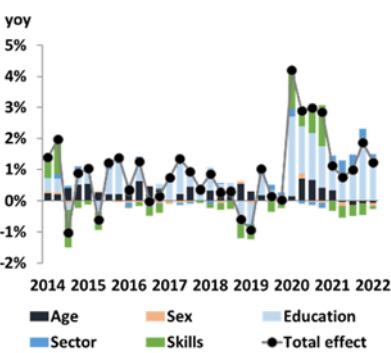
Oaxaca-Blinder decomposition¹ results and minimum wage pass-through to wage growth in different income levels

Graph 6

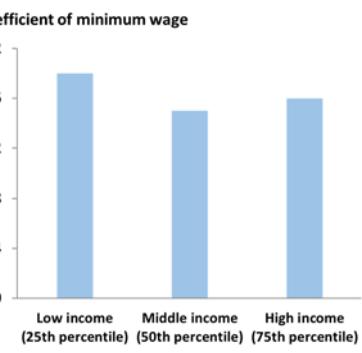
A. Contribution of wage growth classified by composition and price effects



B. Composition effect's contribution to wage growth classified by characteristics of employees



C. Instant sensitivity of a 1% increase in the minimum wage to average wage growth in different income levels



¹ Methodology as demonstrated in Jann (2008).

Sources: NSO; BOT calculations.

In contrast to other countries, labour productivity is not a statistically significant determinant of wage growth (Hong et al (2018); Cormier et al (2019); Nickel et al (2019)). This could be partly explained by employees' low bargaining power, but also likely reflects measurement problems regarding labour productivity.

At a more disaggregated level, evidence of heterogeneity in drivers of wage growth can be found. For example, the wages of high-income employees respond to inflation to a greater extent than those of the low-income group; while low-income employees' reaction to minimum wage increases is slightly greater than those of other groups of worker (Graph 6.C). This might be due to the fact that low-income

employees have less bargaining power. Therefore, the minimum wage adjustment process is particularly important for low-income employees.

At the sectoral level, pass-through from inflation to wage growth is higher in the manufacturing and service sectors than in other sectors. This is consistent with our results that the wages of the high-income group are more sensitive to inflation as both sectors have higher average wages than other sectors. While increases in the minimum wage affect the wages of construction and manufacturing workers to a greater extent than others because the construction sector has the largest proportion of workers earning the minimum wage, and the manufacturing sector has formal employment mostly and enforcement, and verification of minimum wages are stricter in the formal than in the informal sector. Furthermore, an increase in migrant workers by 0.1 million people was associated with a reduction in wage growth of 1% in the construction sector.

Box A

The role of the government in the Thai labour market

The Thai government has played a role in determining the minimum wage as well as in mitigating adverse impacts of economic shocks.

By law, the tripartite national wage committee consists of representatives from the government, employers and employees. The committee's decision on minimum wage adjustment considers current minimum wage, inflation, labour productivity growth and some qualitative economic factors. In the past, the minimum wage adjustment used to be influenced by political factors such as the implementation of a 300 baht daily minimum wage policy, resulting in a 40% increase in the daily minimum wage in 2012. If we exclude the 300 baht policy period, an increase in the minimum wage had a limited impact on overall wages. Based on our estimation from historical data, we find that a 1% increase in the minimum wage would result in 0.46% cumulative increase in the average wage of non-farm employees within one year.

During the Covid-19 outbreak, the government had a crucial role in mitigating the impact of economic shocks on the labour market such as providing monthly transfers to workers, temporarily reducing social security contributions for both employers and employees, subsidising wages to support employment in businesses and creating jobs in the public sector during the pandemic. In addition, wages in the public sector could act as a benchmark for the private sector.

Risks of a wage-price spiral in Thailand

In Thailand, a wage-price spiral is not a major concern, compared with advanced economy countries. Although, inflation has recently been at its peak since the 2000s, wage growth has not picked up much, hovering around the long-term average. This is mainly due to labour market conditions and the flexible structure of the Thai labour market, as discussed previously.

The Thai labour market overall still has some slack because the unemployment rate has not yet reached the pre-pandemic level. This is in contrast with the United States, the United Kingdom, Germany, Canada and South Korea, where unemployment rates have already reached or surpassed pre-pandemic levels.

Both Thai and migrant workers who returned to their home countries or regions during the Covid-19 pandemic are gradually returning to key economic areas. As more supply has been catching up with increasing demand, in tandem with a recovery of economic activity levels, wage pressures have been curbed to some extent. In addition, the relative ease with which workers are able to relocate across sectors and regions has also helped to ease wage pressures to some degree.

Furthermore, wage earners in the Thai labour market account for only 44% of total employment and there is a low level of unionisation. Therefore, workers' bargaining power is generally not very high, and the scope for workers to demand higher wages is limited.

Moreover, pass-through from wage growth looping back to inflation is not expected to be significant. There are two factors supporting this. First, the role of wages in pressuring the overall cost of production is relatively contained. Labour costs vary from 3% in some manufacturing sectors to 34% in some service sectors, but in general, it accounts for 15%, which is limited and not expected to be the main reason for price adjustments. Second, firms' ability to markup prices is currently limited, as the economic recovery is still ongoing.

In summary, both cyclical and structural factors have contributed to a low likelihood of a wage-price spiral in Thailand. However, aggregate demand recovery and the dynamics of both Thai and migrant workers returning to key economic areas must be monitored closely. The overarching priority is to ensure that incipient price pressures emanating from the labour market do not feed into the general price-setting behaviour of firms and undermine the overall anchoring of inflation expectations.

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Central Bank of the Republic of Türkiye note for the 2023 Emerging Markets Deputy Governors Meeting

January 2023

Inflation and labour markets in the wake of the pandemic.

What have been the main drivers of inflation since its flare-up? How far has this reflected pandemic-specific exogenous factors (eg uneven reopening of the economy and international supply disruptions) and policies (eg strong fiscal and monetary policy easing)? To what extent have fiscal measures (eg subsidies, taxes or price caps) sought to reduce price pressures linked to higher commodity prices?

Inflation started to increase sharply after November 2021. Whereas inflation was 21.3% in November 2021, it rose to 36.1% at the end of 2021. The highest inflation rate was 85.5%, in October 2022. In December 2022, inflation declined sharply to 64.3% due to the base effect.

At the beginning of this process, the movements and volatilities in exchange rates, deterioration of pricing behaviour, indexation of prices to exchange rates, deterioration of inflationary expectations, supply side factors and developments in managed/driven prices caused inflation to increase. In the following period, the prices of energy, metal, food and agricultural products increased due to geopolitical developments, high import prices and transportation costs. These factors further deepened problems relating to inflation.

Therefore, inflation was not driven by demand factors, but by negative supply shocks. The current inflation is not a national phenomenon relating to monetary policymaking in Türkiye alone. Rather, it is a global issue faced by almost all central banks around the world and particularly arises from issues relating to energy and food price shocks.

Due to strong action taken by the Central Bank of the Republic of Türkiye (CBRT), inflation expectations are anchored well below the current actual inflation figures. In addition, core indicators and inflation expectations have started to improve, and inflation has settled on a marked downward trend recently. We have already started to see improvement in these indicators which will be more pronounced in the coming months. Moreover, in order to mitigate cost pressures that result from rising energy prices, both consumer and producer electricity and natural gas tariffs are subsidised. With these measures, as well as the improvement in inflation expectations, our estimate for the year-end inflation in 2023 is 22.3%.

Have wage increases matched the rise in inflation? Do you see any evidence of second-round effects through the labour market and of wage-price spirals? If not, do you expect to see them in the near future?

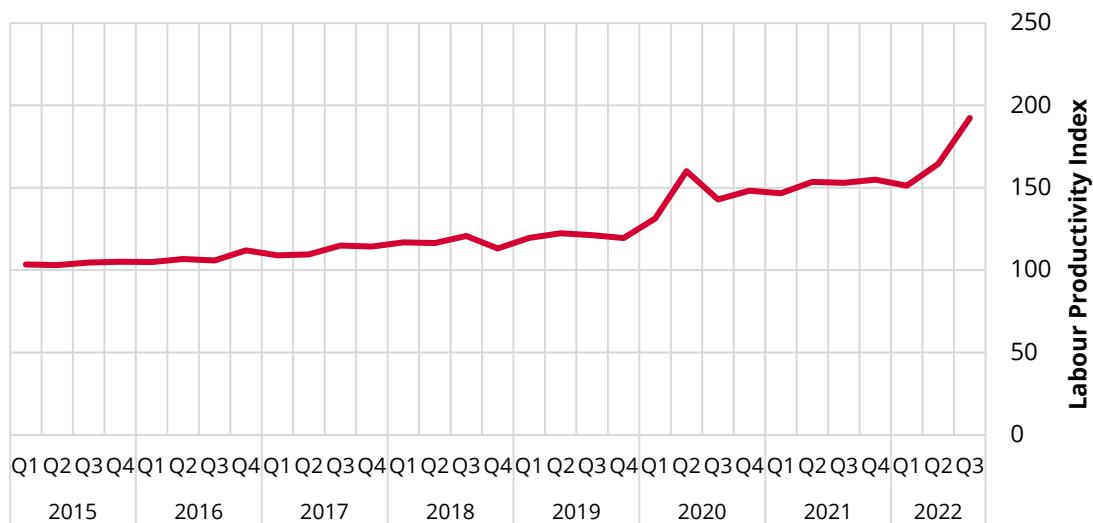
Wages play a major role in inflation through cost-push and demand-pull factors. During the pandemic, wage growth was slower compared with the pre-pandemic period in Türkiye. However, a substantial minimum wage hike for 2021 (by 21.6%) arising from the strong course of economic activity made us closely monitor the unit labour costs and its pass-through to inflation. Wage growth in Türkiye stayed below inflation between the last quarter of 2021 and the second quarter of 2022. On the other hand, in tandem with a 30% additional increase in the minimum wage in the second half of 2022, average real wages showed a significant jump in the third quarter of 2022. Increases in wages were accompanied by increases in working hours and labour productivity during the first nine months of 2022. According to the seasonally adjusted series, the labour productivity index increased by 24% in the third quarter of 2022, compared with the last quarter of 2021 (Graph 1).

The high rate of minimum wage increases and indexation of wages to past inflation is expected to lead wage rises in 2022 to higher levels than in the previous year. As a result of taking into account the impact of the increase in total wages (especially the minimum wage hike), labour market conditions and past inflation – no significant pressure on inflation is expected on the real unit labour costs front in 2023.

Labour productivity index

seasonally adjusted, 2003 = 100

Graph 1



Sources: Ministry of Labour and Social Security; CBRT.

How much slack is there in the labour market at the aggregate and sectoral levels, including differences between the formal and informal sectors? How even have wage increases been across industries or labour market segments?

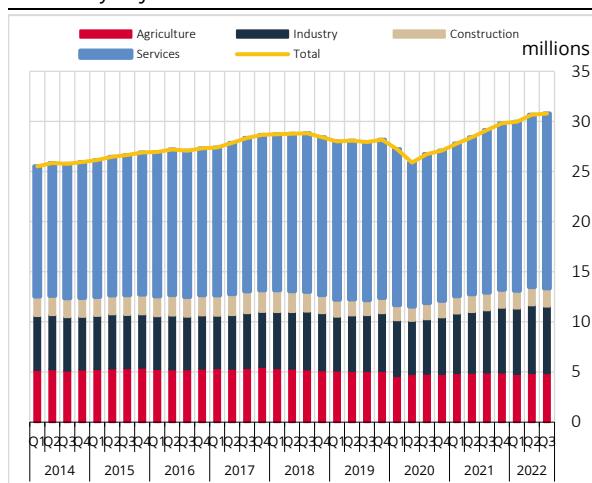
The outbreak of the pandemic adversely affected Türkiye's labour market. However, job retention policies helped to mitigate those effects. Türkiye has managed to increase its participation rate and employment ratio to levels seen before the pandemic. The services sector, constituting 56% of total employment, generated employment after the pandemic year and is currently at its highest level of employment historically. The reduced employment rate due to the Covid-19 pandemic recovered in the subsequent year. Türkiye created more than 3.6 million jobs between the first quarter of 2020 and the third quarter of 2022. Services and industry sectors constituted 1.9 million and 1.1 million jobs, respectively (Graph 2.A). Two million of the jobs created are held by males, however female employment has increased by 17.7% in this period, more than the 11% rise in male employment in this period (Graph 2.B).

Data show that hourly labour cost indices returned to their long-term trends. Despite increasing labour force participation, the unemployment rate is declining and a change in the potential rate of unemployment is not expected (Graph 3.A). Pre-pandemic slack measures are expected to be relevant to the Turkish economy.

Employment

Graph 2

A: Employment by sector
seasonally adjusted

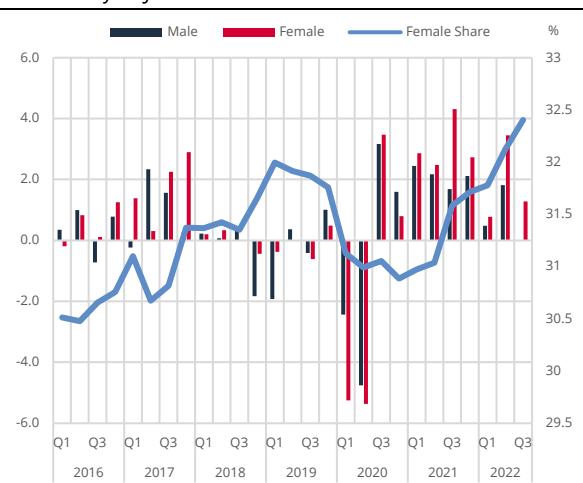


Last observation: Q3 2022.

¹ Quarterly change with respect to previous quarter.

Source: HLFS.

B: Change in employment by gender
seasonally adjusted¹



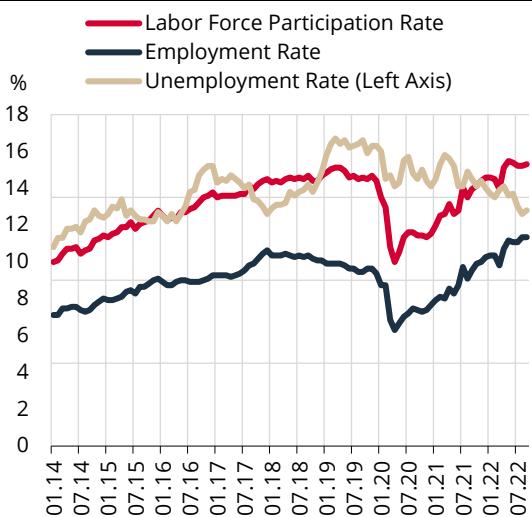
Despite a quick rebound in the labour market since the start of the recovery and a marked decline in unemployment rates, wage growth remains subdued, suggesting that there is still a considerable degree of labour market slack. The decline in real unit wages, which started in the last quarter of 2021, continues in 2022. In this period, both hours worked and value added increased. However, as nominal wage increases remained below inflation, real wages declined. In the first quarter of 2022, according

to seasonally adjusted series, total value added per hour worked increased by 9.5% compared with the previous quarter, while real wage payments decreased by 5.7%. On the other hand, in tandem with an additional increase of 30% in the minimum wage in the second half of 2022, average wages show a significant jump in the third quarter of 2022 (Graph 3.B).

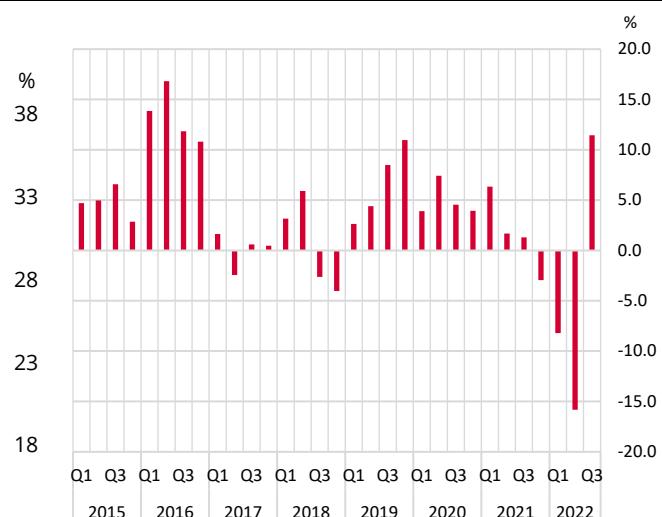
Labour force indicators and real wages

Graph 3

A: Labour market indicators
seasonally adjusted



B: Change in real wages
yoY, %¹



Last observation: Q3 2022.

¹ Based on daily insurable earnings.

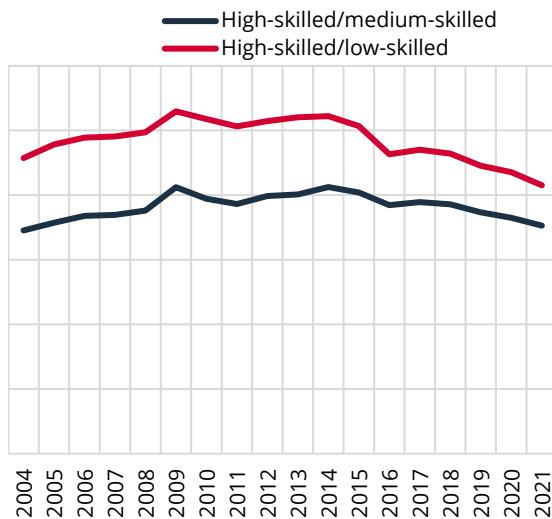
Source: HLFS.

There are significant wage gaps between male and female, highly-skilled and low-skilled, and formal and informal workers, as well as across workers in different sectors in Türkiye. However, in tandem with decreasing inequality in wages, wage gaps are closing over time. According to HLFS, Gini coefficient for net wages of salaried workers declined from 0.33 to 0.28 between 2004 and 2021. In particular, despite the increasing share of highly-skilled workers, wage gaps among high- and low-skilled salaried workers are decreasing over time (Graph 4.A). Similarly, sectoral average wages have become more equal in the same period (Graph 4.B).

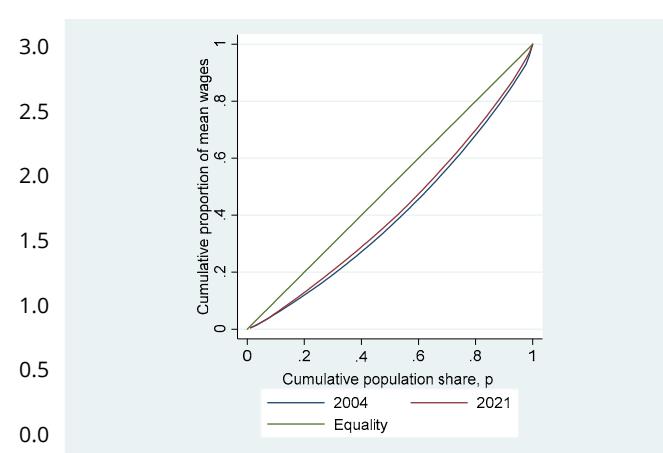
Wages

Graph 4

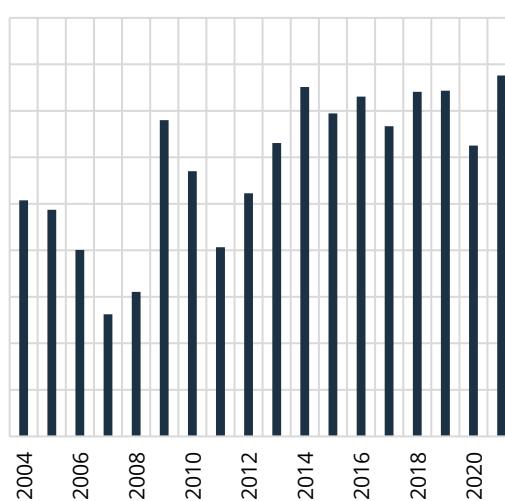
A: Ratio of average wages according to skill level¹



B: Lorenz curve for average wages by sector²



C: Ratio of average wages of formal to informal workers³



D: Ratio of average wages of male and female workers⁴



Last observation: 2021.

^{1, 2, 3, 4} Includes only salaried workers.

Sources: HLFS; CBRT calculations.

On the other hand, no improvements have been observed in closing wage gaps between formal and informal, and male and female workers over time (Graph 4.C and Graph 4.D). This mostly relates to increasing both the formality and participation of females in employment. According to HLFS, the informal employment rate among salaried workers declined from 32.1% in 2004 to 13.7% in 2021. In the same period, the female employment rate increased by 7.2 percentage points to 28%.

Inflation and labour markets: structural aspects.

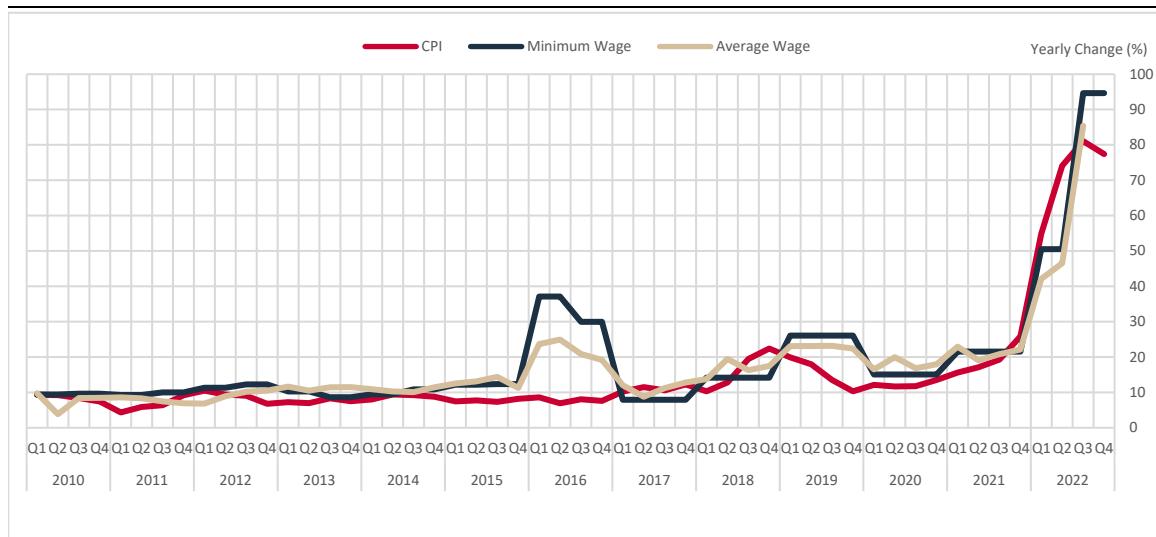
What are the key structural features of the labour market that influence wage formation and the inflation process? How have they evolved over time and why (eg policy reforms, globalisation)? Importantly, how far has the behaviour and history of inflation itself influenced those features?

While the wages or salaries in the public sector in Türkiye are determined by the collective bargaining which takes place once every two years, wages in the private sector are agreed in individual labour contracts between employees and employers. However, the minimum wage, which is very common among workers in Türkiye, has a role as a benchmark for all workers in the private sector, including informal workers. According to HLFS, 38% of full-time wage earners earned in the neighborhood of plus/minus 10% of the minimum wage in 2021.

Rates of increase of the salary of state officials and wages of public workers for two-year periods are specified in separate collective bargaining agreements. If the specified rates stay below inflation in one six-month period, the difference between inflation and the specified rate will be paid to the state officials and public workers in the following six-month period. This determination mechanism could cause the consumer price index to move together with changes in the wages of public workers.

Consumer price index, Minimum wage and Average wage

Graph 5



Last observation: Q4 2022.

Sources: TURKSTAT; MoLLS; SSI.

The minimum wage is determined by the Minimum Wage Determination Commission at meetings held in December every year. The representatives of workers, employers and the government participate in these meetings. In this way, the minimum wage is determined so that it will allow workers to live humanely. This situation has led the minimum wage to move together with the consumer price index. In addition, because the minimum wage is a benchmark wage indicator for non-minimum wage workers too, the wages of the other workers show a similar trend to

that of the minimum wage (Graph 5). This is why minimum wage increases, average wage increases determined by the individual labour contracts of private sector employees and collective bargaining agreements all follow similar trends to that of inflation.

What is the role of the informal sector in the labour market and what is its relationship to the formal sector (eg wage spillovers across the two sectors)?

Despite significant levels, informal employment is declining over time in Türkiye. During the period 2004–21, total employment increased by 9.2 million from 19.6 million to 28.8 million. In the same period, strong employment growth was accompanied by significant reductions in informal employment. The informal employment rate – the ratio of employed who are not registered for social security to total employed – declined by 21 percentage points from 50.1% in 2004 to 29% in 2021.

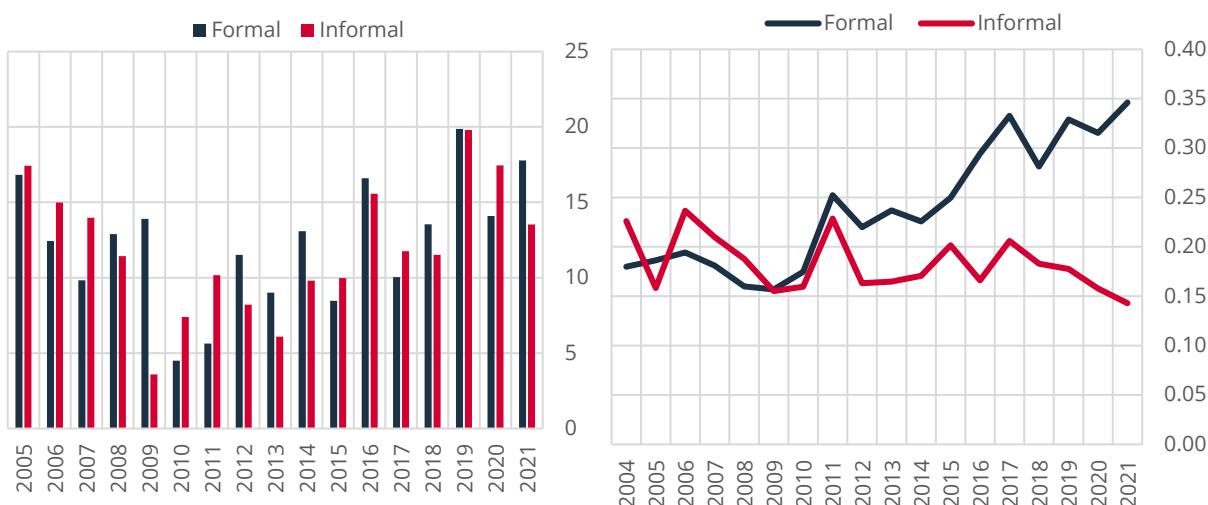
There are several factors contributing to the declining trends of the informal employment rate. The sectoral composition of employed people is one of them. Among agricultural workers, 80% –constituting one fifth of all employed people – are not formally employed. Within non-agricultural sectors, construction has the highest rates of informal employment. Agricultural dissolution shifting agricultural employment to services contributed significantly to the decline in informal employment during the period 2004–21.

Wages by formality

Graph 6

A: Change in average wages by formality¹

B: Share of minimum wage earners by formality²



Last observation: 2021.

^{1,2} Includes only salaried workers.

Sources: HLFS, CBRT calculations.

Informality is widespread in micro firms (those with between one and nine employees) and constitutes a significant share of total employment. In 2021, 54% of workers in micro firms were informal. A reduction in the share of micro firms, as well

as a decline in the informality of these firms, has significantly contributed to a decline in the total proportion of those informally employed. In particular, while 64.1% of workers were working in micro firms in 2004, this had dropped to 49.7% in 2021.

Informal employment is more common among women, youth and those with low levels of education. While a lack of experience leads individuals aged under 30 to work informally, those aged 50 and over prefer to work informally due to opportunities for early retirement. In addition, the increase in female labour force participation over time has caused the share of women in employment to increase. The fact that women, who have a greater tendency than men to work informally, are, over time, employed in greater numbers, has the effect of increasing the rate of unregistered employment. Informal employment is also common among those working in low-qualified occupations and among the self-employed. According to the ISCO08 skill level classification, 44.9% of those working in low-skilled jobs and 62% of self-employed people worked informally in 2021. This implies that an increase in the quality of the labour force and salaried working will play a role in reducing the unregistered employment rate.

Informal sector workers are earning less than formal sector workers. However, average wages are evolving similarly over time (Graph 6.A). In particular, the average annual growth rate of real wages of formal sector salaried workers is 2% between 2004–21, while this rate is 1.6% for informal sector salaried workers in the same period. On the other hand, rapid increases in minimum wages in recent years has increased the share of minimum wage earners in the formal sector (Graph 6.B). This might create disproportionate increases in informal sector wages in the wage distribution, compared with those in the formal sector.

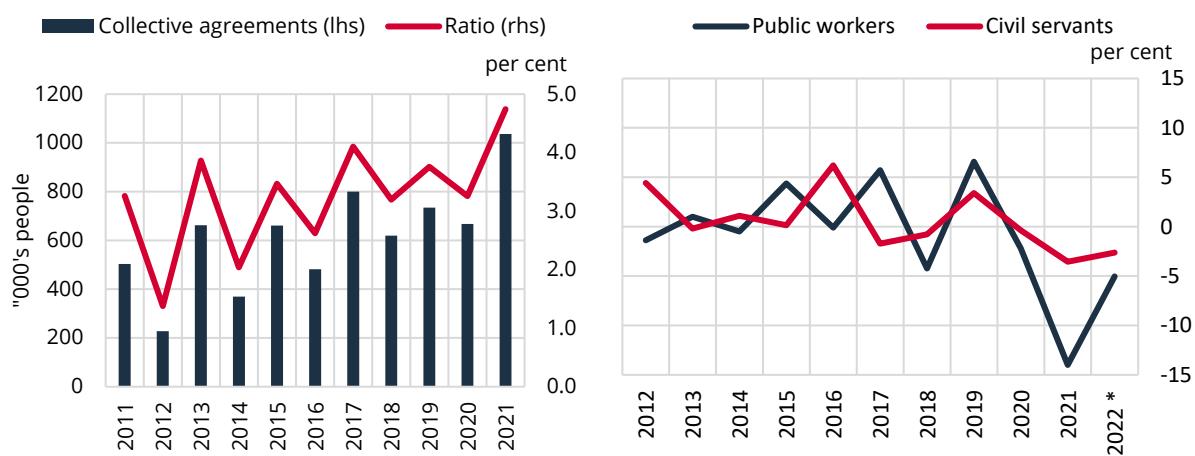
How centralised is the bargaining process? How has the nature of wage bargaining changed over time? Has centralisation helped or hindered inflation control?

The principles and procedures on collective labour agreements are based on Act No 6356 on Trade Unions and Collective Labour Agreements since 2012. A collective labour agreement shall contain provisions on the conclusion, contents and expiration of a contract of employment. Collective labour agreements may also contain other stipulations as to the mutual rights and obligations of the parties, application and supervision of the agreement and the means by which disputes may be settled.

Collective bargaining, public employees and real wages

Graph 7

A: Number of ratio of workers signed collective agreements¹ B: Change in real wage index²



Last observation: 2021.

Last observation: 2022.

¹ Ratio of workers signed collective agreements to registered workers.² CPI based.

Sources: Ministry of Labour and Social Security; SSI.

* Forecast

Sources: Presidency of Strategy and Budget.

Graph 7.A presents the number and ratio of workers signed collective agreements, based on the Law No 6356, between 2012 and 2021. According to the figures, the number of workers signed up to collective agreements is increasing over time. In particular, the number of workers signed up to collective agreements in 2021 was 1,036,006, which is almost five times the number of workers signed up to collective agreements in 2012. Similarly, the ratio of workers signed up to collective agreements among formal sector workers is increasing, but remains low at around 5% in 2021.

Wages of civil servants and civil servants' pensions are determined according to collective agreements in Türkiye. Changes in the net wages received by civil servants and public workers are presented in Graph 7.B. According to Graph 7.B, net wages received by civil servants and public workers change in line with CPI over time, except in 2021. According to the provisions of the collective agreement with public servants, the wages and pensions of civil servants will increase 8% in January 2023, and by an additional 6% in July 2023.

How important are implicit and explicit wage indexation mechanisms? Have these changed over time? Has policy deliberately tried to reduce them?

In Türkiye, wage formation mostly takes account of inflationary movements. During collective bargaining, representatives of labour unions, the employer's union and government try to refer to the consumer price index yearly change when determining wages and salaries. In addition, the minimum wage, as the benchmark for other wages, also historically moves with inflation. Therefore, these situations may lead wages to move together with the consumer price index.

Yavuz and Coşar (2019) found that the great share of salaried employees earn approximately the minimum wage and consumer price index increases were anchors for private sector workers' wage increases. They also indicated that this situation limited the sensitivity of wages to business cycles and fed the rigidity of wage inflation. Another source of wage indexation is collective bargaining. According to the same blog, while undertaking collective bargaining, it was seen that indexation to past inflation was apparent in wage increases. The institutional set up for wage determination and the high level of inflation contributed to the fact that wage movements were linked to inflation.

What is the role of minimum wages or other salaries determined by the government? More generally, what role does the public sector play in the economy-wide wage bargaining process?

The minimum wage set by the Minimum Wage Determination Commission is an important reference point for collective bargaining both in the public and private sectors in Türkiye. Its level is intensely debated and is used by the government as a reference point for various social transfers.

The tripartite Minimum Wage Determination Commission has set the minimum wage at least every two years since 1951 in Türkiye. Due to high inflation rates, from 1997 to 2015 the Commission determined the minimum wage twice a year, but this has taken place annually since 2016 (apart from in 2022).

The regulations on the minimum wage assert that the Commission should take the social and economic conditions of the country, living condition indices for salaried workers, actual wages and average living standards into account when determining the minimum wage. Article 5 of the regulation forbids discrimination based on mother tongue, race, colour, sex, disability, political opinion, philosophical belief, religion and similar reasons. Accordingly, the Commission sets the minimum wage level based on three main pillars: daily calorie needs of workers, cost of living indices and food inflation. Moreover, the Commission tracks other developments in the country and global economic trends.

How important is domestic and cross-border inward and outward migration in explaining labour market and wage dynamics?

Migration has several impacts on the economy in terms of labour market outcomes, prices, firm performance, consumption, production etc. The labour market situation of both native and migrant populations could change as a result of migration. However, the impact of migration could differentiate according to the average educational and skill level of the migrant population. Not only do migrant people complement some parts of the native society's skills, but they also substitute other parts of the society's skills. That is why the impact of migration on native people could be heterogeneous. Türkiye has experienced internal and external migration during its history. Some studies have investigated the impact of migration on labour market outcomes in Türkiye.

Berker (2011) investigated the causal impact of internal migration on the labour market outcomes of native urban male workers between 1990 and 2000. According to this study, labour market outcomes worsened for native males located in provinces with a significant rise of migrant inflows. The negative impact of migration was found

to be pronounced among the older population with the highest educational qualifications in his study. Therefore, we can infer that inward migration may be an important factor worsening labour market outcomes for native workers.

In addition to internal migration, Türkiye experienced a huge refugee influx from Syria due to the conflict that started in this country in 2011. This has caused several labour market indicators to be affected. Balkan Konuk and Tümen (2016) found that the impact of Syrian refugees on regional inflation was a 2.5% decrease for the period between 2010 and 2014. They detected that price declines occurred through the informal labour market. Syrian refugees enabled employers to substitute informal workers with a cheaper labour force and price reduction was seen due to substitution in the informal labour market. Ceritoğlu et al (2017) investigated the same refugee influx on labour market outcomes in Türkiye. They observed that employment losses realised in the informal labour market and formal employment slightly increased after the migration. The impact of this movement on wages became negligible. Whereas formality and unemployment rates increased, labour force participation, the informal employment rate and job finding rates fell among the native population. Disadvantaged groups such as women, the young and the less educated, were affected more negatively from such an inflow of refugees. Akgündüz and Torun (2020) examined the impact of the same issue on tasks and capital intensity. Their results indicated that refugee inflow increased the natives' task complexity, reduced the intensity of their manual tasks and increased the intensity of their abstract tasks. Akgündüz et al. (2023) examined the consequences of Syrian refugee inflow to Türkiye in the firm performance and market structure of Türkiye. According to this study, existing Turkish firms expanded and new firms were created as a result of Syrian refugee inflow. However, newly created firms were more likely to be small and market structure became less concentrated. Another finding indicated that exports rose as a result of increasing competition.

In accordance with the literature, we can say that inward migration could negatively affect labour market outcomes such as employment rate and labour force participation. Besides, it can decrease inflation due to decreased labour costs. Thirdly, while the informality rate could decrease as a result of the arrival of migrants, it could increase the formality and unemployment rates. In addition to that, migrants could alter the tasks and capital intensity of native workers. The native workers could improve their task complexity and reduce the intensity of manual tasks in their jobs as a result of migrant inflow, but this is also dependent on the skill and educational level of the migrant population. If the migrant people were more skilled and educated people, the results would have been different. Lastly, firm performance and market characteristics could change in response to migrants. The Syrian case made Turkish firms grow and the number of Turkish firms increase. However, new firms are more likely to be small.

Do you expect the pandemic to have long-lasting effects on the labour market and, through this, on the inflation process (eg labour supply, technology/automation etc)?

Due to the pandemic, job retention schemes were extended to save jobs and protect households against income losses. Termination of job contracts was prohibited until June 2021. Employers were allowed to give their workers unpaid leave. The employees on unpaid leave were also provided daily cash benefits. Eligibility requirements for

the short-time work allowance (STWA) were eased and the duration of STWA was extended by one year. On average, 4.2 million people benefited from job retention schemes, which corresponds to 28.6% of formal employees, during the pandemic. This rate is slightly above the job retention rate in OECD countries, on average. These policies prevented job losses and contributed to the strong labour market recovery afterwards.

How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglobalisation) to affect labour markets, wages and inflation?

Türkiye has a relatively young demographic structure in comparison with the OECD countries. The share of those aged 15–24 in the total population is 15.4% which is the fifth highest ratio among OECD member countries. However, Türkiye's population is also growing older, as in other countries. The share of those aged 15–24 in the total population was 17.1% in 2010. Despite this fall, Türkiye has one of the most dynamic population structures. Education and investment policies will enhance the potential growth of Türkiye. Additionally, a well educated young population will have a greater tendency to be interested in technical innovation, automation and digital skills. These are expected to increase the job opportunities in the world and create productivity gains. Nevertheless, because automation requires less labour, it may increase unemployment, especially for low skilled workers. Improving skills among the population is expected to mitigate this effect of automation.

Use of labour market indicators in the policy process.

What are the key labour market indicators that your central bank monitors? How is this information presented to the policy board?

In Türkiye, monetary policy decisions are taken by the Monetary Policy Committee (MPC) at pre-scheduled meetings. During the meetings, the MPC is informed about labour market conditions as well as the macroeconomic outlook and monetary policy developments. In particular, main labour market indicators such as employment and unemployment rates, average wages, informal employment and sectoral employment are monitored. In addition to regular monitoring of labour market indicators, changes in labour market policy are raised during the meetings. Potential impacts of these policies are discussed based on econometric analyses.

We also incorporate real sector developments into its decision-making at an increasing rate in order to diversify its information base for monetary policy. In this regard, executives of 1,781 firms, of which 838 were manufacturers, were visited in 2022 (between January and November). These meetings make it possible to obtain first-hand information on economic activities and the decision-making mechanisms of individual firms, and capture real sector sentiment towards the economy in real time. Information obtained from these meetings helps decision-makers to make better assessments about cyclical economic activity (production and sales, investment, employment, borrowing conditions, prices and costs). These visits aim to establish effective communication with representatives of the real sector, exchange views on monetary policy practices and thus contribute to our communication policy.

How do labour market indicators and other economic models presented at policy briefings enter forecasting? Has this changed in recent years? Does this depend on the level of inflation?

In our current models, an inverse relationship between the unemployment gap and the output gap is defined in line with Okun's Law. To associate the changes in wages with the unemployment gap, a Phillips curve is defined that captures the backward indexation behaviour of wages. Also, the domestic real marginal cost variable is defined to include the deviation of real wages from its trend.

In our macroeconometric model that is currently being developed, we enhance the supply side of the economy to include additional labour market dynamics. For this purpose, a labour demand function is defined to include the real minimum wage and economic activity. Then, the labour demand obtained from this function enters into a Cobb-Douglas type production function as a factor of production, along with capital. Finally, the supply side and demand side forecasts for economic activity affect the dynamics of inflation. We continue to work on enhancing the labour market block in the macroeconometric model to capture the dynamics of potential labour, actual labour and employment.

How important are disaggregated data in analysing labour markets and what role do they play in the policy process?

In order to restrain the effectiveness of monetary policy, we valued research activities not only at the macro level but also at the micro level. Various data sources, from household labour force surveys to firm balance sheets, are used in analysing labour market developments by CBRT staff.

Do you refer to labour market indicators in communicating monetary policy? If so, to which ones?

Yes. We use several labour market indicators in the inflation report and for internal use only, and take them into account when implementing monetary policy. These indicators are:

- employment rate;
- unemployment rate;
- labour force participation rate;
- wage indicators such as average wage and minimum wage etc;
- total employment;
- sectoral employment;
- unregistered employment;
- job vacancy rates;
- average hours worked per worker;
- distribution of wage increases;
- rate of wage indexation;
- outcomes of collective agreements;

- unit labour costs; and
- employment components of PMI.

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Monetary policy and banking activities management measures to support labour market development

The State Bank of Vietnam

General assessment of Vietnam's labour market

Labour is an important input to the production process along with capital and total factor productivity (TPF). High-quality labour is a decisive factor in improving labour productivity, economic growth and the development level of each country. As for central banks, labour market indicators are one of the important bases of monetary policy decision-making. For the labour market to develop in balance with other markets, central banks need to focus on aspects revolving around workers as the core target with a view to: (i) stabilising the economy, creating a favourable environment for production and business activities, developing the economy, creating more jobs, increasing labour demand, expanding the labour market, and controlling inflation at a reasonable level and in line with wages; (ii) training, improving skills for employees, improving labour quality and social labour productivity; and (iii) taking care of workers' lives, creating a safe living environment and motivating employees to work harder.

According to the 2021 Statistical Yearbook, the total population of Vietnam in 2021 was 98.5 million people; in which the labour force size (including people aged 15 and over) had reached 50.56 million; and the number of employed workers had reached 49.07 million people. Over the past two years, due to the impact of the Covid-19 pandemic, the labour market has been adversely affected as follows: (i) the employed labour force in 2021 decreased by 4.5 million people compared with 2020, and by 5.59 million people compared with 2019; (ii) there has been a large movement of workers from urban to rural areas and from major economic centres to the provinces, and a change in the structure of employment such that labour forces decreased in the industrial and services sectors, and increased in the agricultural sector; and (iii) the underemployment and unemployment rates have risen, wages and incomes have decreased, and workers' have faced many difficulties.

At present, the labour market has tended to recover but has not yet returned to pre-pandemic levels. The number of employed workers reached 50.5 million in the third quarter of 2022, higher than the 2021 level (49.07 million) but remained considerably lower than the 2019 level (54.66 million).

Solutions for managing monetary policy and banking activities to support and develop the labour market

In order to support and develop the labour market, in recent years, the State Bank of Vietnam (SBV) has consistently managed monetary policy to achieve the goals of inflation control and macroeconomic stability. It has contributed to creating a stable

macroeconomic environment to facilitate the expansion of production and other business activities by enterprises, and the creation of jobs. The SBV has implemented programmes and policies to support, train and improve skills for workers, and to support those experiencing difficulties in the complex context of the Covid-19 pandemic.

First, the SBV managed monetary policy in a proactive, flexible and cautious manner, and in close coordination with fiscal and other macroeconomic policies. This was with the objectives of achieving macroeconomic stability, inflation control and economic growth support, and thereby expanding the labour market. In particular, the SBV: (i) reduced interest rates in 2020, and stabilised them from 2021 and throughout the first nine months of 2022 in the context of huge pressure on Vietnam to hike interest rates in 2022 both domestically and internationally (there were a total of 308 interest rate hikes by central banks globally); (ii) managed the exchange rate policy in a flexible manner, in line with market movements to ensure the macroeconomic stability; (iii) ensured safe and effective credit extension along with credit quality improvement, thus supporting capital for production and business activities – as of 31 October 2022, credit had increased by 11.62% in the year to date¹ (in 2021 it increased 8.72% year to date). Besides, in order to mitigate the impact of Covid -19, debt restructuring, interest rate exemptions and reductions without changing debt categories for businesses and households were introduced. As of end-September 2022, the accumulated amount of debt restructured without changing debt categories was VND 722,447 billion from 1,090,733 customers, and the outstanding balance was VND 95,184 billion. Further, the accumulated amount of interest rate and fee exemption and reduction, without changing debt categories, reached VND 92,425 billion from 561,989 customers – the outstanding balance was VND 14,733 billion.

As a result, the economy recovered and economic growth in the first nine months of 2022 reached 8.83%, the highest increase for nine months between 2011 and 2022. The growth rate in the third quarter alone was 13.67%. In the first ten months of 2022, there were 125,800 newly registered businesses – a 34.3% increase in the number of businesses and an 18% increase in the number of employees, year on year. These data show that the labour market has expanded compared with the previous period, along with the recovery of the economy.

Second, the consistent implementation of monetary policy management solutions to inflation control has contributed to the economy's low and stable inflation in recent years, supporting the living standards of workers, and minimising pressure to increase wages due to the impact of rising commodity prices and the cost of living for workers. The consumer price index average in the past four years has been below the 4% target assigned by the National Assembly. In the first ten months of 2022, it increased by 2.89% amid rising commodity prices and soaring inflation in many countries, which was a clear indicator of positive results for the monetary policy management solutions of the SBV.

Third, the Vietnam Bank for Social Policy (VBSP) has implemented many lending programmes to support job creation, improve workers' skills and buy social housing.

¹ In which, VND credit increased by 12.26% year to date and foreign currency credit increased by 0.66% year to date.

These include a lending programme for employees participating in labour exporting, creating more jobs for Vietnamese workers in the foreign labour market. As of 30 September 2022, the total outstanding loans for labour export (to support workers to improve their skills and foreign languages) reached VND 740.2 billion, with more than 13,600 customers with outstanding debt. There is also a student lending programme that has been active since its initial implementation in 2007, helping students to cover tuition fees and living expenses, support training, improve skills and improve labour quality. As of 30 September 2022, the total outstanding loan amount was approximately VND 9,878.7 billion with 259,844 students benefitting. The outstanding balance in respect of lending for the purpose of creating jobs stood at VND 54,073.1 billion, as of 30 September 2022, with nearly 1.21 million customers. Meanwhile, social housing lending with a preferential interest rate of 4.8% per annum – in accordance with Decree 100/2015 – supports workers with houses. As of 30 September 2022, the outstanding balance in respect of this programme had reached VND 9,147.1 billion, with almost 25,700 customers.

Solutions contributed to stabilising and developing the labour market, supporting rapid and sustainable economic recovery and development

First, continuing to protect people's health has been a primary concern. Measures included maintaining a high vaccination rate to prevent new variants of the Covid-19 pandemic and always being on guard against other diseases. Authorities have also implemented solutions to improve the welfare of workers, – especially in metropolises, industrial zones and export processing zones – in order to limit the number of workers fleeing big cities. This has avoided a labour shortage in the formal sector that would have put pressure on businesses.

Second, a focus on supporting and creating jobs for employees has yielded results. Policies to improve training and sustainable labour development have improved skills and labour productivity. Meanwhile, policies to incentivise work and productivity have been implemented (including improved salaries, bonuses and changes to office cultures). And there has been an increase in labour market connectivity through "job exchanges" in the public sector.

Third, with regard to long-term solutions, it is necessary to have a strategy for the education and training of workers at all levels of education. It is also important to pay attention to the healthcare of mothers and children, combined with improving nutrition, in order to create a future generations of workers possessed of good health, physical strength and high-quality skills to improve and enhance labour productivity for rapid and sustainable development.

Fourth, regarding monetary policy and banking activities, there are several areas of focus. These include continuing to manage monetary policy tools in a cautious, flexible and uniform manner, and in coordination with fiscal and other macroeconomic policies. The goals of monetary and banking activities include macroeconomic stabilisation, inflation control, creating a favourable business environment for people and enterprises, helping to expand the labour market,

improving jobs and ensuring a good quality of life for workers. The SBV, together with the system of credit institutions, continues to implement solutions to support the labour market according to the government's programmes.

In Vietnam, in the context that labour as well as other markets has not fully developed, the market structure has not been synchronised enough; there have remained limitations in the labour statistics that do not have full reflection of other macroeconomic developments and balances. Therefore, the application of labour market indicators to monetary policy decision-making, despite being considered by the SBV, has not yet been implemented.

Survey responses

Question 1 (part 1)

Table 1

Have average wages risen more or less than headline inflation in 2022? Are they expected to rise by more or less in 2023?		Has the minimum wage risen more or less than headline inflation in 2022? Is it expected to rise by more or less in 2023?		
	2022 (latest year-over-year)	2023 (expected)	2022 (latest year-over-year)	2023 (expected)
Argentina	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	between 1 and 3 pp above CPI inflation	between 1 and 3 pp above CPI inflation
Brazil	more than 3 pp above CPI inflation	between 1 and 3 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	between 1 and 3 pp above CPI inflation
Chile	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	more than 3 pp above CPI inflation	more than 3 pp above CPI inflation
China	between 1 and 3 pp above CPI inflation	more than 3 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation
Colombia	between 1 pp below and 1 pp above CPI inflation	not applicable	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation
Czech Republic	more than 3 pp below CPI inflation	between 1 and 3 pp below CPI inflation	more than 3 pp below CPI inflation	more than 3 pp below CPI inflation
Hong Kong	between 1 pp below and 1 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	not applicable	more than 3 pp above CPI inflation
Hungary	more than 3 pp above CPI inflation	more than 3 pp below CPI inflation	more than 3 pp above CPI inflation	more than 3 pp below CPI inflation
India	between 1 and 3 pp below CPI inflation	not applicable	between 1 and 3 pp below CPI inflation	not applicable
Indonesia	more than 3 pp below CPI inflation	not applicable	more than 3 pp below CPI inflation	not applicable
Israel	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	more than 3 pp below CPI inflation	more than 3 pp above CPI inflation
Korea	between 1 pp below and 1 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	between 1 and 3 pp above CPI inflation
Malaysia	between 1 and 3 pp below CPI inflation	between 1 and 3 pp below CPI inflation	more than 3 pp above CPI inflation	not applicable
Peru	more than 3 pp below CPI inflation	more than 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation
Philippines	not applicable	not applicable	between 1 and 3 pp below CPI inflation	between 1 pp below and 1 pp above CPI inflation
Poland	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation
South Africa	between 1 and 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	between 1 pp below and 1 pp above CPI inflation	between 1 and 3 pp below CPI inflation

Question 1 (part 1)

Table 1

Thailand	more than 3 pp below CPI inflation	between 1 and 3 pp above CPI inflation	between 1 and 3 pp below CPI inflation	not applicable
Türkiye	more than 3 pp below CPI inflation	not applicable	more than 3 pp above CPI inflation	not applicable
Vietnam	more than 3 pp above CPI inflation	more than 3 pp above CPI inflation	between 1 and 3 pp above CPI inflation	more than 3 pp below CPI inflation

Source: EMDGM 2023 Questionnaire

Question 1 (part 2)

Table 2

How high is the risk of a wage-price spiral?			Use the space below if you want to add any qualification or comment on the above responses:
Argentina	high	Last estimations point to a real decrease in real wages of around 7% YoY. in December. Unions are expected to negotiate higher real wages in the first semester of 2023. This negotiation will be frequently updated considering the evolution of the CPI in the last months of 2022 and at the beginning of 2023. The government is making some agreements with the main private sector enterprises to assure low growth of the prices of retail food and basic products commonly used by the households.	
Brazil	low	Measures of real wages (usually received or effectively received) according to the National Household Services are increasing more than 5% in YoY terms in Sep/22. However, it is important to note that current levels of real wages are still below the pre-pandemic level. The strong YoY increase in real wages in Sep/22 reflects the base effects in 2021 due to the relevant surprise inflation in consequence of supply shocks. We expect the real wages (effectively received) to decrease -0.6% in 2022 considering the average level in the whole year and to increase around 1% next year. Regarding the minimum wage, in recent years in Brazil it has been readjusted in January. Therefore, the answer reflects that in Jan/22 the minimum wage has increased by the same amount that the CPI in 2021 (Dec21/Dec20). For 2023, the government recently elected has been proposing a real increase slightly higher than 1%.	
Chile	average	Real wages have continued to decline given the recomposition of the labour supply after the covid restrictions and the significant increase in inflation. The fall in real wages is the steepest in more than two decades, amid historically high variations in nominal wages. This is consistent with the information gathered from business surveys. Although companies perceive an increase in their labour costs, in general, nominal wage increases are below the CPI growth and have become less frequent. Except for mining, this evolution of real income is transversal to most sectors, among which the sharp drop in construction and communal services stands out. By occupational group, the most significant declines have occurred in the higher-paid jobs (September 2022, Monetary Policy Report, p. 18).	
China	very low	China's economy is relatively dynamic, with economic growth generally maintaining a stable and rapid level, and households' wage income has been growing relatively fast at over 8% before the outbreak of the pandemic. Affected by the Covid-19 pandemic, China's CPI in 2022 rose by 2% over the previous year, and the wage income in the per capita disposable income increased by 4.9% over the previous year, 2.9 percentage points higher than the CPI growth. There are some disparities in China's regional development and the minimum wage standard varies from province to province. The average national minimum wage increased by 2.6% in 2022. China attaches great importance to protecting the livelihoods of low-income groups and other disadvantaged groups, and to guaranteeing the basic living needs of the people. China's average subsistence allowance increased by 5.6% in the first three quarters of 2022. It should be noted that as China's economy is recovering, the lack of effective demand is still the main issue. The industrial and supply chains operate smoothly, and the supply is adequate. The price level has remained stable and households' inflation expectations have been well anchored. There are favorable conditions to maintain the basic stability of prices. The real growth rate of households' disposable income is basically in line with economic growth, and the risk of "wage-price" spiral is relatively low.	
Colombia	average	Nominal wages for the salaried segment of the labour market have risen by 12% during the last year, partially offsetting the observed inflation (11.4% in September 2022). Thus, real wages have remained quite stable. It is worth to say that in the case of the non-salaried workforce, a segment that represents around of 53% of total employment, the nominal adjustments in their labour income have been stronger: currently their real labour income is growing at annual rates around 10%. Part of this large increase is related to a low base of comparison in 2021 due to the effect of the pandemic on this segment. Regarding the minimum wage (MW), its increase for 2022 was 10.07%, which implies that real MW shrank by 1,3 percentage points (pp) throughout the year. The 2023 scenario remains uncertain; nevertheless, in Colombia, the MW adjustment has as floor the observed inflation in the last year, and usually the rise incorporates an additional adjustment due to productivity growth. For such reason, nominal MW is expected to grow by, at least, 11% for the coming year. Given the high incidence of MW on wages, increases of such magnitudes are a cause of concern."	

Question 1 (part 2)

Table 2

How high is the risk of a wage-price spiral?		Use the space below if you want to add any qualification or comment on the above responses:
Czech Republic	average	<p>The wage growth in the Czech Republic has risen over the last year but it has been falling behind the inflation greatly. There are however several significant risks of future wage development. First comes from overall status of the Czech Labour market, which has been cooled down only moderately after the pandemic and the energy crisis hasn't hit it as deeply as expected, despite the fact of Ukrainian refugees' inflow during 2022. The unemployment rate is keeping its extremely low levels (lowest in the EU). There are signals of persistent demand for labour by employers (leading indicators show hiring intentions, there is still almost as many vacancies as unemployed people). Another warning signal may be still robust and gradually further accelerating wage growth over the last year in business sector (2022Q1: 8.1%, 2022Q2: 4.4%, 2022Q3: 7.3%, 2022Q4: 8.9%), industry (1Q2022: 6.9%; 2Q2022: 7.9%; 3Q2022: 7.7%; 4Q2022: 9.4%; January 2023: 11.9%) and construction (1Q2022: 6.7%; 2Q2022: 7.9%; 3Q2022: 8.6%; 4Q2022: 9.0%; January 2023: 14.9%). Also, wage payments for January and February 2023 point to a further acceleration of overall wage growth to 10%.</p>
Hong Kong	low	<p>For the expected 2023 headline inflation rate, we adopt the latest market Consensus Forecasts, which average 2.1%. Regarding the minimum wage, the statutory rate is subject to a two-year review cycle and the current level is HK\$37.5 per hour, which hasn't changed since the last revision effective 1 May 2019 (and hence ""not applicable"" above). Recently, the Minimum Wage Commission has proposed raising the statutory minimum wage in Hong Kong from HK\$37.5 to HK\$40 per hour. The 6.7 percent increase is expected to come into force in May 2023 upon the Government's approval and is higher than the expected headline inflation rate of 2.1% by the market. Note: Headline inflation rate in Hong Kong could be quite volatile due to the effects of Hong Kong Government's one-off relief measures (eg public housing rental waiver, electricity charges allowance). As such, one can also refer to the official underlying inflation rate, which nets out the impact of these relief measures, for the trend of price changes.</p>
Hungary	low	<p>There is no sign of a wage-price spiral in Hungary yet, which is confirmed by the largest HR services companies. Wage dynamics are high because of the one-off effect of the huge minimum wage increase in the beginning of the year and the historically tight labour market. Wage dynamics are expected to slow down next year.</p>
India	low	<p>The data on wages in India relate to average rural wages for men for all-India covering all the agricultural and non-agricultural occupations released by the Labour Bureau, Government of India. Comparison of rural wage inflation with CPI Rural inflation has been considered above.</p> <p>References:</p> <ol style="list-style-type: none"> 1. Reserve Bank of India, Monetary Policy Report, September 2022 (Box II.2. ""An Examination of the Rural Prices and Wages Dynamics in India.""). 2. Kundu, S. (2019). Rural wage dynamics in India: What role does inflation play. RBI Occasional Paper, 40, 51-84.
Indonesia	low	<p>Average wages rise in Feb'22: 1,12%. Average minimum wages rise 2022: 1,09%. 2022 Inflation (as of Oct'22): 5,71%.</p>
Israel	average	<p>Inflation does not seem to be a major factor in the labour market as of yet, provided that it will be contained at the current level and decelerate in 2023. The risk is that the formation of a new government, against the backdrop of a strong fiscal position and the lag of wages in the public sector relative to the business sector- due to temporary institutional factors - will result in substantial public sector wage increases that will ignite a wage spiral. A significant minimum wage increase is also expected in the beginning of 2023, unless the default legislative mechanism is adapted.</p>
Korea	low	<p>For 2022, we utilised YTD average for CPI inflation (January to September, CPI inflation averaged 3.3%), and average wages for the private sector (1Q-3Q average growth: 2.9% per worker). Data covers the Services and Manufacturing sectors (3Q 2022: 3.5% and 1.9% respectively). For 2023, we utilised the mid-point forecast range for CPI inflation from the Ministry of Finance: 2.8-3.3%. Average wage outlook are internal projections.</p>
Malaysia	low	<p>For 2022, we utilised YTD average for CPI inflation (January to September, CPI inflation averaged 3.3%), and average wages for the private sector (1Q-3Q average growth: 2.9% per worker). Data covers the Services and Manufacturing sectors (3Q 2022: 3.5% and 1.9% respectively). For 2023, we utilised the mid-point forecast range for CPI inflation from the Ministry of Finance: 2.8-3.3%. Average wage outlook are internal projections.</p>

Question 1 (part 2)

Table 2

How high is the risk of a wage-price spiral?			Use the space below if you want to add any qualification or comment on the above responses:
Peru	very low	Annual inflation to October was 8.28 percent, mainly in the food group (11.3 percent). This increase in inflation has mainly affected households in the lowest income quintiles, which dedicate a larger proportion of their income to spending on food. At the same time, this group of the population mainly registers for informal jobs and does not benefit from the increase in the minimum wage.	
Philippines	low	<p>The risk of a wage-price spiral is low for the Philippines given that inflation expectations remained firmly within target in the medium-term. At the same time, regulation on annual wage adjustment will help prevent wage-price spiral. While the average regional wage increases in 2022 was higher-than-expected, the last wage adjustment took place in 2020 for most of the regions.</p> <p>The estimated national minimum wage increased by 13.1 percent in 2022. January to September 2022 headline inflation rose to 5.1 percent. The BSP's latest inflation forecasts of 5.6 percent for 2022, 4.1 percent for 2023 and 3.0 percent for 2024 incorporate adjustments in minimum wage that are consistent with the country's labour productivity growth and historical wage increases.</p> <p>Other factors that contain the risk of a wage-price spiral include the underlying shocks to inflation that mostly originate outside of the labour market, falling real wages, and aggressively tightening monetary policy. In the case of the Philippines, the BSP raised its policy rate to 4.25 percent or by 225 bps since May 2022. The policy actions are expected to contain domestic inflation pressures and manage inflation expectations.</p>	
Poland	low	<p>The latest year over year growth in the average nominal wage was 3.6% in the 2022Q2, while average CPI inflation was 6.6% year on year in 2022Q2.</p> <p>Expected wage inflation is 6.7% in 2023, whereas CPI inflation is expected to be 5.3%.</p> <p>In 2022 the minimum wage increased by 6.9% year on year, while CPI inflation is expected to be 6.5%.</p> <p>The minimum wage is a recent development in the South African labour market, with its enactment into law having come into effect in 2019, so it is still too early to determine whether a strong relationship exists between CPI inflation and the minimum wage.</p>	
South Africa	low	<p>The conditions that have driven concerns of a wage-price spiral in the US and parts of Europe such as an elevated number of vacancies relative to job seekers and significantly higher wage growth as a result of the labour market tightness are not of much concern in the South African labour market, which experiences considerable slack in low-skilled work and relative tightness in high-skilled work. The nuances in the South African labour market are such that wage increases are determined more by labour union strength than they are by tightness or slackness particularly in the public sector, mining and manufacturing. In addition to this, the drivers of inflation are from outside the labour market (food and fuel being most influential), real wages are actually declining which is helping to reduce price pressures, and the SARB is on progressive monetary policy tightening. These factors should minimize the probability of a wage-price spiral unfolding in the near and medium-term.</p>	
Thailand	low	<p>The risk of a wage-price spiral is expected to be minimal due to low share of wage earners, flexibility of labour market and weak labour market institutions. During the first three quarters of 2022, headline inflation had averaged 6.2 %YoY and wage growth was 2.1 %YoY. However, in Q4 of 2022 minimum wage has increased at 5%, resulting in the continued wage growth in the following year. In 2023, wage growth will also be higher than headline inflation, which is expected to decrease to 2.6% due to falling global oil prices and gradual easing of supply chain bottlenecks.</p>	
Türkiye	average	<p>The decline in real unit wages, which started in the last quarter of 2021, continues in 2022. In this period, both hours worked and value added increased. However, as nominal wage increases remained below inflation, real wages declined. In the first quarter of 2022, according to seasonally adjusted series, total value added per hour worked increased by 9.5% compared to the previous quarter, while real wage payments decreased by 5.7%. On the other hand, in tandem with 30% additional increase in minimum wage in the second half of 2022, average wages show a moderate increase in real terms in July 2022.</p>	
Vietnam	high		

Source: EMDGM 2023 Questionnaire

Question 2

Table 2

What is your current assessment of the labour market in your country, overall and by segment?							Use the space below if you want to add any qualification or comment on the above responses:
	overall labour market	agricultural sector	manufacturing sector	service sector	for high-skill workers	for low-skill workers	
Argentina	strong	weak	strong	neutral	strong	neutral	<p>The real wage has recently shown a very flexible development, encouraging a strong expansion of the employment level. Most of the employment creation was focused in the informal sector, and low skilled workers. The main sectors of economic activity (manufacturing, trade and construction) are already in high levels of employment, while services producers' employment levels are near the pre-pandemic levels.</p> <p>Our assessment is presented only for the overall labour market. Currently the unemployment rate is below the historical average (since 1999, using data from more than one survey). The employment level (ratio between the number of employed people and working age population) is above historical averages. Other indicators point in the same direction (see boxes in the recent editions of the Inflation Report: https://www.bcb.gov.br/content/ri/inflationreport/202209/ri202209b9i.pdf and https://www.bcb.gov.br/content/ri/inflationreport/202203/ri202203b4i.pdf). Despite a strong labour market, real wages remain below pre-pandemic levels (but are increasing).</p> <p>Since there is mobility of workers among sectors in the economy, it is not clear if they should have different levels of over/underheating. In meeting with representants of the non-financial sector of the economy (business associations, firm executives, and firm owners), Anecdotes suggest shortages for some types of skilled workers, principally in IT. But this seems a structural issue. In addition, employers in the agricultural sector complained about the difficulties in hiring.</p>
Brazil	strong						<p>The labour market tightness that we observed during 2021 and the beginning of 2022 has significantly loosened. Total employment stagnates or marginally decreases, and real wages decrease in year on year and quarter on quarter comparisons. This picture is very also when considering sectorial figures; except for mining, real wages are falling in all sectors. According to our expectations of the last Monetary Policy Report, we should be seeing somewhat higher real wages and lower employment; thus, the adjustment in the labour market is happening more through prices than quantities.</p>
Chile	weak	neutral	weak	neutral	weak	weak	<p>In 2022, China's surveyed unemployment rate fluctuated, due to multiple unexpected factors, such as the pandemic, but the overall employment situation has remained stable. With the package of economic stabilization policies and measures taking effect, the optimization of Covid-19 prevention and control measures, manufacturing enterprises gradually resuming production, and the significant improvement in hospitality, catering, tourism and other service industries, China's surveyed unemployment rate stood at 5.5% in December 2022, and averaged at 5.6% for the whole year.</p>
China	neutral	neutral	neutral	neutral	neutral	neutral	

Question 2

Table 2

What is your current assessment of the labour market in your country, overall and by segment?							Use the space below if you want to add any qualification or comment on the above responses:
	overall labour market	agricultural sector	manufacturing sector	service sector	for high-skill workers	for low-skill workers	
Colombia	strong	weak	neutral	strong	strong	neutral	The most recent labour market data from the household survey show that overall employment grew at an annual rate of 8.7% in August. This means that the level of total employment is 4 pp above the pre-pandemic levels. The sectors that contributed the most to the annual expansion of employment were services and commerce (6.3 pp out of 8.7 pp), followed by manufacturing and construction (1.7 pp out of 8.7 pp). Instead, agriculture contributed 0.5 pp, and was the only sector whose employment shrank in monthly terms during the last months. Regarding demographic characteristics, the employment growth has been more dynamic for skilled workers, particularly those with technical and technological education.
Czech Republic	overheated	strong	overheated	strong	strong	overheated	The demand for labour remains quite solid in the Czech Republic. As of February 2023, there were about 280 thousand vacancies for as many unemployed people registered in the Czech employment offices. There have been no significant dismissals over the last two years. The Czech labour market remains strong despite the Covid pandemic and energy crises caused by the Russian invasion. The immigration wave induced by the invasion has been absorbed fully into the labour market with no significant effect on its status. The number of employed Ukrainian refugees in the second half of 2022 was around one hundred thousand.
Hong Kong	weak		weak	weak	weak	weak	For most major industries and occupations, the unemployment rates declined in recent months and the number of employed persons began to increase again. This recovery is supported by the continued revival of domestic economic activities amid various policy support measures (eg Government's Consumption Voucher Scheme). Yet in general labour market conditions were still weaker than the pre-pandemic levels (and hence the ""weak"" assessment above), given various external challenges including the worsened global economic prospects. Note: The agricultural sector assessment is left blank as the relevant labour market data are not available in Hong Kong. That said, the local agricultural sector is very small, representing less than 1% of GDP in Hong Kong.
Hungary	strong	neutral	strong	strong	overheated	strong	The Hungarian labour market remained resilient throughout the COVID-crisis and approached full employment again during 2022. Recently, the labour market has been strong, however, early signs of a slowdown has appeared.
India							The official labour market data, ie the periodic Labour Force Survey Report (PLFS) by Government of India (GOI) comes with a lag of one year. The latest annual PLFS 2021-22 which covers both rural and urban areas shows improvement in unemployment rate, labour force participation rate and employment rate compared to pre-pandemic period. Key results of latest PLFS quarterly bulletin suggest strengthening of employment conditions in urban area in Q3:2022-23. Labour force participation rate (LFPR) at 48.2 per cent was the highest in the series, slightly higher than 48.1 per cent registered just before the pandemic (Q4:2019-20).

Question 2

Table 2

	What is your current assessment of the labour market in your country, overall and by segment?						Use the space below if you want to add any qualification or comment on the above responses:
	overall labour market	agricultural sector	manufacturing sector	service sector	for high-skill workers	for low-skill workers	
Indonesia	neutral	neutral	neutral	strong	strong	neutral	The labour market is recovering with no sign of overheating.
Israel	strong	neutral	strong	strong	overheated	strong	Overheating is relevant predominantly to the high-tech sector.
Korea	strong	strong	strong	strong	strong	strong	The overall labour market of South Korea is strong. However, the number of persons employed in face-to-face service sectors still remained sluggish, such as food services and accommodation, wholesale and retail trade, and personal services, where the negative effects of the pandemic were most concentrated.
Malaysia	neutral	strong	neutral	neutral	neutral	strong	Responses above reflect qualitative judgments on slack/tightness or under/overheating in the labour market, based on data on labour supply and demand conditions as well as wage growth. In the Malaysian labour market, improvements in employment have been forthcoming since 4Q 2021, where labour demand increased following the reopening of the economy. This was met by forthcoming labour supply as labour force participation rate rebounded above pre-pandemic levels. The improvements in wage growth seen since 2Q 2022 in particular is assessed to largely reflect the pickup in economic activity, and to a smaller extent the minimum wage hike effective May 2022. Wage developments are not assessed to further fuel inflation thus far. However, there has been significant shortage in the supply of labour, especially in the agriculture sector following departure of migrant workers since the onset of the pandemic. This has led to some wage pressure seen in the low skilled segment. However, this increase in wages was not sufficient to attract local workers given the nature of jobs in the sector. As a result, agriculture production has been declining since 2020.
Peru	neutral	strong	strong	under-heated	neutral	neutral	In the second quarter of 2022, the labor participation rate exceeded the level observed before the pandemic. Meanwhile, private formal employment recovered its pre-pandemic level since the fourth quarter of 2021. It should be noted that after the pandemic began, there was significant growth in employment in the agricultural sector since it was not affected by sanitary restrictions. As of this year, this sector has returned to normal employment.

Question 2

Table 2

What is your current assessment of the labour market in your country, overall and by segment?							Use the space below if you want to add any qualification or comment on the above responses:
	overall labour market	agricultural sector	manufacturing sector	service sector	for high-skill workers	for low-skill workers	
Philippines	neutral	neutral	weak	strong	neutral	strong	<p>Labour market conditions have improved about two years since the onset of the pandemic with the gradual re-opening of the economy. Employment and unemployment rates have reached pre-pandemic levels, while labour force participation rate exceeded the pre-pandemic level. Moreover, overall employment gains have been consistently recorded in the last thirteen months. Among major sectors, services recorded a strong recovery with consistent employment gains and jobs growth for the past year, while Agriculture registered employment gains with moderate jobs growth. On the other hand, employment conditions in Manufacturing have not been favorable as recovery in the sector continues to be weighed down by economic concerns, ie high inflation and depreciation of the Philippine peso.</p> <p>Official data on high-skill workers and low-skill workers are not available. Nonetheless, low-skill workers, as proxied by elementary occupation workers, have registered sustained employment gains. Meanwhile, signs of recovery for high-skill workers are mixed given that managerial jobs continued to register job losses while other skilled occupations such as clerical support workers, service and sales workers, and craft and related trades workers have registered employment gains.</p>
Poland	strong	neutral	weak	strong	strong	neutral	<p>Labour market conditions remain favorable in Poland. It is reflected in a record low unemployment, high level of employment and a strong wage dynamic. However, some weakening of labour demand has been already noticed and expected in the following quarters. The overall labour market assessment needs also to consider a relatively high level of uncertainty now resulting from the war in Ukraine, as well as all socio-economic consequences of this war (including the energy crisis).</p>
South Africa	weak	weak	weak	neutral	strong	weak	<p>We used the following understanding of each of the assessment choices made</p> <p>Weak = labour demand is generally low relative to supply and/or has been declining in recent years with no real structural changes that give prospects of an upward shift in demand for labour.</p> <p>Strong = labour demand is high relative to supply, or unemployment is relatively low.</p>
Thailand	strong	strong	strong	neutral	strong	weak	<p>We assess labour market by comparing the current (Q3 of 2022) level of employment and wage rates to that of the pre-pandemic level. At sectoral level, manufacturing sector has recovered faster than other sectors, as shown by number of employees and real wage which have reached the pre-pandemic level. On the other hand, despite being minimally affected by the pandemic, agricultural sector has currently been facing higher cost due to the Russia-Ukraine conflict. Tourism-related sectors, which employ a large number of low-skilled workers, have still lagged behind due to the very low number of foreign tourists comparing to the pre-pandemic level.</p>

Question 2

Table 2

What is your current assessment of the labour market in your country, overall and by segment?							Use the space below if you want to add any qualification or comment on the above responses:
	overall labour market	agricultural sector	manufacturing sector	service sector	for high-skill workers	for low-skill workers	
Türkiye	strong	neutral	strong	strong	strong	strong	In tandem with economic activity, labour market shows a strong outlook in Türkiye. As of the first quarter of 2022, Türkiye outperforms all other OECD countries in terms of employment increase compared to the pre-pandemic levels. In August 2022, seasonally adjusted employment increases by 3.7% (1.1 million people) since the beginning of the year. Despite the increases in labour force participation rates, unemployment rates are declining. In August 2022, seasonally adjusted unemployment rate declined to 9.6%, which is the lowest level since April 2014.
Vietnam	strong	strong	strong	strong	strong	neutral	

Source: EMDGM 2023 Questionnaire

Question 3

Table 3

Do you expect the pandemic or any of the policies enacted during it to have any lasting impact on labour market dynamics or wages?	
Argentina	Monetary policy management during the pandemic required a major expansion of liquidity. Given the previous existence of inertial components in the inflationary process, expansive monetary policies have indirectly impacted on an inflation inertia that has stood at high levels. Other factors have also triggered inflation dynamics, such as, the influence of international prices, which have been more related to the price of energy and the cost of global manufactures, the recovery observed in the marketing margins in some sectors and the rearrangement of relative prices in private services after the reopening of activities due to the improved epidemiological situation and, to a lesser extent, the wage adjustments resulting from the collective bargaining agreements.
Brazil	We still do not have a definite answer to this question. Some new patterns might have emerged and become permanent. For example, home office adoption for certain careers (particularly for high income earners). However, its macroeconomic impact is unclear. In addition, in meeting with people from the non-financial sector of the economy (business associations, firm executives, and firm owners), people from the tourism and lodging sector stated that after the pandemic previous employees in the sector are not returning as expected and many of them complain about the work schedules (night and weekend shifts). This may also reflect a strong labour market.
Chile	The participation rate has stagnated recently and is still below its pre-pandemic level, lagging behind other economies. This is mainly linked to the delayed recovery in the participation among workers under 25 and over 54 years, in a context in which women's participation continues to lag well behind men (49.9% and 70.1%, respectively). According to NSI information, among the reasons for not participating, family and personal responsibilities, studying, and retirement are at the top of the list (September 2022, Monetary Policy Report, p. 18). It will not be a surprise if those age segments' participation rates do not return to pre-pandemic levels over the next year.
China	Following the outbreak of Covid-19 in 2020, China quickly put the pandemic under control, and tried hard to lessen the impact on the labour market and the economy. Monetary policy has remained accommodative, responding strongly to the shocks from the pandemic and other unexpected factors to support the economy, while taking into account internal and external balances to ensure support from the monetary policy is sustainable. China optimized Covid-19 prevention and control measures at the end of last year and the beginning of this year. Now the infection rate has passed the peak, with the order of production and life quickly restored, without enduring disruptions to labour supply. After the Chinese New Year in 2023, enterprises resumed operations and employees returned to work earlier than in previous years, so labour supply and demand remained stable. The 20th National Congress of the Communist Party of China has made clear to prioritize employment, and the Central Economic Work Conference stressed the need to make efforts to stabilize employment by promoting employment, especially for college graduates, and strengthening protection of workers' rights and interests. These would help stabilize the job market.
Colombia	<p>Studies done by the technical staff of the Central Bank suggest that the pandemic could have enhanced automation. During the pandemic, job openings and salaried employment fell more drastically in occupations with higher potential for automation. These effects are sizable and persistent and are mostly driven by the changes in the relative labour demand from sectors that were affected by the mobility restrictions imposed by the government.</p> <p>In a country characterized by high levels of unemployment and informality as Colombia, this automation effect could produce a structural mismatch between the demand of occupations where new labour skills are required and the skills currently offered in the labour market, inducing thus a negative effect on the long-term unemployment rate.</p> <p>On the other hand, there was an emergency relief program aimed to subsidize employment of small firms and those most affected by the pandemic (PAEF, by its acronym in Spanish). Preliminary evidence from a work in progress of the members of the technical staff points out to significant effects on employment of the firms targeted by the program.</p> <p>Reference:</p> <p>Bonilla, L.; Flórez, Luz A.; Hermida, D.; Lasso-Valderrama, F.; Morales, L.; Ospina, J and J. Pulido (2022). ""Is the Covid-19 Pandemic Fast-Tracking Automation in Developing Countries? Evidence from Colombia,"" Borradores de Economía 1209, Banco de la República de Colombia.</p>
Czech Republic	Not anymore. During the pandemics there were significant disruptions into wage dynamics and labour force caused by government policies associated with pandemic business closures, but all those effects have already faded away.

Question 3

Table 3

Do you expect the pandemic or any of the policies enacted during it to have any lasting impact on labour market dynamics or wages?	
Hong Kong	Hong Kong's economy and labour market have been adversely affected by the COVID-19 pandemic and the accompanying restrictive measures. In particular, the impact of the pandemic on the labour market were highly uneven, with elevated unemployment rates in the more affected sectors (eg inbound tourism). Meanwhile, we have observed some signs of employment shifting towards more "high-end" service sectors, especially the financial industry and those witnessing greater use of digital technologies. There is also some evidence of companies upskilling their workforce by hiring new graduates with higher education levels during the pandemic. Sectoral data also reveal real wage increases in the "high-end" industries, while in the lower-end real wages have remained roughly stable or have decreased since the pandemic. Having said that, it remains to be seen whether the pandemic would have any ""lasting"" impact on the labour market dynamics or wages, especially considering the fact that domestic economic activities are gradually normalizing. As an example, visitors to Hong Kong have risen visibly, albeit from a low base, after the Government further adjusted the quarantine arrangements for inbound visitors in September this year. This will be conducive to the recovery of employment and wages in tourism-related sectors.
Hungary	Not being able to work in sectors (such as tourism) during the pandemic made workers shift to other sectors, such as IT and communication and other services, which now enhances the labour shortage in certain sectors. In the meantime, the spread of home-office possibilities allows for more people to be able to work.
India	The average Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) wage rate was revised by the Government of India with effect from April 1, 2020, by Rs.20 over the wage rate of 2019-20.
Indonesia	As the case for Indonesia, the potential for scarring during the current pandemic period is significantly lower than during the Asian Financial Crisis. This is in line with the relatively faster economic recovery, which has boosted improvement in labour demand as reflected by among others. The recovery is reflected in the decrease of the unemployment rate to 5,83% in February 2022 from the spike up at 7,07% in August 2020, although it was still higher than the pre-pandemic level at 4,94% in February 2020. The recovery is also reflected in the sectoral labour absorption in line with the reopening of the economy, support of fiscal and monetary stimulus, and current export. The recovery is also supported by a better structure of the labour market. To mitigate the scarring risk and promote economic recovery, Bank Indonesia and Government strengthen the national economic policy synergy to maintain macroeconomic and financial system stability, while reviving lending to businesses in priority sectors to stimulate economic growth and exports, while increasing economic and financial inclusion. Several structural avenues to mitigate the scarring risk are labour reallocation to solve persistent unemployment and create new capabilities, capital reallocation to break down the stagnation of production and operation and resume investment for productivity, create an innovative environment, and digital inclusion
Korea	In spite of many concerns about the scarring effects of the pandemic, the current Korean labour market has mostly recovered to the pre-pandemic level. However, we are consistently monitoring the labour market with the possibility that there may be structural changes (eg the effect of acceleration of digital transformation on employment) due to the pandemic.
Malaysia	We do not expect policies enacted during the pandemic to have lasting impact on the labour market. Policy support has been withdrawn and progressively becoming more targeted since 2021. Nevertheless, the pandemic has accelerated technological adoption, digitalization, and automation, which may result in lower need for labour in some low-skilled and mid-skilled segments in the medium to long term, and structurally lower wage pressures for these segments. On the other hand, demand for high skilled workers would increase. Wages for these high-skilled workers should also adjust higher gradually over time, to commensurate with their higher productivity. There could be upward pressure on wages for this segment if the supply of high-skilled workers is slow to adjust to higher demand.
Peru	As a result of the pandemic, fewer formal jobs have been generated, which is why growth in the informality rate in the labor market is to be expected in the years to come. Additionally, since labor participation in Peru is high and income in real terms has not recovered, more household members are expected to participate in the informal labor market to offset the drop in income.

Do you expect the pandemic or any of the policies enacted during it to have any lasting impact on labour market dynamics or wages?	
Philippines	<p>For minimum wages, there was more than 2 years lag since the last wage order was approved by the regional wage boards due to the pandemic. However, we see that the current minimum wage setting, where no new wage order may be issued within a period of 12 months from effectiveness of the current wage order, limits any undue risk to the wage-price dynamics in the country.</p> <p>At the same time, the fiscal response concerning wages during the pandemic were mostly one-time financial support to small businesses, private sector employees that have adopted flexible working arrangements or endure temporary closure, and displaced land- and sea-based Filipino workers.</p> <p>In terms of labour market dynamics, there was an uneven pace of recovery across types of jobs available in the labour market about two years since the onset of the pandemic. A predominant share of jobs created post-pandemic are elementary occupations and self-employed workers without any paid employee, which are considered mostly as vulnerable employment. On the other hand, hiring of skilled and salaried occupations such as managerial jobs continued to contract. This shift in employment composition reflected how workers and firms have adapted to the changes in work and business environment brought about by the pandemic. The contraction in employment of managers coincides with lower labour demand from firms during the period due to business closures or firms operating only at partial capacity, while the growth in self-employed workers may have resulted from laid-off and unemployed workers putting up their own micro-businesses or one-person enterprises to earn income. However, we expect that this change in employment composition would persist in the short to medium term given current unfavorable macroeconomic conditions. For instance, demand for managers hinges on the strength of economic recovery as well as positive business sector sentiment, which now is hampered by concerns on high inflation and depreciation of the peso, among others.</p>
Poland	<p>The anti-crisis measures targeted to protect labour market from the negative consequences of the pandemic, especially to avoid the surge in unemployment, were temporary and their effect on economy faded away gradually throughout 2020 and 2021.</p> <p>However, since the beginning of the pandemic, a number of amendments to the law dedicated to foreigners have come into force in Poland. Their aim was to extend the legal stay of a foreigner staying in Poland and extend the validity of legal work entitlements, ie work permits, seasonal work permits as well as work based on declarations on entrusting work to a foreigner. The government has been continuing its efforts to facilitate immigrants' activity in Poland as it recently legislated amendment to the Act on Foreigners. The aim of this new law was to facilitate the procedures of granting the residence permits and employing the foreigners. The most important modification was the extension of the validity period for declarations on entrusting work to a foreigner (granted to citizens of 6 countries: Armenia, Belarus, Georgia, Moldova, Russia and Ukraine) from 6 to 24 months.</p> <p>After the unprovoked Russian aggression against Ukraine some new regulations have been advanced to deal with the massive influx of Ukrainian refugees. Pursuant to a special law, Ukrainian refugees are allowed to legally remain in Poland for 18 months since 24 February 2022 and can apply for PESEL (Polish National Identification Number), which grants, <i>inter alia</i>, the right to work and start a business in Poland without a special work permit and to receive social assistance including unemployment benefits.</p> <p>The observed evolution of legislation promotes the settlement immigration by granting longer stay permits and simplifying work legalisation procedures, which should allow for more stable work for current immigrants and act as an attracting factor for the new ones. A growing share of permanent immigrants would, in turn, favour a more effective labour force allocation in the economy by making it worthwhile for employers to improve their foreign staff skills. This should contribute to an increase in labour productivity and result in a more intensive job creation.</p> <p>During the pandemic, the prevalence of remote work has increased. In response to this trend, a package of changes in Labour Code is being proceeded by Polish parliament at the moment and is intended to come into force by the end of 2022. New regulations address such topics as teleworking, more elastic working arrangements for parents and securing more stable working conditions for young workers <i>i.a.</i> by limiting temporary employment. The proposed labour code amendments should support the work-family life reconciliation which should foster higher labour force participation and improve general well-being. The planned changes are likely to increase labour supply both at the intensive and extensive margin. Teleworking is expected to encourage entering labour market by young, still in education, disabled and affected by traffic exclusion, especially those in urban areas.</p>

Question 3

Table 3

Do you expect the pandemic or any of the policies enacted during it to have any lasting impact on labour market dynamics or wages?	
South Africa	<p>A trend that has emerged in patterns of employment in the post-pandemic recovery phase is that of rapid growth in part-time employment while full-time employment has grown slower. This may be a reflection of hesitance by employers to employ on a full-time basis given the prevailing high uncertainty.</p> <p>The pandemic also brought about significant changes in how people work with more organisations allowing for work from home and hybrid arrangements. The greater flexibility of these new arrangements is likely to remain a feature of the labour market. This flexibility may partly explain the increase in part-time hires during the recovery.</p> <p>During the pandemic the government implemented the Covid-19 Temporary Employer-Employee Relief Scheme (TERS) which subsidised the wage bill to qualifying employers affected by the COVID-19 lockdowns. Although there is little research into the impact of this policy on the labour market, there is some evidence that it enhanced job retention during the most stringent lockdown period (Kohler, Hill and Bhorat (2022)*, suggesting the impacts were temporary.</p> <p>*Köhler, T., Hill, R. & Bhorat, H. (2022) The effect of wage subsidies on job retention: Evidence from South Africa during the COVID-19 pandemic. WIDER Working Paper 2022/114. Helsinki: UNU-WIDER."</p>
Thailand	<p>Human capital loss is the main impact that the pandemic could leave lasting scars in the Thai labour market. This could happen in the shifting of employment from nonfarm formal sector to agricultural sector and self-employed, through lower productivity of the informal sector businesses and mismatch between new demanding skills and their previously trained skills.</p>
Türkiye	<p>Due to pandemic, job retention schemes were extended to save jobs and protect households against income losses. Termination of job contracts were prohibited until June 2021. Employers were allowed to send their workers on unpaid leave. The employees on unpaid leave were also provided daily cash benefit. Eligibility requirements for the short-time work allowance (STWA) were eased and duration of STWA was extended by 8 months. On average, 4.2 million people benefited from job retention schemes, which corresponds to 28.6% of formal employees, during the pandemic. This rate is slightly above the job retention rate in OECD countries, on average. These policies prevented job losses and contributed to the strong labour market recovery afterwards.</p>
Vietnam	<p>There is currently no plan to increase the regional minimum wage in 2023, but on 11/11/2022, the National Assembly passed a Resolution on the state budget estimate for 2023. Accordingly, from 1/7/2023 base salary will be increased by 20.8% compared to the current base salary (equivalent to an increase from 1.49 million VND/month to 1.8 million VND/month). The base salary growth in 2023 is 3 times larger the growth of the last base salary change (7.2% in 2019). Therefore, it is expected that the base salary increases in 2023 will have an impact of about 0.6 ppt on inflation in 2023.</p>

Source: EMDGM 2023 Questionnaire

Question 4

Table 4

	What fraction of workers is informal?			What fraction of wages are covered by collective wage agreements?			What fraction of wages have explicit indexation clauses?			Use the space below if you want to add any qualification or comment on the above responses:			
	% of total workers			% of total employment			% of total sales			% of total workers			
	2000	2019	2022	2000	2019	2022	2000	2019	2022	2000	2019	2022	
Argentina	36.60	22.80	23.40	27.40	27.70								There has been a shortening in the lengths of wage contracts, which evolved from an annual basis to a 6-months one. There is anecdotal evidence of wage indexation, but it's not a generalized trend. Despite the high levels of inflation, the government avoided the inclusion of indexation clauses in the wage bargaining process.
Brazil		40.70	39.00										Informality according to the first criteria in the attached Excel file (DadosMT_BIS.xlsx)
Chile	39.30	28.47	27.04	14.80	20.40		34.60						Regarding government actions on wage indexation, annual or other indexation timing is not mandatory in Chilean law; only the public sector sets annual adjustments that are discussed and approved by the parliament. Recently, there have not been specific government measures to affect wage indexation. Sources: First column: 39.30=Perticará and Celhay (2000); 28.47 INE, year average of the labor informality rate; 27.04=INE, Average of the labor informality rate from January to September. The third column (corresponds to "Collective Bargaining Coverage"): OECD https://stats.oecd.org/Index.aspx?DataSetCode=TUD (14.80= the year 2009; 20.40= the year 2018; year 2022= NA). Fourth column: From questions b1 and b2 ENCLA 2019, Ministry of labor, Chile. Considers the percentage of workers that received an adjustment of their salary, but it was not due to collective negotiation. So the most likely option is that is due to indexation clauses.

Question 4

Table 4

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	% of total workers			% of total employment			% of total sales			% of total workers		
	2000	2019	2022	2000	2019	2022	2000	2019	2022	2000	2019	2022
Colombia	46.80	44.72					24.10	24.90		The period between 2010 and 2019 was characterized by a continuous decline in the informality rate. Some studies have attributed this behavior to the decrease in non-wage labor costs, in particular to the labor reform in 2013 (see response 5). During the pandemic period, informality rebounded, but, with the economic recovery, it decreased again and is currently at historical lows. A note about the informality measure: The informality measurement is only available for urban areas, and the definition used in the table stands for a firm-size approach (salaried employees in firms with less than 5 employees and self-employed with no college). Given that a new sample frame for the household survey was introduced as of 2021, the numbers reported in the table come from two different versions of the household survey.		
Czech Republic										Regarding salary indexation clauses, in Colombia, the mechanism with the greatest coverage is the MW. This variable is adjusted in January of each year and salaried employees cannot legally earn less than the MW. Therefore, wages must be increased for those workers with a wage at the old MW or below the new MW. The National Agreement & Salary Policy Committee determines the extent of the adjustment, mainly on the basis of the observed inflation and productivity growth. The table reports the number of salaried workers earning 1 MW as a share of total employment. Thus, the number reported would be a lower bound of the fraction of wages that have explicit indexation clauses. Other mechanisms of salary indexation include collective labor agreements between unions and firms; however, there is no data available about the number of employees covered by these types of arrangements.		
										Those kinds of data are unfortunately unavailable for the Czech National Bank. We know, out of small sample that comes from external statistical survey, that only about 2 % of collective agreements had in 2020 terms for real wage growth and that this share has been fairly stable over the past 6 years. Percentage of employees covered by a collective agreement is 35% (latest available data for 2019, OECD/AIAS ICTWSS database).		
										There is no hard evidence about informal economy in the Czech Republic and other shares requested above especially when it comes to time series. There are only several estimations of the ratio to official GDP (ranging between 6 to 12 percent), but there is no data about employment in informal sector. The estimations (eg Eurobarometr 2019) give similar numbers for employment as in the case of GDP.		

Question 4

Table 4

	What fraction of workers is informal?		What fraction of wages are covered by collective wage agreements?		What fraction of wages have explicit indexation clauses?		Use the space below if you want to add any qualification or comment on the above responses:			
	% of total workers		% of total employment		% of total sales		% of total workers			
	2000	2019	2022	2000	2019	2022	2000	2019	2022	
Hong Kong										Notes: As mentioned in our reply for "A: Data" (see excel file), Hong Kong does not have data on the "informal sector". Additionally, data on collective wage agreements and explicit wage indexation are not available in Hong Kong. Consequently, the above section is left blank. In general, Hong Kong's labour market is widely regarded as flexible, and the said practices are not prevalent.
Hungary										We have no data for informal employment.
India	68.40	71.80								Periodic Labour Force Survey Report (PLFS) provides information on informal sector for industry groups/divisions 014, 016, 017, 02 and 03 and the industry divisions 05-99 (referred to as the non-agriculture sector and no data for the all workers). During 2018-19, 68.4 per cent of workers in the above category fell under informal sector, which increased to 71.8 during 2021-22.
Indonesia	60.47	55.89	59.97							Based on Sakernas February 2022, August 2020, and August 2019.
Israel	60.00	50.00	48.00	70.00	55.00	52.00	70.00	0.00	0.00	There are no reasonable estimates of informality and its magnitude. Figures on collective bargaining and indexation are speculative and depend on definitions. Collective bargaining includes here factory/industry bargaining - not necessarily national negotiations.
Korea										<ol style="list-style-type: none"> 1. There are no official statistics on the informal economy in South Korea. 2. The bargaining system of South Korea is highly decentralized. Most bargaining takes place at enterprise or company level. In most companies of South Korea, employers set employees' wages based on their performance and sales conditions. 3. In South Korea, wage indexation is not active and there are no official statistics on it.
Malaysia	8.30		0.40							Informal workers: Malaysia's statistical authorities (Department of Statistics Malaysia, DOSM) surveys informal workers every 2 years, with the first available data point referring to 2013 (9.8% of employment). Pre-pandemic (and latest available data) was for 2019 reference period.
Peru	75.30	72.70	76.80	3.90	3.40	3.70				One factor to consider is the source of information with which the data on formal employment in Peru are constructed. Household surveys are not representative of formal employment. Administrative data on formal employment register growth closely linked to increased economic activity. This underestimation of formal employment produces an excessively higher rate of informality.

Question 4

Table 4

	What fraction of workers is informal?			What fraction of wages are covered by collective wage agreements?			What fraction of wages have explicit indexation clauses?			Use the space below if you want to add any qualification or comment on the above responses:		
	% of total workers			% of total employment			% of total sales			% of total workers		
	2000	2019	2022	2000	2019	2022	2000	2019	2022	2000	2019	2022
Philippines										<p>Official data on the above-cited indicators namely fraction of informal workers to total employment, fraction of wages covered by collective wage agreements, and fraction of wages that have explicit indexation clauses, are not available. Nonetheless, the informal sector provides a bigger share of workers to total employment compared to the formal sector. Based on estimates of the International Labor Organization from 2008 to 2017, workers in the informal economy in the Philippines comprise an average of about 56 percent of total employment. The share of informal sector workers to total employment has been broadly steady throughout 2008 to 2017 ranging from 54 percent to 57 percent. Of the total informal workers, 51 percent are self-employed without paid employee, 31 percent are wage and salary workers in precarious employment, and the rest are unpaid family workers.</p>		
Poland	2.30	1.10								<p>The share of unwritten contracts in total employment (Polish LFS) has been used as a proxy of informal work. The percentage of informal work has decreased as a consequence of the pandemic outbreak. Informal workers appeared to be most vulnerable to labour market adjustments in the face of the shock. Both collective wage agreements and wage indexation mechanisms (esp. automatic ones) have rarely been used among enterprises and played a minor role. Collective wage agreements have occurred only in selected industries such as mining or electricity. According to Eurostat data (Survey of Earnings Structure) only 2.1% workers were participants of a collective agreement on national or interconfederal level in 2018, and more than 2/3 did not participate in any collective pay agreement. According to NBP Enterprise Survey (Oct 2022) the vast majority of companies (92.3%) do not have a system of wage indexation by inflation, ie regular adjustment of basic salaries by the CPI.</p>		
South Africa	18.20	19.00		25.50	26.40					<p>QLFS data which has information on informal employment and workers covered by collective wage agreements only begins in 2008.</p> <p>Percentage of informal workers excludes agriculture</p> <p>Data on indexation is not available</p> <p>Data given for 2022 is an average of the first 2 quarters</p>		

Question 4

Table 4

	What fraction of workers is informal?		What fraction of wages are covered by collective wage agreements?		What fraction of wages have explicit indexation clauses?		Use the space below if you want to add any qualification or comment on the above responses:			
	% of total workers		% of total employment		% of total sales		% of total workers			
	2000	2019	2022	2000	2019	2022	2000	2019	2022	
Thailand	56.10	54.28	57.50	2.40	1.10					According to Lathapipat and Chucherd (2013), Informal workers composed of self-employed workers and small firm's employees. By this definition, more than half of employment are informal workers, which has risen after the pandemic as formal workers either forced or voluntarily switched to self-employed jobs in informal sectors eg online trading and farming. According to ILO stat, few of Thai workers are covered by collective agreements which can imply low bargaining power with their employers.
Türkiye	50.60	34.50	26.90	3.80	3.30		30.10	31.80		Fractions of wages are covered by collective wage agreements refers to the ratio of employees to the number of insured workers (except agriculture). Fraction of wages have explicit indexation clauses refers to the ratio of minimum wage earners in total employee (Based on Household Labor Force Surveys).
Vietnam	36.60	67.50	54.10	27.40	27.70					We do not have enough information to answer all of above indies.

Source: EMDGM 2023 Questionnaire

Question 5

Table 5

Which are the key contributing factors for informality in labour markets?								Use the space below for qualification or comments on the above responses:
	Taxation	Bureaucratic burden	Too high legal labour standards	Insufficient enforcement of rule of law	Overall economic performance	Minimum wage	Inflation	
Argentina	important	somewhat important	important	important	somewhat important	not at all important	not at all important	From the workers perspective, it is worth taking into account that the Argentinean economy has a very wide social protection network, with cash transfers from the government.
Brazil								We do not have an assessment of this issue.
Chile	somewhat important	somewhat important	somewhat important	average importance	important	somewhat important	not at all important	
China	important	average importance	important	average importance	very important	very important	average importance	

Colombia	very important	average importance	very important	important	important	very important	somewhat important	<p>Colombia is characterized by high rates of informality and a combination of high non-wage labour costs and a high and binding MW. The specialized literature usually finds a negative relation between informality rates and non-wage labour costs. In Colombia, the impact assessment of reforms that have seek to reduce payroll taxes shows evidence in that direction. A case that has been extensively documented is the reduction of 13.5 pp in the payroll taxes in 2013. Several studies have found that this reform increased formal employment, reducing the informality rate. The magnitude of the reduction in the informality rate varies between 2,3% and 3,6% depending on the study.</p> <p>On the other hand, there is evidence of a negative effect of larger increases of the MW relative to productivity growth on informality. When the rise in MW is higher than the increase in productivity, hiring slows down, and job seekers are finally pushed to informality. This is especially true in Colombia, where there is heterogeneity in terms of productivity growth across different labour markets but a single MW country wide. Estimates by the technical staff of the central bank suggest that an increase of 1 pp in the MW relative to the wage in the 70th percentile of the wage distribution, increases the probability of obtaining an informal job by 0.21 pp. This effect is particularly pronounced for young, female, and less skilled workers.</p> <p>Finally, there are recent estimates on the impact of the MW on formal employment. The results suggest that a 1% increase in the real MW reduces formal employment by 1%. The drop in formal employment is accounted for by an increase of 44 basis points (bp) in formal job destruction, and a decrease of 56 bp in formal job creation. It is worth saying that the destruction of formal employment does not necessarily imply a direct impact on informality, since workers could move not only towards informality but to unemployment or inactivity as well.</p> <p>References</p> <p>Arango, Luis E.; Flórez, Luz A. & Guerrero, Laura D. (2020). ""Minimum wage effects on informality across demographic groups in Colombia,"" Borradores de Economía 1104, Banco de la República de Colombia.</p> <p>Arango, L. E. (coordinador) et al (2022). Efectos macroeconómicos del salario mínimo en Colombia. Ensayos sobre Política Económica (ESPE), núm. 103. Banco de la República de Colombia.</p> <p>Flórez, L.A.; Hermida, D. and L. Morales (2022). ""The Heterogeneous Effect of Minimum Wage on Labour Market</p>
	very important	average importance	very important	important	important	very important	somewhat important	

Question 5

Table 5

Which are the key contributing factors for informality in labour markets?							Use the space below for qualification or comments on the above responses:	
	Taxation	Bureaucratic burden	Too high legal labour standards	Insufficient enforcement of rule of law	Overall economic performance	Minimum wage	Inflation	
							Flows in Colombia,"" Borradores de Economia 1213, Banco de la Republica de Colombia."	
Czech Republic							Unfortunately, there are no official information about the informality in the labour market. The Czech statistical office does some rough estimation of shadow economy when estimating the GDP, but for the labour market there is no such thing.	
Hong Kong							Please see notes to question 4.	
Hungary	very important	average importance	somewhat important	somewhat important	important	average importance	somewhat important	In the past years, the economic policy, in addition to raising wages, aimed to reduce company costs (mainly by reducing the social contribution tax), which contributed to the whitening of the economy.
India	somewhat important	somewhat important	somewhat important	somewhat important	important	somewhat important		The high share of agriculture in total employment is often assessed as one reason for high informality in the economy. The other two employment generating sectors, construction and trade also informal in nature. The poor skill levels of workers is also important. The labour laws often make the cost of regulatory compliance high, especially for micro and small firms. The four labour codes passed by parliament tries to address this.
Indonesia	important	average importance	important	important	important	important	important	Based on data from the Central Bureau of Statistics (BPS) in February 2022, the majority of the population in Indonesia works in informal activities, which is 59.97% of total workers. In Indonesia, almost all of those factors are important for informal workers.
Israel	not at all important	somewhat important	somewhat important	not at all important	not at all important	not at all important	not at all important	
Korea	very important	not at all important	not at all important	not at all important	not at all important	not at all important	not at all important	Although official statistics are not available, it has been known that the size of South Korea's informal economy has been gradually decreasing as the use of cash decreases and the use of credit cards becomes more active. The reduction in cash use made tax evasion more difficult, and it is partly contributed to the decrease of informal economy.
Malaysia								There has not been a comprehensive study on the contributing factors of informality in the Malaysian economy in particular. It is likely that all factors listed above contribute to extent of informality in general.

Question 5

Table 5

Which are the key contributing factors for informality in labour markets?							Use the space below for qualification or comments on the above responses:	
	Taxation	Bureaucratic burden	Too high legal labour standards	Insufficient enforcement of rule of law	Overall economic performance	Minimum wage	Inflation	
Peru	very important	very important	important	very important	important	important	not at all important	Different works on informality in Peru highlight three reasons that would explain the high and excessive level of informality in the Peruvian labor market: (i) high labor costs and non-labor, (ii) the complexity of the tax system, and (iii) excessive and ineffective labor regulation.
Philippines	important	very important	very important	important	very important	very important	important	High informality in the Philippines is attributed to labour market rigidities and high labour costs. A report by the World Bank cited that restrictive labour market regulations in the country (relative to regional peers) impede the efficient movement of labour across firms or sectors. The Philippines ranked 77th out of 137 countries on the Global Competitiveness Index in terms of ease of hiring or firing workers, which reflects the long administrative processes required from firms to employ or retrench workers. The high costs of labour have led to non-regular work contracts of employees and higher incidence of temporary employment. Moreover, the Philippines ranked 86th in terms of flexibility in wage determination, mirroring the high minimum wages in the country both relative to Filipino labour productivity and relative to regional peers.
Poland	very important			important	somewhat important			
South Africa	average importance	average importance	important	important	important	important	somewhat important	
Thailand	somewhat important	somewhat important	somewhat important	important	important	somewhat important	somewhat important	Insufficient enforcement of law, especially social security law and labour protection law which includes minimum wage, and the overall economic performance are the key factors contributing to informality in labour market.

Question 5

Table 5

Which are the key contributing factors for informality in labour markets?								Use the space below for qualification or comments on the above responses:
	Taxation	Bureaucratic burden	Too high legal labour standards	Insufficient enforcement of rule of law	Overall economic performance	Minimum wage	Inflation	
Türkiye	important	average importance	average importance	average importance	somewhat important	important	average importance	In 2019, the total tax wedge for a one-earner couple was 37.5% of the labour cost, which is the third highest among the OECD countries. However, several employment subsidies on social security contributions are provided by the government to foster formality and increase tax collection rates. Still, many firms intend to either hire informally or report gross wages at lower levels than the actual amount to avoid the tax burden. The rigidity of employment laws exacerbates informal employment by increasing the labour related costs associated with formal employment. Redundancy costs, mandatory employment of vulnerable groups, rules for mass layoffs and uncommon use of atypical work contracts weaken the flexibility in hiring and firing workers resulting in informal employment. According to the latest data, Türkiye has the most protective employment regulations on temporary forms of employment among OECD countries.
Vietnam	not at all important	somewhat important	very important	average importance	important	somewhat important	not at all important	

Source: EMDGM 2023 Questionnaire

Question 6

Table 6

What is the estimated impact of a 10% increase in wages on CPI inflation within one year? (in %)			Use the space below for qualification or comments on the above responses:	
	all wages increasing by 10%	only formal sector wages increasing by 10%	only informal sector wages increasing by 10%	
Argentina				<p>We estimate a VEC multivariate model and the estimated impact of a 10% increase in only formal sector wages on Headline CPI is 7% within a year. The estimated pass-through of wages on Headline CPI is 0.44 within a year.</p>
Brazil	5.40			<p>Using the most recent version of BCB's DSGE model, estimated using Bayesian methods, an exogenous wage markup shock that increases nominal wage (Q-o-Q) by 10% increases CPI inflation (Y-o-Y) by 11.4%, using the median of the parameters of the model. Computing wages on a year-over-year basis, the ratio between CPI inflation response and wages is estimated at 0.54. Thus, an increase of 10p.p. in wages within one-year results in a CPI inflation increase of 5.4p.p. The wage markup shock is associated with exogenous deviations of the Wage Phillips Curve of the model. The model has been recently extended to incorporate a more complete labor market structure, based on Gali, Smets and Wouters (2012).</p>
Chile	4.50			<p>For this exercise, we use the Central Bank of Chile's primary DSGE model, used for forecasting and policy analysis*. We simulate a labour supply shock with a magnitude calibrated to generate a 10% increase (at its peak) in nominal wages. The model does not differentiate between formal and informal wages.</p> <p>Benjamín García & Sebastián Guarda & Markus Kirchner & Rodrigo Tranamil, 2019. XMAS: An extended model for analysis and simulations, Working Papers Central Bank of Chile 833, Central Bank of Chile.</p>
China				<p>Historical data shows that China's CPI growth is positively correlated with the average wage growth rate of urban employees, with a simple correlation coefficient of about 0.6. However, there are many factors that affect CPI inflation, such as changes in households' propensity to consume and constraints on consumption scenarios. Therefore, it is difficult to give the exact figure for CPI increase caused by wage inflation through simple liner extrapolation.</p>
Colombia	1.40			<p>Estimates are only available for increases of the MW, this means that the reported impact is the effect of the changes in total labour income induced by changes in MW (nevertheless, given the high incidence of MW on labour income distribution, the point estimate is informative about the effect of increases in wages on inflation). Studies done by the technical staff of the central bank suggest that an increase of 10 pp in the MW causes an increase of up to 1,4 pp in CPI inflation. It should be noted, however, that these estimates only cover a period characterized by low inflation (2010 - 2019).</p> <p>Reference: Arango, L. E. (coordinador) et al (2022). Efectos macroeconómicos del salario mínimo en Colombia. Ensayos sobre Política Económica (ESPE), núm. 103. Banco de la República de Colombia.</p>
Czech Republic	5.00	0.00	0.00	<p>Our rough estimate is that a 10 % increment in year-on-year wage dynamics would cause between 4% to 6% increase in prices. The result depends on the nature and trajectory of the shock to wages (whether it is on-off shock - level shift - or gradual over-the-year increase). This estimate also omits any reaction of the monetary policy. We would argue that the monetary policy could react swiftly and accordingly and mitigate the inflation pressures. The reaction of the central bank would have to be a 5-percentage point increment. This simulation was carried out by the core forecasting model g3+ (DSGE) of the Czech national bank and it only covers the wage and price dynamics with no special treatment of other variables.</p> <p>There is no distinction available for the Czech National Bank between formal and informal sector, hence we make our judgement only based on available data.</p>

Question 6

Table 6

What is the estimated impact of a 10% increase in wages on CPI inflation within one year? (in %)			Use the space below for qualification or comments on the above responses:
	all wages increasing by 10%	only formal sector wages increasing by 10%	only informal sector wages increasing by 10%
Hong Kong			<p>We do not have an explicit estimate of the elasticity of inflation with respect to wage inflation. In the case of Hong Kong, wages and prices are widely regarded as flexible, and responsive to external shocks. Research results suggest that in Hong Kong, as in other places, consumer prices tend to respond to external shocks first, while productivity-adjusted nominal wages follow later. Consequently, consumer prices have been a leading indicator of nominal wages (but not vice versa), with little evidence of a wage-price spiral.</p> <p>For more details, please see ""Disentangling wages and consumer price inflation in Hong Kong"" by the staff in the Office of the Government Economist, and ""A structural investigation into the price and wage dynamics in Hong Kong"" by the staff at the Hong Kong Monetary Authority."</p>
Hungary	1.25		<p>The is the result of a wage shock on inflation based on our model.</p>
India			<p>The data for formal and informal sector wages is not available in India. Rural wages data is available.</p> <p>The Monetary Policy Report September 2022 Box II.2 presents ""An Examination of the Rural Prices and Wages Dynamics in India"". The analysis suggests the long-run coefficients of the relationship between rural prices and rural wages for the pre-COVID period are below unity in both the prices and wage equations (0.41 and 0.57, respectively), indicating less than proportional increase in prices in response to wage shocks and vice versa.</p>
Indonesia			
Israel	1.70		<p>Based on the BoI DSGE model, a wage increase of 10% (due to a labour supply shock and in addition to the steady state wage increase of 3% annually) in a given quarter, is expected to increase inflation (during the following year) by 1.7%.</p>
Korea			<p>According to the results of VAR model using the macroeconomic-level data, the effects of nominal wage growth on CPI inflation depend on inflation level. In high inflation regime(1990s), the impact of wages on prices is statistically significant. Meanwhile, in low inflation regime (2000~), the pass-through from wages to prices is relatively weak and not significant.</p>
Malaysia	0.40		<p>Note 1: 0.4 refers to % of core CPI level. Depending on model specifications, the estimations range from around 0.2 to 0.8; 0.4 refers to the average of the models. Note 2: The models used include single equation NKPC models and structural DSGE model. Note 3: "Wages" is defined as real wages per worker.</p>
Peru			<p>In general, no estimates have been made of the increase in wages based on inflation. Only the impact of increases in the minimum living wage on inflation has been estimated. The impact of a 10 percent increase in the minimum wage would generate, 12 months later, an increase of up to 0.73 percentage points in inflation.</p>
Philippines			<p>Data and assessments on formal and informal labour sectors are not available. Estimated impact is for internal use only.</p>
Poland	2.76	2.76	<p>We do not acquire nor estimate data on wages in informal sector that is why the estimate for formal sector and all wages is the same. This result is based on simulation run on the structural macro econometric model of the Polish economy (NECMOD). It assumes 10% increase in wages as a permanent level shift and reflects average CPI uplift in one year, in percentage points (2.76%).</p>

Question 6

Table 6

What is the estimated impact of a 10% increase in wages on CPI inflation within one year? (in %)			Use the space below for qualification or comments on the above responses:
	all wages increasing by 10%	only formal sector wages increasing by 10%	only informal sector wages increasing by 10%
South Africa	1.00		<p>A 10% increase in nominal wages has an average annual impact of 1 percentage point on CPI inflation in the current year and 3 percentage points one year after the shock. The peak impact is 3.1 percentage points six quarters after the shock.</p> <p>We only model total wages. Therefore, we do not have a separate impact for formal vs. informal.</p>
Thailand	0.40		<p>A 10 percent increase in unit labour cost (ULC) results in a 0.4 percent average increase in headline inflation over the next 4 quarters. The low estimated impact for Thailand is due to:</p> <ul style="list-style-type: none"> (i) low share of wage earners at 44% as most of the labour force in Thailand are self-employed (ii) low wage contribution to overall production costs (15 percent on average) (iii) low wage growth due to factors such as no labour unions
Türkiye			<p>CPI inflation has been rising since the end of 2020 and this rise accelerated at the end of 2021. Although both minimum wage and average wage year-over-year percentage changes outpaced the yearly CPI inflation for the latest month or quarter, wage indicators had been below CPI inflation for the last quarter of 2021, the first quarter of 2022 and the second quarter of 2022. Therefore, it is considered that an increase in nominal wages at a rate close to inflation shall not create an additional pressure on the inflation rate.</p>
Vietnam	0.20	0.10	0.10

Source: EMDGM 2023 Questionnaire

Question 7

Table 7

What is the importance of minimum wages and other salaries determined by the government in your country (eg public sector wages, etc)? Has this changed over the past 10 years?	
Argentina	Government determined salaries are useful as a threshold to guide private sector bargaining negotiations in terms of nominal expectations. Some social-related expenses of the government, are tied to the evolution of the minimum wage.
Brazil	Minimum wage is 1212 BRL and the average wage in Jan/22 was around 2600 BRL. Therefore, a large share of the employed population in the formal sector earns the minimum wage. When this variable is adjusted, other wages in the economy increase. However, a formal indexation of wages to the minimum wage is prohibited by Brazilian law.
Chile	Public employment represents 17% of total employment (average for 2022). Public employees' wages are subject to specific governmental laws for readjustment, which are negotiated yearly. The last readjustment was 6,1% for the period of 2021-2022. The proportion of workers who earn the minimum wage is close to 10% (the year 2022). Since 2016, the minimum wage is typically adjusted twice a year by specific laws (before that year, adjustments took place once a year). Between 2010 and 2022, it raised from CLP 172.00 to 400.000 CLP, which represents an average real annual growth of somewhat over 4%. The government does not directly influence other salaries of the economy.
China	China's Minimum Wage Regulations, which came into force on 1 March 2004, laid down the institutional arrangements for the state to intervene in the distribution of wages and guarantee the basic livelihood of low-income workers, and for the government to regulate economic activities and promote social equity. Since 2012, households' wage income has increased steadily, and the minimum wage has been raised from 996 yuan per month in 2012 to 1,755 yuan per month in 2021.
Colombia	In Colombia, the MW relative to median wage (Kaitz index, IK) is around 90%, while the average of this ratio is roughly 50% for the OCDE countries. The higher value of the IK in Colombia indicates that the level of the MW disproportionately exceeds the market wages, which means that the MW is quite high compared with labour productivity. Besides as a mechanism of fixation of the minimum legal wage, the adjustment in the MW is also used as a reference for increases in social security contributions, the minimum retirement pension, among others. This gives the MW a major role in the labour market and the adjustments of prices in general.
Czech Republic	Some studies have found that in Colombia the MW is a source of substantial rigidities and labour market distortions. For instance, there is evidence of its contribution to informality, job losses, and structural unemployment, as well as its negative impact on income inequality, monetary poverty, and inflation (see Arango et al 2022). Finally, wages in the public sector are adjusted according to annual nationwide labour agreements. Usually, the increases are linked to the past inflation. As 2022 Q2, the share of total employment represented by employees of the public sector is 4,2%. Reference: Arango, L. E. (ed.) et al (2022). Efectos macroeconómicos del salario mínimo en Colombia. Ensayos sobre Política Económica (ESPE), núm. 103. Banco de la República de Colombia.
Hong Kong	According to Average Earnings Information System (results from 1H2022) there are about 128 thousand workers who work for a minimum wage (when considering the total employment to be around 5 450 thousands this implies approximately 2% of all workers). About 18% of all workers work in sectors where state set the wages directly. Both minimum wage and state-employed workers share has been relatively stable over time.
Hungary	In Hong Kong, the statutory minimum wage (SMW) has come into force since 1 May 2011. Over the years, the SMW rate has increased from HK\$28 per hour initially to HK\$37.5 per hour now (for detailed changes, please see the excel file). The SMW rate has effectively protected those in low-income jobs against unduly low pay while allowing Hong Kong to remain competitive internationally. The implementation of SMW has helped alleviate the problem that workers with extremely low wages struggling to make ends meet and improve their living conditions. On public sector wages, adjustments to civil service pay will take into account all relevant factors, particularly private sector pay through different surveys.
India	According to our calculations, today the proportion of those earning the minimum wage is 8.3 percent and the proportion of those earning the expected minimum wage is 12.7 percent, so every fifth employee is directly affected by the measures of these wage raises. The proportion of those earning the minimum wage has decreased over the years. However, due to wage congestion, a total of 2.5 million people (54 percent of the employed) are estimated to see their wages rise as a result of these measures.
	The minimum wages along with secured employment of 100 days for unskilled manual labour prescribed under the MGNREGA is a powerful instrument for inclusive growth in rural India. In the formal sector, the last pay revision for central government employees (ie 7th Central Pay Commission award) came into effect from 1st July 2017.

Question 7

Table 7

What is the importance of minimum wages and other salaries determined by the government in your country (eg public sector wages, etc)? Has this changed over the past 10 years?	
Indonesia	The Government of Indonesia regulates the determination of the Minimum Wage. The government focuses on the interests of workers and entrepreneurs and business continuity. The minimum wage is held in Government Regulation Number 36 of 2021. The determination of the Minimum Wage aims to achieve the welfare of workers/ by considering the company's capabilities and national conditions. In addition, the Minimum Wage policy is intended to alleviate poverty and encourage Indonesia's economic progress.
Israel	In the medium-term public sector wages move closely in line with business sector wages. The public sector employs directly about 20% of all employees, and about 10% more are employed in businesses directly connected to the public sector. This structure has been broadly stable during the last decade. Minimum wages are set at 47.5% of the average wage, but occasional modifications to the formula are made in trilateral negotiations and expanded to the entire economy by government decree.
Korea	1) The minimum wage in South Korea has risen sharply over the past decade (4,320 Won in 2011, 9,160 Won in 2022), which seems to have had some impact on the overall wage growth. 2) Among all workers in 2011-21, less than 5% are employed in the government sector, so public sector wages do not have a large effect.
Malaysia	Public sector wages are likely to have become less important in influencing wage-setting dynamics for the private sector since the introduction of minimum wages in 2013, as the minimum wage level may be higher than salaries and wages earned by some civil servant workers. Minimum wages are reviewed every 2 years. In the past, minimum wages adjustments have not typically led to significant upward pressures to inflation, in part reflecting modest adjustments in 2015, 2017, and 2019. While the minimum wage revisions in 2022 were relatively more substantial, we do not expect the increase in wages to be pervasive as they affect a relatively small section of the workforce.
Peru	20 percent of the population with formal jobs in the private sector have incomes around the minimum wage. On the other hand, 30 percent of formal jobs in Peru belong to the public sector, and this percentage has not changed in the last decade.
Philippines	Developments on minimum wages are monitored closely by the BSP as it forms part of the information incorporated in our inflation forecast. The minimum wage determination in the Philippines is the primary responsibility of the National Wages and Productivity Commission (NWPC) and the Regional Tripartite Wages and Productivity Boards (RTWPBs). Minimum wage per region is reviewed periodically given the petition for wage increase and presence of supervening condition, such as an extraordinary increase in prices of petroleum products and basic goods and services. This has not changed in the past 10 years after the two-tiered wage system was implemented in 2012.
Poland	According to LFS, employment share of the public sector in Poland in the last 10 years is relatively stable amounting to ca. 25% of total employment. Around half of the public sector constitutes the so called 'budgetary sphere' (financed by central or local government) where wages are dependent, to a higher degree, on governmental regulations than in the remaining part of this sector. On the other hand, average monthly wages in public sector are significantly higher than in the private one, although the relation 'public vs. private' has decreased over time from ca. 117% in 2012 to 113% in 2021 and to 109% in the first half of 2022. The minimum wage in Poland in the past 10 years rose at a higher pace than the average wage. As a result, the relation between minimum wage and the average increased from 42% in 2012 to 49% in 2021 and is expected to further increase up to 52% in 2023. However, the share of workers earning minimum wage in Poland has been relatively stable within a range of 14-16% in the last decade, still it can slightly rise in 2023.
South Africa	The minimum wage is a recent development in the South African labour market, with its enactment into law having come into effect in 2019. Noting that 2020 was an unusual year in all respects owing to COVID-19, there hasn't been enough time to assess its impact versus its objective of protecting low-earning (vulnerable) workers in South Africa and providing a platform for reducing income inequality. The minimum wage initially excluded three low skilled types of employment including farm workers, domestic workers and expanded public works programmes employees as well as workers participating in learnerships, but in 2022 wages for domestic workers and farm workers were aligned with the national minimum wage whereas in previous years wages for these groups of employees were determined by sector specific minimum wages. Public sector wages on the other hand have trended above inflation and above average private sector wages, with the gap between public and private wages widening most notably in the last 6 years. This has given rise to a ballooning public sector wage bill which has been difficult to contain due to the above inflation wage agreements common in public sector wage settlements. Recently, government has embarked on a programme to consolidate its finances, with moderation in the wage bill a key component of the planned consolidation.

Question 7

Table 7

What is the importance of minimum wages and other salaries determined by the government in your country (eg public sector wages, etc)? Has this changed over the past 10 years?	
Thailand	After 2013 when minimum wage rate increased around 40% nationwide from THB 176 to THB 300, the importance of minimum wage had declined as the rate has slightly changed over the past 9 years, with the current rates average at THB 337. Nowadays, only 14% of workers are paid below the minimum wage. However, public sector wage could set the benchmark for private sector due to some competition to hire skilled workers. This is confirmed by the high correlation around 0.9 of wage rate between both sectors.
Türkiye	Minimum wage set by the Minimum Wage Determination Commission is an important reference point for collective bargaining both in the public and private sector in Türkiye. Its level is intensely debated and is used by the government as a reference point for various social transfers. The tripartite Minimum Wage Determination Commission sets minimum wage at least every two years since 1951 in Türkiye. Due to high inflation rates, from 1997 to 2015 the Commission determined the minimum wage twice a year, but annually since 2016 (with an exception in 2022). The regulations on minimum wage ensure that the Commission take social and economic conditions of the country, living condition indices for salaried workers, actual wages and the average living standards into account while determining the minimum wage. Article 5 of the Minimum Wage regulation forbids discrimination based on mother tongue, race, color, sex, disability, political opinion, philosophical belief, religion and similar reasons. Accordingly, the Commission sets the minimum wage level based on three main pillars: daily calorie need of workers, cost of living indices and food inflation. Moreover, the Commission tracks other developments and global economic trends.
Vietnam	The regulation of the minimum wage is very important for determining the actual salary of the employee in order to protect the minimum rights for citizens in the employment relationship. Since 2012, minimum wage in Vietnam had been increased 12 times.

Source: EMDGM 2023 Questionnaire

Question 8

Table 8

How have labour productivity and unit labour costs in your country evolved in recent decades?	
Argentina	Labour productivity has been falling for the past ten years, and in a similar way, but since 2018, have the unit labour costs decreased too.
Brazil	<p>Brazil does not have an adequate a ULC measure. Productivity data can be obtained, for example, here: https://ibre.fgv.br/observatorio-produtividade and here https://ibre.fgv.br/observatorio-produtividade/temas</p> <p>Annual data in: https://ibre.fgv.br/observatorio-produtividade/temas/categorias/pt-anual</p> <p>Despite cyclical movements, labour productivity (per worker) increased from 1992 to 2013, declined until 2016 and started a recovery in 2017. 2021 levels are 1.6% below the peak in 2013. From 2001 to 2010, the average productivity growth was 1.2% in average; it declined to 0.4% in 2011-2020</p>
Chile	<p>Regarding productivity the Central Bank of Chile has updated its projection of trend growth in June 2021. The changes are mainly due to a reassessment of the future evolution of TFP growth. Those estimates, as well as information from external sources, suggest that TFP has been showing a downward trend. Therefore, the trend growth projection scenarios consider a range of TFP growth between 0% (approximately the average of the last decade), and 0.7% (the average between 1997 and 2019). This scheme contrasts with the practice of previous estimates, in which future TFP growth was assumed to be equal to the historical average growth ("Estimation of Structural Parameters of the Chilean Economy," Background Paper, Monetary Policy Report, June 2021, p. 21). Structural parameters will be reevaluated in the current Monetary Policy Report (December 2022) where trend and TFP growth will probably be revised downwards.</p> <p>Regarding unit labour costs, between 2013 and the beginning of the COVID pandemic they had been growing at an average annual real rate somewhat over 1%. During the first half of 2020 they showed a significant decline, mainly explained by the sectors most affected by the pandemic (retail and transport services). Since mid-2020 onwards unit labour costs recovered but are still 5% below its pre-pandemic levels.</p>
China	In 2021, China's labour productivity per person posted 146,380 yuan, an increase of 80.3% from 2012 and an average annual growth of 6.8%, higher than the average annual GDP growth rate by 0.2 percentage point. In 2021, the average wage of urban employees was 106,837 yuan per person, an increase of 128.4% over 2012 and an average annual growth rate of 9.6%. Both labour costs and labour productivity have grown rapidly, but costs have risen faster than productivity, leading to an increase in unit labour costs in recent years.
Colombia	During the last decade labour productivity grew at an annual rate of 0.8% on average. Recently, during the covid-19 pandemic, labour productivity had an outstanding increase (close to 4.4%), due to the fact that the hours worked fell much more than the GDP. On the other hand, the real median wage grew at an annual rate of 1.1% on average in the last 10 years; so there have been increases in the unit labour cost, of around 0.4% on average.
Czech Republic	Both productivity and labour costs have been slowly but steadily rising. The growth in productivity had lagged behind the wage growth by a great margin in the second half of 2010s. Modest productivity in combination with solid wage growth have created inflation pressures that caused inflation rise even before today's inflation period. This was reinforced in the time of the covid closures, when implied wage growth (and with it also unit labor costs) stagnated, while labor productivity fell significantly. In 2020, nominal unit costs rose by 5.9%, while labor productivity fell by 3.8%.
Hong Kong	Over the past 20 years, the Hong Kong's labour productivity largely maintained positive growth, although the growth momentum moderated somewhat in recent years. A shift-share analysis using sectoral data suggests that sectoral upgrading (ie. the skill upgrades of individual sectors due in part to rising proportion of higher-skilled employment) has been the key determinant contributing to productivity growth.
Hungary	Meanwhile, the nominal unit labour cost (ULC) in Hong Kong, which is estimated by nominal index of payroll per person engaged multiplied by total employment and then divided by real gross domestic product (for data, please see the excel file), displayed a downward trend during 2000-2009 first as a result of the deflationary environment post-Asian financial crisis and later due to faster growth in output. The nominal ULC gradually climbed up during 2010-2019 alongside payroll rises and positive inflation, before edging down during the pandemic.
	While real productivity has doubled between 1981 and 2021, real labour costs have quadrupled during these decades in our country, which suggests that unit labour cost has increased in recent decades. However, the number of employed people increased by more than 800,000 between 2010 and 2021 contributed to a smaller increase in productivity (GDP/employee). In addition, the economy whitened significantly, which also means that the increase in wages did not necessarily differ so notably from productivity.

Question 8

Table 8

How have labour productivity and unit labour costs in your country evolved in recent decades?	
India	<p>1. In the long-term, India's labour productivity, however, has slowed down in line with the global trend. India's labour productivity grew on average by 2.7 per cent for the period 2017-19, compared with 6.5 per cent for 2014-16. For emerging markets, this rate declined from 2.2 per cent to 1.2 per cent for this period.</p> <p>2. The unit cost of labour in India may have fallen by 2.6 per cent (after adjusting for inflation) on average for the period 2020-2022.</p> <p>3. The unit cost of labour was showing signs of deceleration in India even before COVID. The average annual growth in the unit cost of labour for the period 2017-19 was 3.8 per cent, compared to 7.3 per cent for the period 2014-16. Estimates are based on Total Economy Database (The Conference Board) and India KLEMS.</p>
Indonesia	<p>In Indonesia, developments regarding labour productivity have experienced significant results in recent years. A series of structural reforms continue to be strengthened by the authority to increase efficiency and productivity in order to achieve higher, sustainable economic growth. Structural policy reforms aim to create new sources of growth, increase local value added; greater integration between sectors and regions; and promote inclusive growth.</p>
Israel	<p>Labour productivity in Israel has increased in recent decades at a very similar rate to the average of the OECD.</p>
Korea	<p>Labour productivity (*) and unit labour cost (**) both increased in 2021 compared to 2011, and the increase in unit labour cost is larger than the increase in labour productivity.</p> <p>* labour productivity index (except for agricultural sector, 2015=100): '11 104.5 '21 110.0</p> <p>** unit labour cost index (2015=100): '11 93.08 '21 106.76 "</p>
Malaysia	<p>Unit labour costs (as measured by total wage bill in proportion to sales) have been steadily declining since 4Q 2021 (in the manufacturing sector) and 2Q 2022 (in the services sector), in line with improving labour productivity trends in 2022. However, this may to some extent reflect cyclical effects from the recovery from the pandemic. At the same time, the share of compensation of employee to GDP have declined in 2021, as the economy partially recovered from the pandemic (2021: 34.8%; 2020: 37.1%; 2019: 35.9%).</p>
Peru	<p>On average, labour productivity grew 3.3 percent between 2004 and 2019. Meanwhile, the unit labour cost for the period 2010 - 2019 grew by 2.9 percent (In 2020 decreased 4.6 percent due to the drop in labour income).</p>
Philippines	<p>Labour productivity growth was stable in the early 2000s and then accelerated from 2010 to 2019. However, the gains in labour productivity growth over the past two decades was reversed during the pandemic. Labour productivity in the Philippines from 2001 to 2008 grew at an average annual rate of 2.2 percent. In the aftermath of the Global Financial Crisis in 2009, labour productivity contracted by 1.4 percent but subsequently bounced back to a growth of 4.4 percent in 2010. The decade prior to the pandemic (ie 2010 to 2019) posted an acceleration in labour productivity which expanded at an average annual rate of 4.5 percent. Labour productivity dropped by 3.0 percent in 2020, and further contracted by 6.0 percent in 2021. [Note: Labour productivity is computed as Gross Domestic Product per employed person. Official data on unit labour cost is not available.]</p>
Poland	<p>Labour productivity has been growing systematically. In the 2000s and 2010s the average annual growth amounted to about 3%. During the pandemic labour productivity dynamics fell below -2% annually, yet since Q2 21 it rebounded to positive numbers of ca. 5-6% y/y.</p> <p>The growth rate of unit labour costs (ULC) has been relatively stable. In the 2000s the average annual growth was equal to 1.5%, but the first half of that decade demonstrated a negative ULC dynamics, while the second half faced a sharp increase in 2008. In the 2010s the average annual growth went slightly up to ca. 2.0%. In 2020, as a result of a drop in GDP due to the Covid-19 outbreak and an introduction of the lockdown in the NE, the ULC growth rate accelerated, indeed (above 7% in 2020). However, in mid-2021 ULC dynamics have already declined, stabilizing at an average level (below 5% in 2021).</p> <p>Until mid-2022 labour productivity has been growing quite dynamically, so no significant acceleration of ULC growth rate has been noticed (3.0% y/y in Q1 22, 7.2% y/y in Q2 22).</p>

Question 8

Table 8

How have labour productivity and unit labour costs in your country evolved in recent decades?	
	Average change in labour productivity in each decade:
	1971-1980: -0.6
	1981-1990: 1.2
	1991-2000: 1.9
	2001-2008: 2.4
	2010-2019: 1.1
	2021-2022: 4.3
	Average change in unit labour costs in each decade:
	1971-1980: 13.2
	1981-1990: 17.4
	1991-2000: 11.0
South Africa	2001-2008: 6.7
	2010-2019: 6.0
	2021-2022: 2.0
	Labour productivity growth has increased noticeably in the period since the adoption of inflation targeting but prior to the global financial crises, registering an average of 2.4% in the period 2001-2008, up from 1.9% in the 1991-2000 period and -1.2% in the 1981-1990 period. This trend is consistent with the performance of GDP growth that benefited from the lifting of sanctions in the early 90s to the commodity boom pre-GFC. However, post-GFC the South African economy has struggled, experiencing trend growth slowdown until just before the outbreak of the Covid-19 pandemic. Consequently, productivity has also slowed to just 1.1% over the period 2010-2019. Post-Covid-19, the country has experienced a faster than anticipated recovery in growth that was not accompanied by similar growth in employment growth. As a result, productivity has picked up to an average of 4.3% between 2021 and 2022.
	Similarly, the unit labour cost trend has benefited from the above trend in productivity but moreover, it has benefited from better inflation outcomes. Since the adoption of inflation targeting, trend inflation has decelerated from above the upper target limit of 6% to below the 4.5% target midpoint just before Covid. Consequently, the unit labour cost trend has decelerated from an average of 11% in the period 1991-2000 to an average of just 2% post-Covid.
Thailand	Labour productivity grew from 2.3 %CAGR in the 2000s (except 2000) to 3.3 %CAGR in the 2010s, in line with unit labour costs, which also grew from 1.3 %CAGR to 1.8 %CAGR during the same period.
Türkiye	Since 2014, while labour productivity has tendency to increase, unit labour cost has a declining trend.
Vietnam	In recent years, labour productivity has improved significantly, but Vietnam's labour productivity growth rate is not fast enough to close the gap with other countries in the region. Due to the effects of aging and rising labour costs, Vietnam will soon lose its current comparative advantage in cheap labour.

Source: EMDGM 2023 Questionnaire

Question 9

Table 9

How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglobalisation) to affect labour market and wages?	
Argentina	Long term trends should consider that the demographic dividends projections will start to negatively impact the labour market.
Brazil	The main long-term trend we highlight is population aging in Brazil. Working age population growth will decline in the next years and this will influence the labour force participation rate, for example.
Chile	In terms of technical innovation and automation, we expect it to have a negative impact on employment in the short term, as the high-skill positions generated by the automation process are significantly fewer than the low-skill ones that are destroyed. In a general equilibrium setting for Chile, Rivera (2019) finds that a 1% decrease in the international price of robots would have a short-run negative impact between 0.05% and 0.25% in labour and wages. In the long term, the effect is unclear as it will depend on the economy's ability to relocate the lost positions. Frey and Osborne (2017) estimate that with new developments, 57% per cent of jobs across the OECD are susceptible to automation. How this would affect average wages, in the long run, is not evident since it will depend on whether lost employments are reallocated and on which wage. Regarding demographics, Chile is in the process of ageing of the population. The working-age population older than 45 has continuously increased from 45% in 1992 to 51% in 2017 (*). However, the aging process is being delayed with the recent wave of migration. According to governmental sources, migrants represent 3,4% of the total population (2017). Additionally, the 2017 Census shows that 80% of migrants are part of the labour force, representing 8,8% of the total labour force. This aside, demographic changes push the unemployment rate downwards because workers younger than 25 (with a higher unemployment rate than the average) tend to represent a smaller share of the labour force. Estimations indicate that with the labour force composition of 1992, the unemployment rate of 2018 would have been 1.5 higher (*).
China	In the long run, the slowdown of population growth and the ageing problem would reduce labour supply and labour participation and pushing up labour costs. Technical innovation and automation would not only lead to changes in overall labour demand and wages, but also lead to structural changes in the labour market by improving production efficiency. In particular, it would further increase the demand for labour for non-automated jobs and jobs that complement robot skills, while replacing some automatable jobs. Both the demand and supply of high-skilled workers will increase, and the demand and supply of low-skilled workers will decrease, further exacerbating the polarization of the wage income between high-skilled and low-skilled workers.

How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglobalisation) to affect labour market and wages?

One of the main facts that has shaped the labour market trends in Colombia is the massive immigration from Venezuela. In 2013, migrants from Venezuela as a share of the working-age population in Colombia were roughly 0.2%; this share rose up to 7% by 2022. Given the demographic profile of immigrants, characterized mainly by people of working age, the massive inflow of migrants helped to slow down the process of population aging in Colombia. Further, the migratory wave, particularly since 2018, modified the decreasing trend in population growth due to the secular drop in the birth rate. The immigrant population has tended to stabilize during the last year, and a better outlook for the Venezuelan economy would imply that this population would not continue increasing at the rate observed in previous years.

Studies on the impact of migration from Venezuela on the Colombian labour market show relatively minor displacement effects in terms of employment for native workers; and negative hourly wage effects concentrated on less educated natives (see Tribin et al 2020 and Lebow, 2022 for comprehensive discussions). Further, it is also documented that Venezuelan immigrants face more frictions in the labour market, producing a larger extent of misallocation of this workforce, that prevent immigrants from working in their desired occupations (Pulido, 2020). By removing the additional frictions immigrants face, Colombian aggregate labour productivity could increase permanently up to 0.4%.

Besides immigration, other factor shaping labour market dynamics is the automation process, which, as noted in response 3, it has been accelerated by the pandemic. As stated earlier, a faster automation could have long-run consequences on structural unemployment and informality, to the extent that the mismatch between the current skills of workers and those required by a labour market that is now more prone to automation is enhanced.

Colombia

Finally, regarding the whole globalization process, the evidence is scarcer. There are impact assessments of particular episodes of trade liberalization, such as the induced by the unilateral tariff reduction in 2010 and the free trade agreement signed between Colombia and the United States in 2012 (Bonilla et al 2022). The results show that import competition generate reallocation of workers across sectors. In the manufacturing sector, there are decreases in employment in a similar magnitude than foreign inputs increase it; with the adverse employment effects driven by firm exit. At the same time, foreign inputs increase non-college educated employment in services, by inducing firm entry.

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Czech Republic

There is no signal of sudden changes in the wage dynamics in years ahead. There are no signs of big foreign investment that would affect the wages economy-wide. The government also isn't introducing any major policy that would have any potential to change the long-term wage dynamics development (such as immigration laws, return to job market after maternity leaves, laws about retirement or for example taxation). Since the Czech Republic is highly industrial-oriented country, there is a risk of changes in the labour market connected with an automation of manufacturing, but all these changes are only in a form of speculation or risk with no quantifiable impact for now.

Hong Kong

In the long term, population aging is going to exert downward pressure on labour force / labour force participation rate, while technological progress and innovation, as well as continued investment in human capital, will help support labour productivity growth and wages. In addition, changes in consumption behaviors or business models post-COVID-19 may expedite adoption of innovation and technology in daily lives and business operations, such as online shopping, remote work and distance business, which may lead to changes in demand for talents for different jobs.

Hungary

Demographic burden is one of the issues the Hungarian labour market has to face as the number of people participating in the labour force is expected to decrease in the upcoming years. Technical innovation and automation may help the labour shortage in Hungary by substituting defined tasks and jobs.

Question 9

Table 9

How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglobalisation) to affect labour market and wages?	
Indonesia	In the medium to long term, Indonesia has the potential for the economy to benefit from the demographic bonus. Indonesia's demographic bonus provides an advantage on the supply side through the relatively large size of the productive age population, which increases the potential number of workers. To maximize the potential of the demographic bonus, the absorption of workers plays a vital role. An increase in the amount of incoming investment, accompanied by an able workforce that can meet the needs of industry, including technical innovation and automation, is crucial for the absorption of workers and, ultimately, a brisker pace of economic growth. Given the current trend of key producers relocating their production facilities to emerging market economies in the mid of globalization, it is vital that Indonesia create a more conducive business climate while boosting domestic investment, thereby increasing the chances of Indonesia becoming a new production base and will have an impact on the labour market and wages.
Korea	1) Population aging is expected to have a significant impact on the Korean labour market. As older population increases, the labour force participation rate and employment rate will fall, and the working-age population is expected to gradually decrease. 2) The effect of technical innovation or automation on labour market is unclear up to now. Although a lot of academic and policy papers show the possibility of replacing between automation and labour, their results are unilateral, and no consensus has been reached.
Malaysia	On demographics: Although Malaysia is set to become an aging society in the next decade, the Malaysian labour force remains relatively young (Proportion of labour force <55 years old: 91.7%; Advanced economies*: 74.9%), while women's labour force participation is still recovering from pandemic-induced shocks (3Q 2022: 55.8%, 4Q 2019: 56.9%). These two factors keep the supply of workers forthcoming, alongside the gradual return of migrant workers. This would serve to contain wage pressures, particularly when combined with structurally low collective wage bargaining and coverage of wage indexation agreements. On the other hand, an increasingly educated labour force, combined with greater automation and digitalisation, would eventually raise productivity and ultimately wage levels in the long term. While technical innovation is advancing at a more rapid pace and more businesses are automating and digitalising than ever before (from anecdotal insights and industrial engagements), we do not currently expect these trends to induce disorderly dislocations of workers in the labour market, as they are expected to occur at a gradual pace. Additionally, there are various re-skilling and up-skilling programmes available to facilitate an orderly transition and reallocation of affected workers. The impact of reconfiguration in GVC on Malaysia is still unclear. While there are risks of deglobalisation weighing on trade, Malaysia could also benefit from diversion of trade and investment, which would be positive on the labour market. * Includes USA, Canada, Sweden, Australia, South Korea, and Japan.
Peru	It is to be expected that the lower growth of the population in Peru will lead to a lower increase in the economically active population and employment. On the other hand, technological innovations could generate greater inequalities in the labor market. Due to the low human capital of a large proportion of the population that participates in the labor market, they could not option jobs with higher benefits, which would lead them to take jobs in sectors with low productivity and generally in the informal sector
Philippines	Digitization has radically altered how firms and economic agents operate during the pandemic; hence it is expected to likewise reshape the labour market landscape going forward. Demand for workers possessing digital skills is seen to expand in the coming years as this would be crucial in complementing firms' adoption of digital technologies to their business functions. Information Technology (IT)-related jobs are among the most in-demand jobs in the Philippines based on separate surveys conducted by the Department of Labour and Employment (DOLE) and LinkedIn from 2020 to 2022. However, a report by the Worldbank suggests that the country's labour force have limited digital skills and low level of digital literacy, which poses substantial skills shortage for IT-related jobs. This is also confirmed in the World Digital Competitiveness Ranking 2022 wherein the Philippines ranked 42nd in digital/technological skills indicator and 56th in the overall index for digital competitiveness among the 63 countries that were studied. Efforts to bridge the digital skills gap and upgrade existing technical skills of the Philippine labour force is imperative to address the current skills mismatch and to respond to the growing demand for digitally skilled workers.
Poland	The long-term trends in demographics will lead to a gradual decrease in the total population and negative changes in the population age structure, in particular from the labour market perspective. In the future these tendencies will result in population ageing and significant reduction in the domestic labour supply. In a long run an improvement in job quality, both regarding domestic and foreign workers, appears to be one of the crucial factors required for further labour productivity growth. Job quality improvement could be attained by i.a. by promoting lifelong learning and making the education system more responsive to labour market needs. With regard to productivity improvement, supporting the job automation and digitalization processes should be recommended, especially among smaller firms. ICT implementation – together with active migration policy measures – might also mitigate future labour force shortages, by decreasing demand for labour. At present, however, the level of automation and robotization among Polish enterprises remains relatively low.

Question 9

Table 9

How do you expect long-term trends (demographics, technical innovation, automation, globalisation/deglobalisation) to affect labour market and wages?	
South Africa	<p>Domestically, working age population growth has been rising faster than employment growth for a number of years resulting in sharply higher unemployment. Significant structural reforms are required to create sufficient dynamism in the economy to absorb those currently unemployed as well as new entrants to the labour market.</p> <p>Another characteristic of the South African labour market is the high unemployment among the youth (aged 15-34). In 2022Q2 youth unemployment averaged 51.3% compared to the national unemployment rate of 33.9% in the same period. High youth unemployment often results in the youth withdrawing completely from the labour market, ie becoming "inactive." This partly explains the wide gap between the narrow (official) unemployment rate and the broader unemployment rate. This has a further impact on lost potential earnings, greater social security cost, lower skills and productivity and slower economic growth in the future.</p> <p>While automation poses a potential risk to employment outcomes particularly given the low skill base for the majority of the workforce, to date there is no notable disruptions to the labour market and wages. However, this risk should be monitored closely going forward.</p> <p>The domestic labour market is relatively insulated and the impacts of globalization/ deglobalization are likely to remain minimal in the near term.</p>
Thailand	<p>Long term trends such as demographic change and technological advancement are expected to affect labour market. According to UN population projection, we expect that aging society will reduce labour force 1 % per year after 2070. Digital disruption will result in some jobs being replaced by technology and create demand for new set of skills.</p>
Türkiye	<p>Türkiye has a relatively young demographic structure in comparison with the OECD countries. The share of 15-24 age population in total population is 15.4% which is the fifth highest ratio among the OECD member countries. However, Türkiye's population is growing older as well like other countries in the world. The share of 15-24 population in total population was 17.1% in 2010. Despite this fall, Türkiye has one of the most dynamic population structure. True education and investment policies will enhance the potential growth of Türkiye. Additionally, well-educated young population will have more tendency to be interested in technical innovation, automation and digital skills. These are expected to increase the job opportunities in the world and create the productivity gains. Nevertheless, because the automation requires less labour, it may increase the unemployment especially for low skilled workers. Improving skills of the people is expected to mitigate this effect of the automation.</p>
Vietnam	<p>Vietnam has been implementing national science and technology tasks, supporting businesses in research, innovation, technology transfer and application to improve productivity. We are building and implementing science and technology tasks, plans to improve our labour productivity and total factor productivity (TFP) based on science, technology and innovation. At the same time, we are promoting institutional reform; continue to promote the development of high-quality human resources associated with innovation.</p>

Source: EMDGM 2023 Questionnaire

Question 10 (part 1)

Table 10.1

How important are the following labour market indicators for monitoring and forecasting at your institution?															
	unemployment rate	labour force participation	average wage rate	minimum wage	total employment	under-employment rate	youth unemployment	migration flows	sectoral employment	employment in informal sector	age profile of labour force	job vacancy rates	average hours worked / employee	employment components of PMIs	
Argentina	important	somewhat important	very important	somewhat important	average importance	average importance	average importance	not at all important	average importance	average importance	average importance	average importance	average importance	statistic not available	average importance
Brazil	very important	very important	very important	important	very important	average importance	not at all important	not at all important	average importance	average importance	not at all important	statistic not available	somewhat important	not at all important	not at all important
Chile	very important	very important	very important	not at all important	very important	average importance	somewhat important	important	very important	important	somewhat important	very important	average importance	average importance	very important
China	very important	important	important	important	very important	average importance	very important	important	important	important	average importance	average importance	important	average importance	average importance
Colombia	very important	important	important	very important	very important	somewhat important	average importance	important	important	important	somewhat important	very important	important	statistic not available	important
Czech Republic	important	somewhat important	very important	somewhat important	average importance	somewhat important	somewhat important	somewhat important	average importance	statistic not available	somewhat important	average importance	somewhat important	statistic not available	somewhat important
Hong Kong	very important	very important	very important	important	very important	important	important	important	important	statistic not available	important	important	important	important	important
Hungary	very important	important	very important	important	very important	somewhat important	average importance	statistic not available	important	statistic not available	somewhat important	important	somewhat important	statistic not available	somewhat important
India	important	important	important		important		important				important			important	
Indonesia	important	somewhat important	important	important	important	important	not at all important	somewhat important	important	important	somewhat important	important	important	statistic not available	somewhat important
Israel	very important	somewhat important	important	somewhat important	important	somewhat important	not at all important	somewhat important	somewhat important	not at all important	not at all important	very important	somewhat important	somewhat important	somewhat important
Korea	very important	important	very important	important	very important	somewhat important	average importance	somewhat important	important	statistic not available	important	very important	somewhat important	not at all important	somewhat important
Malaysia	very important	very important	very important	very important	very important	important	important	somewhat important	important	somewhat important	average importance	very important	somewhat important	somewhat important	very important
Peru	not at all important	somewhat important	very important	important	somewhat important	somewhat important	somewhat important	somewhat important	average importance	important	somewhat important	statistic not available	somewhat important	important	somewhat important
Philippines	very important	important	important	very important	important	important	important	statistic not available	important	statistic not available	important	statistic not available	important	important	statistic not available
Poland	very important	very important	very important	important	very important	important	somewhat important	very important	important	somewhat important	very important	important	important	very important	average importance
South Africa	important	important	very important	important	very important	statistic not available	not at all important	not at all important	important	not at all important	not at all important	somewhat important	statistic not available	important	statistic not available
Thailand	very important	average importance	very important	average importance	important	average importance	average importance	important	important	average importance	somewhat important	statistic not available	important	average importance	average importance

Question 10 (part 1)

Table 10.1

How important are the following labour market indicators for monitoring and forecasting at your institution?														
unem- ployment rate	labour force participa- tion	average wage rate	minimum wage	total employ- ment	under- employ- ment rate	youth unem- ployment	migration flows	sectoral employ- ment	employ- ment in informal sector	age profile of labour force	job vacancy rates	average hours worked / employee	employ- ment compo- nents of PMIs	distribu- tion of wage increases
Türkiye	important	important	very important	important	important	average importance	somewhat important	somewhat important	important	important	somewhat important	important	important	important

Source: EMDGM 2023 Questionnaire

Question 10 (part 2)

Table 10.2

How important are the following labour market indicators for monitoring and forecasting at your institution?							Use the space below if you want to add any qualification or comment on the above responses:
	rate of wage indexation	outcome of collective agreements	unit labour costs	any other (First option)	Answers for "any other (first option)"	any other (Second option)	Answers for "any other (second option)"
Argentina	very important	very important	important	informal income	important		The monitoring of the labour market indicators is a key input for the CPI forecasting models at the CB. A lot of focus is placed in the wage bargaining process
Brazil	statistic not available	important	statistic not available				
Chile	statistic not available	not at all important	very important				
China	average importance	average importance	important				
Colombia	statistic not available	statistic not available	important	labour flows	very important	hiring expectations	very important
Czech Republic	statistic not available	somewhat important	important	Social insurance data	statistic not available	Leading indicators	average importance
Hong Kong	statistic not available	statistic not available	important	Online job advertisement	important		For more details on online job postings, please see "Box 3: A big data analysis of Hong Kong's labour demand using online job advertisements" in HKMA Half-yearly Monetary and Financial Stability Report September 2020.
Hungary	important	statistic not available	important	inflation expectations	important	tightness of the labour market	very important
India							Employment and unemployment data are monitored for assessing labour market conditions, but they are not being used for forecasting purposes due to non-availability of timely and high frequency official data covering the entire economy.
Indonesia	important	important	important				
Israel	not at all important	important	average importance				
Korea	somewhat important	somewhat important	somewhat important	employment by status of worker (regular, temporary, self-employed)	very important	flow rates (eg, employment to unemployment)	very important
Malaysia	statistic not available	statistic not available	somewhat important				
Peru	statistic not available	somewhat important	somewhat important				
Philippines	statistic not available	statistic not available	statistic not available				Unemployment rate and minimum wage increases enter into the BSP's main forecasting and scenario-building models. Other available labour indicators are monitored to assess demand conditions and the quality of economic recovery following the pandemic.

Question 10 (part 2)

Table 10.2

How important are the following labour market indicators for monitoring and forecasting at your institution?							Use the space below if you want to add any qualification or comment on the above responses:
	rate of wage indexation	outcome of collective agreements	unit labour costs	any other (First option)	Answers for "any other (first option)"	any other (Second option)	Answers for "any other (second option)"
Poland	somewhat important	somewhat important	very important				
South Africa	statistic not available	important	very important				Variables rated as very important are those that feature in our main forecasting model. The other variables typically feature in conjuncture analyses.
Thailand	statistic not available	somewhat important	somewhat important	labour mobility	average importance		Unemployment rate and wage rate are ranked the most important indicators because wage rate is relevant to inflation. In addition, unemployment rate is the most powerful slack indicator to explain wage rate according to econometric results.
Türkiye	important	important	very important				
Vietnam							We do not have enough information to answer above questions.

Source: EMDGM 2023 Questionnaire

Question 11

Table 11

<p>Could you provide a brief description of how labour market indicators enter into your main models and forecasting? If possible, please highlight any recent change you have made in this respect.</p>	
Argentina	The wage growth enters in univariate OLS, VAR and VEC models of Headline and Core inflation. In the estimation of the Phillips Curve enters the output gap estimated by Krysa and Lanteri (2018) which includes a block related to the labour market dynamics.
Brazil	Short-term forecasts for unemployment rate and payroll (net job creating) are provided by specialists who monitor the labour market data using reduced-form models and other sources of information. These two variables together with capacity utilization rate in the manufacturing sector and GDP are used to compute the output gap measure (an unobserved variable) along with the other equations of the small scale semi-structural model, estimated with Bayesian techniques, in order to forecast inflation.
Chile	We use cointegrated VAR models for short-run forecasting, including employment, wages, and other relevant macro variables. We use these models to forecast two quarters ahead. For medium-run forecasts we use structural models. Labour market variables are introduced in the structural model, XMAS, which has search and matching frictions following the seminal work by Mortensen and Pissarides (1994). In this type of labour market specification, firms publish vacancies to hire workers, and the unemployed seek employment, which allows inputting an unemployment rate and other relevant labour market variables into the model. In addition, pairings are allowed to be broken both endogenously, as they respond to economic shocks, and exogenously. Financially constrained and unconstrained workers have the same productivity. For simplicity, it is assumed that an agent negotiates on behalf of workers' single contract based on the average productivity. In this context, all the workers receive the same salary and work the same number of hours. The evolution of employment, on the other hand, depends on the number of employees who lose their jobs and on new pairings. The latter is a function of the number of unemployed and the vacancies that companies decide to open. The greater the number of workers looking for work and the greater the number of vacancies available, the greater the creation of new jobs.
China	When forecasting the impact of labour market on economic growth, the quantity and quality of labour supply are usually considered. The former is mainly measured by the total employment, while the latter is mainly measured by the education level of the employed. On the one hand, workers with a certain level of education can directly improve economic output, and workers with a higher level of education have a higher marginal output level. On the other hand, human capital promotes the total factor productivity through innovative activities, and human capital has the function of "technology carrier". In the Cobb-Douglas production function, the former plays its role through L (labour force), and the latter through A (technology), which can be realized by constructing the functional relationship between indicators such as geographical distribution of human capital or structural density and technology.
Colombia	Some labour market indicators, such as unemployment, employment, and labour participation rates, are used to generate short-term forecasts of the unemployment rate. In turn, these short-term forecasts, along with GDP forecasts, feed a battery of models mainly based on Okun's law relations that are used to produce medium-term forecasts of the unemployment rate. The results of these models, along with forecasts of core inflation and other macroeconomic variables, as are used to estimate and forecast the non-accelerating inflation rate of unemployment (NAIRU). The unemployment gap obtained from the NAIRU and unemployment forecasts, in turn, feeds models that nowcast the output gap, which is an essential input for the main models for monetary policy implementation.
Czech Republic	We process all the data, that is available, and prediction based on several simple or medium-complicated models. The key indicator is then used again in the structural DSGE model. The endogenous prediction is then return back to econometric models and used for calculation of all-time series.
Hong Kong	In our in-house forecasting model for the Hong Kong economy, we have a Phillips curve equation which links inflation (excluding housing rental and food) to unemployment gap.
Hungary	In general, we are flexible and adopt a holistic approach by looking at a host of different indicators (for example, see question 10 above) when formulating models or doing forecasts. In recent years, we have also used data science (eg web-scraping) to explore big data of online job advertisements to detect labour demand changes in a more timely manner during the COVID-19 pandemic.
India	Labour market indicators such as unemployment rate, labour force participation and rural wage rate are used to assess the labour market situation. The impact of wage shock (proxied by rural wage) as a driver of inflation (ie in terms of deviation of CPI inflation from its deterministic trend) is assessed in the Monetary Policy Report (MPR) published by the RBI.

Could you provide a brief description of how labour market indicators enter into your main models and forecasting? If possible, please highlight any recent change you have made in this respect.	
Indonesia	<p>Bank Indonesia involves labour market indicators and monitors employment dynamics in economic assessments. Labour market indicators are one of the main economic variables that determine the level of prosperity, the standard of living, and the poverty level of an economy. At the same time, increasing prosperity and living standards and minimizing poverty is one of the main goals and is included in the economic policy framework. As the monetary authority, Bank Indonesia needs to analyze the labour market thoroughly and granularly and consider the impact of labour market development on economic growth and inflation to determine the necessary policies to maintain stability and recovery momentum. Bank Indonesia needs to consider and monitor various indicators for labour market conditions. Monitoring multiple indicators of the labour market is important to assess more on the economic phenomenon change, such as how the shift in unemployment rate represents the labour market slack caused by the Covid-19 pandemic, the scarring effect in labour on sectoral and industries, and the difference of labour conditions that will impact on the capacity of the work as a factor of production to support economic recovery.</p>
Israel	<p>The main labour-market indicators affecting our recent staff-forecasts are:</p> <ol style="list-style-type: none"> 1. Tight labour market with low unemployment and high employment rates (in main working age population and also compared with pre-Covid trends). 2. High vacancy rate which is expected to support employment also against the background of monetary-policy tightening. Thus, the staff-forecast assumes only a minor increase of unemployment (to 3.5%, compared with 3.1% today). 3. Relatively low real wages (due to inflation surprises) which are expected to contribute to a moderation of private consumption.
Korea	<p>We use the theory of equilibrium unemployment and flow-based forecasting model to predict unemployment rate and the number of workers employed. The main variables for forecasting are flow rates such as employed to unemployed, unemployed to inactivity and so on.</p>
Malaysia	<p>Labour market indicators and projections are incorporated in models and framework used to forecast growth and inflation, as well as output gap. On growth, labour market indicators including income, employment, and unemployment rate are used in the forecast of private consumption. In more recent times, shocks to the economy are prompting a revisiting of consumption dynamics (including marginal propensity to consume by household income brackets). On inflation, the forecast incorporates indicators such as labour market slack and wage growth. Recently, the high-cost environment amid strong demand conditions prompted a revisiting of Philips curve to take into account potential non-linearity. On output gap, NAIRU estimation models are being revisited to take into consideration pandemic-induced shocks and indicators for demand and structural changes like increased frictions in the labour market. In terms of broad analyses, key indicators such as employment, unemployment rate, wages and labour productivity were also assessed to identify the extent of slack and tightness in labour market. Recently, more granular indicators, including labour force participation, employment, and unemployment rates by different demographics are also tested to account for pandemic-induced frictions.</p>
Peru	<p>Labour market indicators are part of the calculation of potential GDP. Labor and labor intensity use help us to characterize the dynamics of the economics supply, and, in this regard, it is instrumental to identifying demand pressures. The most recent change corresponds to the introduction of labor informality, which has implications in aggregated productivity as labor productivity is heterogenous across formal and informal sectors.</p>
Philippines	<p>Unemployment rate is used in the Policy Analysis Model for the Philippines (PAMPh). Specifically, in the PAMPh, the unemployment gap is determined mainly by the output gap. A positive output gap reduces the unemployment rate, while a negative output gap contributes to a higher unemployment. As the endogenous policy rule in the model helps close the output gap, it does help bring the unemployment rate to its long-term trend.</p> <p>Meanwhile, in assessing price pressures in the domestic economy, the BSP closely monitors wage dynamics, which are duly considered in the BSP inflation models. The BSP's baseline inflation forecast incorporates adjustments in minimum wages that are consistent with the country's labour productivity growth and historical wage adjustments. Adjustments in non-agricultural minimum wage are based on the wage orders issued by the Regional Tripartite Wages and Productivity Boards in various jurisdictions.</p> <p>Other available labour indicators are monitored/assessed as necessary. During the COVID-19 pandemic, the BSP has increasingly looked at the quality of employment generation to gauge the extent of the economic recovery as well as the possible long-term scarring given the pandemic's impact on actual labour supply and the economy's productive capacity.</p>

The NECMOD model, the main tool for macroeconomic projections and analyses in Narodowy Bank Polski, features a fully-fledged labour market block with participation rates and non-accelerating wage rate of unemployment (NAWRU), endogenously determined.

The labour market indicators which enter NECMOD are listed below.

The NECMOD variables determined by the labour market indicators are presented below each indicator (sign (+) or (-) stands for the positive or negative impact of the labour market indicator).

•unemployment rate:

- wage growth (-)
- unemployment benefit (+)

•labour force participation (decomposed into four age groups in order to account for shifts in the labour supply tied to demographic factors):

- unemployment rate (-)

- potential GDP (+)

•average wage rate:

- selected general government revenue and expenditure items (i.a. tax and social security contributions, pensions, general government wage fund) (+)

- current account net remittances (-)

- production capital of enterprises in equilibrium (-)

- labour force participation (+)

- households' disposable income (+)

- unit labour costs (+)

•minimum wage:

- average wage rate (+)

- labour force participation (+)

- the share of employed, receiving minimal wage (+)

- NAWRU (+)

•total employment:

- labour force participation (+)

- unit labour costs (+)

- households' disposable income (+)

•sectoral employment - the model distinguishes between the number of persons employed in agriculture and in the non-agricultural sectors.

• the share of persons employed in agriculture in the total employment:

- operating surplus of household (+)

- labour force participation (+)

• the share of persons employed in the non-agricultural sectors in the total employment:

- wage fund (+)

•migration flows - immigration inflow of non-EU residents:

- potential GDP (+)

- average wage rate (-)

- current account net remittances (-)

•unit labour costs

- CPI inflation (core inflation, food prices and energy prices) (+)

- gross fixed capital formation deflator (+)

•NAWRU

Poland

Question 11

Table 11

<p>Could you provide a brief description of how labour market indicators enter into your main models and forecasting? If possible, please highlight any recent change you have made in this respect.</p>	
	<ul style="list-style-type: none">- potential GDP (-)- wage growth (+)
South Africa	<p>The SARB uses the Quarterly projection model (QPM) as its main forecasting model. In this model the labour market price pressures are captured via the real unit labour cost gap, which measures compensation relative to productivity.</p> <p>As a measure of slack, the QPM uses the output gap instead of the unemployment rate in part because unemployment in South Africa is largely structural in nature.</p> <p>The SARB also makes use of the ""core"" econometric model which is a stylized structural error-correction model estimated on South Africa's historical economic relationships. In the core model employment in the private sector is determined in the long run by both real wages (data obtained from the Quarterly Employment Survey) as well as overall economic activity as proxied by the gross domestic product (GDP).</p>
Thailand	<p>In the Bank of Thailand macro econometric model, labour market indicators such as average earnings and minimum wage are used with others economic variables to estimate total working hours and total earnings respectively. Total earnings will be used to indicate private consumption via income channel to eventually estimate the GDP.</p>
Türkiye	<p>In our current models, an inverse relationship between unemployment gap and output gap is defined in line with Okun's Law. To associate the changes in wages with the unemployment gap, a wage Philips curve is defined that captures the backward indexation behavior in wages. Also, domestic real marginal cost variable is defined to include the deviation of real wages from its trend.</p> <p>In our macro econometric model that is being developed currently, we enhance the supply side of the economy to include more of labour market dynamics. For this purpose, a labour demand function is defined to include the real minimum wage and economic activity. Then, the labour demand obtained from this function enters into a Cobb-Douglas type production function as a factor of production, along with capital. Finally, the supply side and demand side forecasts for economic activity affect the dynamics of inflation. We continue to work on enhancing the labour market block in the macro econometric model to capture the dynamics of potential labour, actual labour and employment.</p>
Vietnam	<p>Our labour market data is not sufficient to enter into our main models and forecasting</p>

Source: EMDGM 2023 Questionnaire

Please list any key studies on the role of labour markets in inflation for your country below.

Argentina	Garegnani, L. y L. D'amato (2009) "La dinámica de corto plazo de la inflación: estimando una curva de Phillips híbrida neokeynesiana para Argentina (1993-2007)", <i>Ensayos Económicos</i> , BCRA, 55, Julio-Septiembre 2009, pp 33-56. https://www.bcra.gob.ar/PublicacionesEstadisticas/Resumen_ensayos.asp?id=306
	García-Cicco, J., L. Garegnani, M. Gómez Aguirre, A. Krysa y L. Libonatti (2022) "Regularidades Empíricas de la Inflación en Latinoamérica" Documento de Trabajo N°101, BCRA, Mayo 2022. https://www.bcra.gob.ar/Institucional/DescargaPDF/DownloadPDF.aspx?Id=1034
	Krysa, A. and L. Lanteri (2018) "Estimación del producto potencial y de la brecha del producto, para Argentina: aproximaciones a partir de un filtro multivariado y del método de la función de producción". Central Bank of Argentina (BCRA) Economic Research Working Paper N° 80. DOI: https://bcra.gob.ar/Institucional/DescargaPDF/DownloadPDF.aspx?Id=815
	Banco Central do Brasil (2022). Labour market on the radar. Inflation Report, September 2022, 83-85. https://www.bcb.gov.br/content/ri/inflationreport/202209/ri202209b9i.pdf
Brazil	Banco Central do Brasil (2022). Labour market situation according to alternative indicators. Inflation Report, March 2022, 43-47. https://www.bcb.gov.br/content/ri/inflationreport/202203/ri202203b4i.pdf
2019	1. Albagli, E., M. Canales, C. De La Huerta, M. Tapia, and J.M. Wlasiuk (2019), ""Firm Productivity Dynamics and Distribution: Evidence for Chile using Micro Data from Administrative Tax Records,"" Working Paper 831, Central Bank of Chile.
Chile	2. García, B., S. Guarda, M. Kirchner, and R. Tranamil (2019), ""XMAS: An Extended Model for Analysis and Simulations,"" Working Paper 833, Central Bank of Chile.
2020	3. Albagli, E., M. Canales, A. Martner, M. Tapia, and J.M. Wlasiuk (2019), ""Misallocation or Misspecification? The Effect of ""Average"" Distortions on TFP Gains Estimations,"" Working Paper 835, Central Bank of Chile.
2022	4. García, B. and J. Guerra-Salas (2020), ""On the Response of Inflation and Monetary Policy to an Immigration Shock,"" Working Paper 872, Central Bank of Chile.
Colombia	- Arango, L. E. (coordinador) et al (2022). Efectos macroeconómicos del salario mínimo en Colombia. <i>Ensayos sobre Política Económica</i> (ESPE), núm. 103. Banco de la República de Colombia. - Arango, Luis E., Andrés F. García y Carlos E. Posada. (2013). "Inflación y desempleo en Colombia: Nairu y tasa de desempleo compatible con la meta de inflación. 1984-2010". In <i>El mercado de trabajo en Colombia: Hechos, tendencias e instituciones</i> , edited by Luis Eduardo Arango and Franz Hamann. Bogotá: Banco de la República, 333-356. - Arango, Luis E., Luz K. Ardila, y Miguel Gómez. (2011). "Efecto del cambio del salario mínimo en el precio de las comidas fuera del hogar en Colombia". In <i>El mercado de trabajo en Colombia: hechos, tendencias e instituciones</i> , edited by Enrique López-Enciso and Franz Hamman. Chapter. 21, 872, Bogotá: Banco de la República. [on line], available in: http://babel.banrepultural.org/digital/collection/p17054coll18/id/314/rec/2

Question 12

Table 12

Please list any key studies on the role of labour markets in inflation for your country below.	
Czech Republic	Empirical Analysis of Labour Markets over Business Cycles: An International Comparison (2015, Jan Bruha, Jirí Polanský) The Effects of Minimum Wage Increases in the Czech Republic (2021, Jakub Grossmann) Labour Market Flows over the Business Cycle: The Role of the Participation Margin (2018, Kamil Galušcák, Jan Šolc, Paweł Strzelecki)
Hong Kong	Cheng, Michael and Ho, Wai-Yip Alex. "A Structural Investigation into the Price and Wage Dynamics in Hong Kong". No 0920, Working Papers (2009), Hong Kong Monetary Authority. Genberg, Hans, and Laurent Pauwels. "Inflation in Hong Kong, SAR-In search of a transmission mechanism." Working Paper no.1 (2003), Hong Kong Institute of Monetary Research. Genberg, Hans, and Laurent L. Pauwels. "Wage–price dynamics and deflation in Hong Kong." Pacific Economic Review 10.2 (2005): 191–216. Genberg, Hans, and Laurent L. Pauwels. "An Open-Economy New Keynesian Phillips Curve: Evidence from Hong Kong." Pacific Economic Review 10.2 (2005): 261–277. P Vere, James. "Disentangling Wages and Consumer Price Inflation in Hong Kong." Economic Letters (2022).
India	1. Sujata Kundu, "Rural Wage Dynamics in India: What Role does Inflation Play?", Reserve Bank of India Occasional Papers Vol. 40, No. 1, 2019 2. Reserve Bank of India, "An Examination of the Rural Prices and Wages Dynamics in India" MPR October 2022 Box II.2 3. G V Nadhanael, "Recent Trends in Rural Wages: An Analysis of Inflationary Implications" Reserve Bank of India Occasional Papers Vol. 33, No. 1 & 2: 2012
Indonesia	Binyamini, A. (2021). A Structural Investigation of Israeli Labour Market Dynamics. Bank of Israel discussion Paper 2021.19.
Israel	Brand, G. The mutual links between price inflation and the labour cost in Israel, (work in progress). Elkayam, D., & Illek, A. (2013). Estimating the NAIRU using both the Phillips and the Beveridge curves (No. 2013.10). Bank of Israel. Argov, E., A. Barnea, A. Binyamini, E. Borenstein, D. Elkayam, and I. Rozenshtrom (2012). MOISE: A DSGE Model for the Israeli Economy. Bank of Israel discussion Paper 2012.06. Lavi, Y., & Sussman, N. (2007), "The Phillips Curve in Israel", Israel Economic Review, 5(1), 93–109. Ribon, S. (2004), "A New Keynesian Phillips Curve for Israel", Discussion Paper No. 2004.11. Bank of Israel. Elkayam, D., (2002). "A Model for Monetary Policy Under Inflation Targeting, The Case of Israel" Vol. 49, No. 1, pp 30–45. Caspi, I. and S. Ribon, (2022), "The link between activity and inflation in Israel in recent decades", in Yaron and Strawczynski, ed., Monetary Policy in a Period of Price Stability, Bank of Israel (Hebrew).
Korea	Most of the academic papers on the relationship between inflation and the labour market are written in Korean. - Chang, Lee and Choi (2022), "Changes in the Macroeconomics Relationships among Output, Employment and Prices", the Korean Journal of Economic Studies, the Korean Economic Association (in Korean) - Hansen, Mongardini, and Zhang (2019), "Labour Market Slack and the Output Gap", IMF Working Paper WP/19/167 (in English)
Malaysia	1. Role of global slack: Assess the role of global slack in determining inflation among Asia Pacific economies; https://www.bnm.gov.my/documents/20124/767013/p3ba2.pdf 2. Living wage: Introducing the concept of living wage as a way to improve living standards; https://www.bnm.gov.my/documents/20124/829200/cp04_001_box.pdf
Philippines	• Alarcon, S.J, Alhambra, P.R., Amodia, R. & Bautista, D.M. (2020). Policy Analysis Model for the Philippines. BSP Working Paper Series, 2020-12. • Abenoja, Z.R.R., Dacio, J.E. & Romaraog, M.R.S. (forthcoming) Monetary policy formulation and labour market during the COVID-19 pandemic period. Labour Book Report, Chapter 12. • Abenoja, Z. R. R., Dacio, J. E., Castañares, S. J. A., Ocampo, J. C. G., & Romaraog, M. R. S. (2022). The BSP's Forecasting and Policy Analysis System. Philippine Review of Economics, 59(1), 77–107.

Question 12

Table 12

Please list any key studies on the role of labour markets in inflation for your country below.

	Szafranek K. (2017). Flattening of the New Keynesian Phillips curve: Evidence for an emerging, small open economy, <i>Economic Modelling</i> , Elsevier, vol. 63(C), pp 334-348.
Poland	Hulej, M., & Grabek, G. (2015). Output gap measure based on survey data. <i>National Bank of Poland Working Paper</i> , (200).
	Nikulin D.: Relationship between wages, labour productivity and unemployment rate in new EU member countries, <i>Journal of International Studies</i> . -Vol. 8., iss. 1 (2015), pp 31-40
	Pošta, V. (2015). Time-Varying NAIRU and Some of Its Determinants—A Semi-Structural Approach: Evidence from Eastern European Economies. <i>Eastern European Economics</i> , 53(2), pp 149-165.
	Estimating a New Keynesian Wage Phillips Curve', <i>South African Reserve Bank Working Paper Series</i> No. WP/20/13, December 2020. https://www.resbank.co.za/content/dam/sarb/publications/working-papers/2020/WP%202013.pdf
South Africa	Merrino, S. 2021 'Wage inequality under inflation-targeting in South Africa' <i>South African Reserve Bank Working Paper</i> . Available https://www.resbank.co.za/en/home/publications/publication-detail-pages/working-papers/2021/WageinequalityunderinflationtargetinginSouthAfrica
	Vermelun, C. 2017. 'Inflation and unemployment in South Africa: Is the Phillips curve still dead?' <i>Southern African Business Review</i> 21: 20–54.
Türkiye	- Gökçü, M. (2021). ""Estimating Time-Varying Potential Output and NAIRU Using a Multivariate Filter for Türkiye"", CBT Working Paper No: 21/39
	- Andıç, S.B., Küçük, H., Ögünç, F. (2014) ""Inflation Dynamics in Türkiye: In Pursuit of a Domestic Cost Measure"" , CBT Working Paper No: 14/20
	- Ögünç, F. (2019). ""A Bayesian VAR Approach to Short-Term Inflation Forecasting"" , CBT Working Paper No: 19/25
Vietnam	The relationship between inflation and unemployment and research reality in Vietnam - MSc. Le Thi Xoan - Ho Chi Minh City University of Natural Resources and Environment;
	Labour and Social Trends in Vietnam 2012-2017 - Institute of Labour and Social Sciences and International Labour Organization.

Source: EMDGM 2023 Questionnaire
