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.

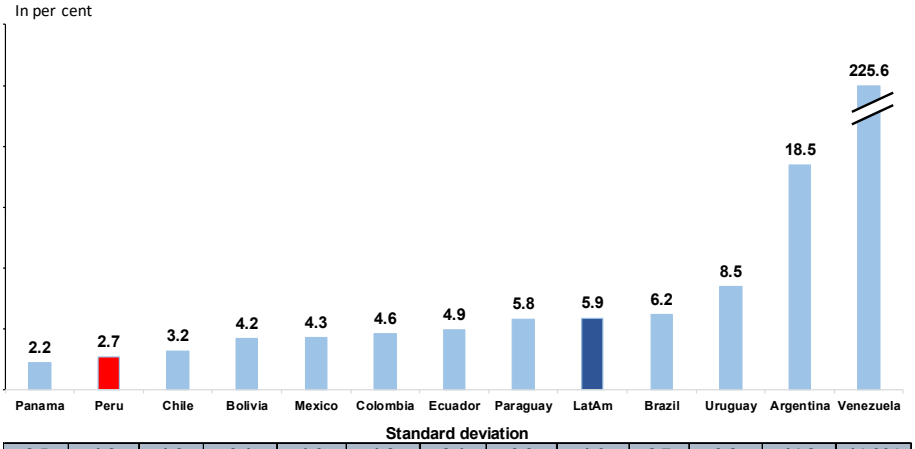
While informal markets lower long-run growth because the provision and allocation of public services are inefficient (see Loayza (1996)), these markets may help to deal with shocks by making it easier to buffer economic activity, but they also weaken the transmission mechanism of monetary policy (Alberola 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.

Average annual inflation rate 2001–21 Graph 1



Note: Calculated with annual average CPI.

Source: IMF (2022).

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.

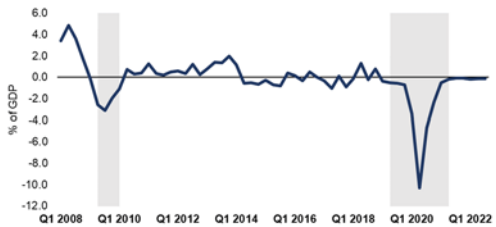
However, the response of labour variables to the economic cycle changed considerably during the 2020 pandemic, which prompted the monetary authority to enhance follow-up on developments in the labour market.

Peru: macroeconomic variables

Graph 2

A. Expected inflation (12 months ahead)

B. Output gap



C. Interbank interest rate

D. Unemployment rate

E. Real wages

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.

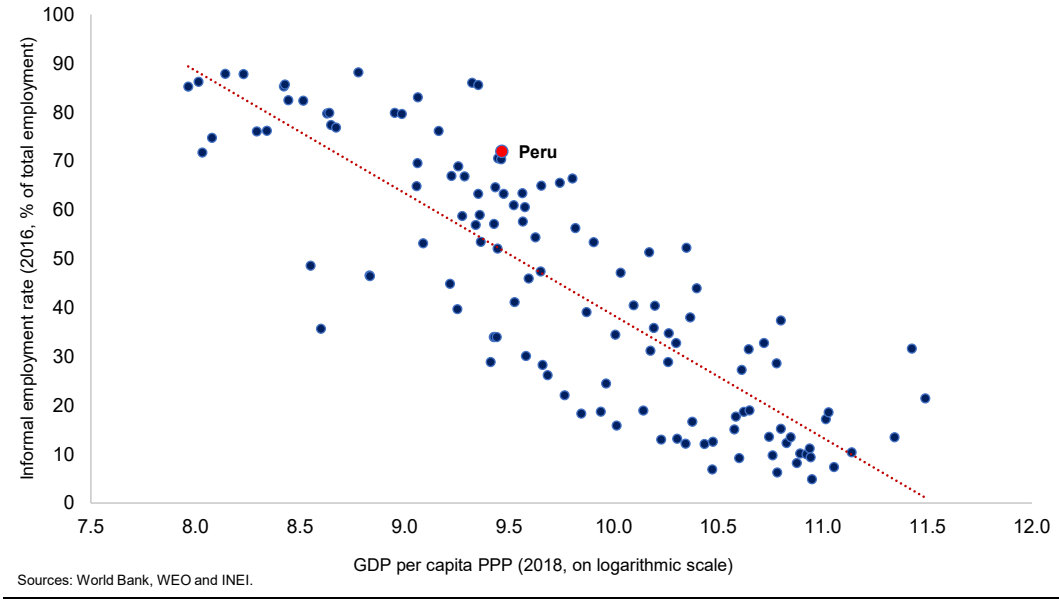
[7] Informal workers are those who work in the informal sector (companies or people without a taxpayer identification number) and workers in the formal sector whose employers do not pay for health insurance. Dependent workers with health insurance paid by their employers are formal. Self-employed workers 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

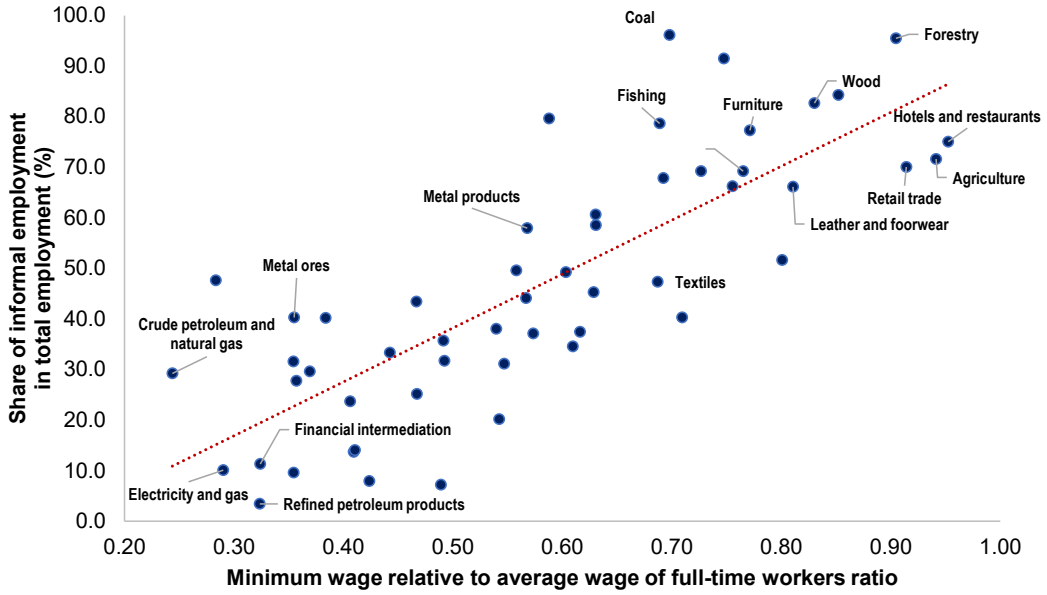
Graph 3



Sources: World Bank, WEO and INEI.

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 3Q	Var % annual 2019	2020	2021	2022 3Q
A	**Working age population**	23.1	24.5	24.9	25.3	25.7	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

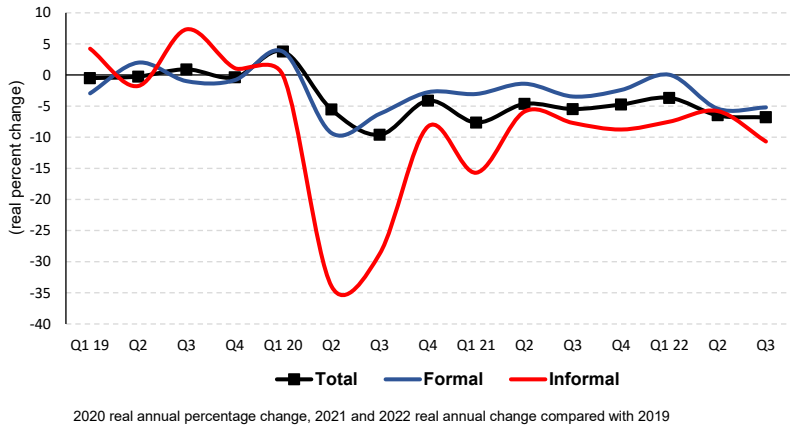
1 Based on the formal employment of the Payroll. Informal dependent and self-employed workers are obtained by difference.

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



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	188	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
	(29)	(22)														
2	515	517	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
	(26)	(25)														
3	788	832	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
	(49)	(57)														
4	960	1 002	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
	(90)	(78)														
5	1 124	1 161	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
	(98)	(99)														
6	1 315	1 387	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
	(136)	(203)														
7	1 570	1 621	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
	(151)	(203)														
8	1 961	1 973	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
	(204)	(231)														
9	2 606	2 604	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
	(299)	(340)														
10	5 372	5 128	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
	(1119)	(1083)														

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 mayor 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 Whatson (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 $\boldsymbol{y_t}$ 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:

$$\boldsymbol{y}_t = \boldsymbol{B}_0 + \sum_{\ell=1}^{p} \boldsymbol{B}_\ell \boldsymbol{y}_{t-\ell} + \boldsymbol{A}\boldsymbol{e}_t \text{ with } \boldsymbol{e}_t \sim N(\boldsymbol{0}, \boldsymbol{I}), \qquad (1)$$

where $\boldsymbol{A}$ 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 $\boldsymbol{A}$. Let's denote this column as $\boldsymbol{a_r}$.

The impulse-response function is computed by projecting different leads of $\boldsymbol{y_t}$ onto the hyperplane generated by $\{\boldsymbol{y_s}\}_{\boldsymbol{s=t-1}}^{\boldsymbol{t-p}}$. That is, we first need to estimate the following $\boldsymbol{H}$ regressions:

$$\boldsymbol{y}_{t+h} = \boldsymbol{\beta}_0^h + \sum_{\ell=1}^{p} \boldsymbol{\beta}_\ell^h \boldsymbol{y}_{t-\ell} + \boldsymbol{u}_{t+h} \text{ with } \boldsymbol{u}_{t+h} \sim VMA(h) \text{ for } h \in \{0, \dots, H\} \qquad (2)$$

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 $\boldsymbol{t-1}$ (i.e., $\boldsymbol{E}\left[\boldsymbol{y_{t+h}} \middle| \{\boldsymbol{y_{t-1}} + \boldsymbol{a_r}, \boldsymbol{y_{t-2}}, \dots, \boldsymbol{y_{t-p}}\}\right]$) while the other forecasts are computed without considering the shock (i.e., $\boldsymbol{E}\left[\boldsymbol{y_{t+h}} \middle| \{\boldsymbol{y_{t-1}}, \boldsymbol{y_{t-2}}, \dots, \boldsymbol{y_{t-p}}\}\right]$). Hence the impulse response function is defined as:

$$\boldsymbol{IRF_r(h)} = \boldsymbol{E}\left[\boldsymbol{y_{t+h}} \middle| \{\boldsymbol{y_{t-1}} + \boldsymbol{a_r}, \boldsymbol{y_{t-2}}, \dots, \boldsymbol{y_{t-p}}\}\right] - \boldsymbol{E}\left[\boldsymbol{y_{t+h}} \middle| \{\boldsymbol{y_{t-1}}, \dots, \boldsymbol{y_{t-p}}\}\right], \qquad (3)$$

[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:

$$\boldsymbol{IRF_r(h) = \beta_1^h a_r.} \qquad (4)$$

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 $\boldsymbol{e_w' \beta_1^h a_r}$ (for all $\boldsymbol{h} \in \{\mathbf{0}, \ldots, \boldsymbol{H}\}$), where $\boldsymbol{e_w}$ is a column vector of zeros with one in the position of our metric of wages.

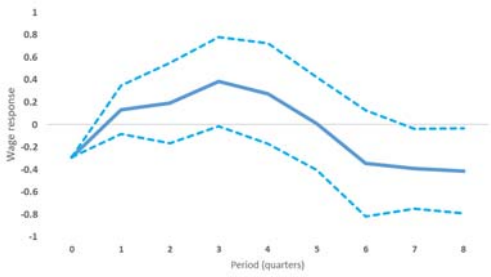
Jordá (2005) shows that the residual in equation (2) follows a VMA(h) process; hence, we are required to compute confidence intervals that are robust to this process. We then build error bands as in Lütkepohl et al (2015) by applying Scheffé's method to approximate simultaneous confidence coverage, and obtain the percentile bound for the 16th and 84th percentiles.

3.4 Impulse responses by local projections

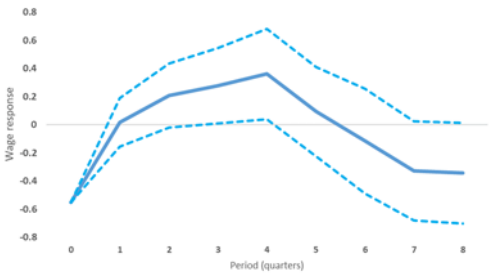
Following Jordá (2005) and Lütkepohl et al. (2015), we find that the Covid-19 event made wages more sensitive to an interest rate shock. When we use information for aggregate wages, the initial response (Graph 7.B) almost duplicates that in the period prior to the Covid-19 event (Graph 7.A). Moreover, 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]

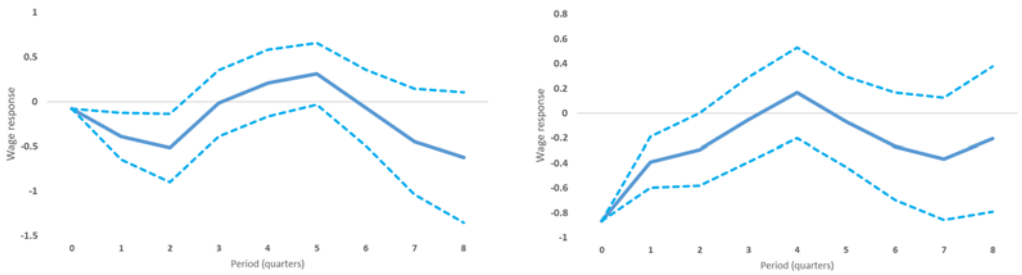
Two points to highlight in this exercise are: (i) the initial wage response to an interest rate shock, both before and after the pandemic, is stronger in the informal sector than in the formal labour market; and (ii) in the aftermath of Covid-19, the wage response in the formal sector becomes closer 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.

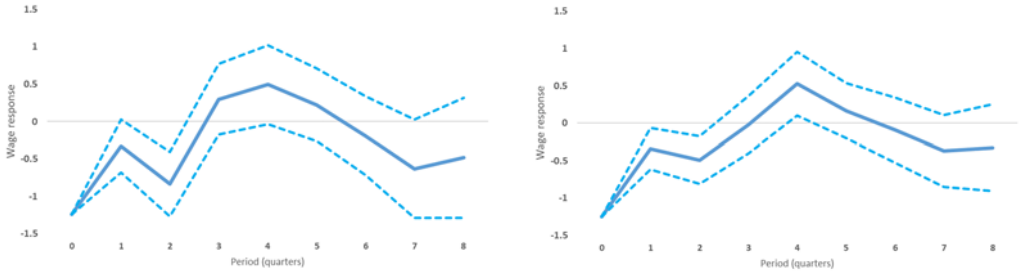
We argue that these results are consistent with firms in the formal sector being hit harder than informal ones during the Covid-19 event. In this scenario, the informal sector absorbs a substantial part of the unemployed force from the formal sector. If so, the response from aggregate wages tends to 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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