

Bottlenecks, labour markets and inflation in the wake of the pandemic¹

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It is a pleasure to join this session. Supply bottlenecks have grabbed all the headlines recently, but the theme chosen by the Indonesian G20 Presidency (“Recover together, recover stronger”) also prompts us to consider the longer-term structural changes brought about by the pandemic and the policy measures deployed in response. This is particularly apt now, as we look ahead to future inflation developments. I will argue that longer-term structural issues, especially in the labour market, are crucially important in plotting the course ahead. For my remarks, I will draw on two recent BIS Bulletins that have addressed recent labour market developments and supply bottlenecks.²

Bottlenecks

Let me start with a recap of where we stand on bottlenecks. Bottlenecks that started as supply disruptions due to the initial Covid shock in 2020 have this year morphed into something more persistent. Widespread reports of shortages have gone hand in hand with supply that appears to be running at full speed. Production of key manufactured inputs, such as semiconductors, now comfortably exceeds pre-pandemic levels. The same is true for many raw materials and freight volumes on key shipping routes.

As well as supply, two additional factors are key in understanding where we are. The first is the shift in the composition of demand away from services to manufactured goods, which tend to be more dependent on the smooth functioning of supply chains than are services. The second is the endogenous behavioural changes that have given rise to so-called bullwhip effects,³ whereby supply chain participants react to perceived shortages by ordering more, ordering earlier and by

¹ The views expressed here are mine, and not necessarily those of the BIS. I am grateful to Daniel Rees and Phurichai Rungcharoenkitkul for their efforts in putting together the analysis for this speech; to Nicolas Lemerrier and Alessandro Barbera for research assistance and to Egon Zakrajšek and helpful comments.

² See F Boissay, E Kohlscheen, R Moessner and D Rees, “Labour markets and inflation in the wake of the pandemic”, *BIS Bulletin*, no 47, October 2021 and D Rees and P Rungcharoenkitkul, “Bottlenecks: causes and macroeconomic implications”, *BIS Bulletin*, no 48, November 2021.

³ https://en.wikipedia.org/wiki/Bullwhip_effect

hoarding inputs. This kind of reaction is prudent and rational when considered in isolation but can lead to aggregate outcomes that are ultimately self-defeating.

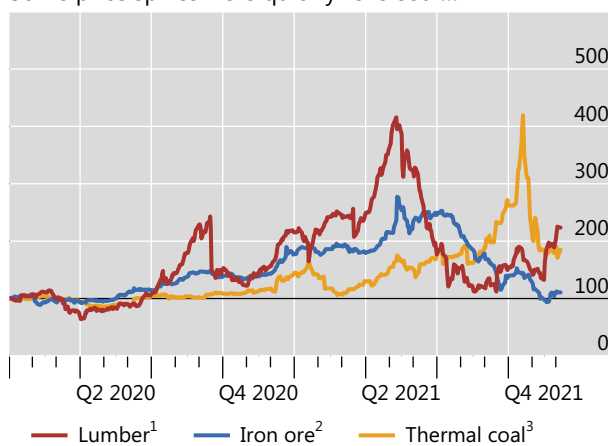
A brief review of the main bottleneck-affected industries highlights the complex dynamics at work. The sharp swings in the prices of commodities such as lumber, iron ore and coal over the past year illustrate well how the current bottlenecks are not simply a uniform squeeze everywhere along the supply chain. Instead, we have seen commodities demand whipsaw as pressures emerged at different points in the supply chain, resulting in large price fluctuations (Graph 1, left-hand panel). For lumber, iron ore and coal, prices are well below peaks reached earlier in the year. Anecdotal evidence also points to localised gluts where the lack of storage capacity has depressed prices at key points.

Swings in commodity and shipping prices are suggestive of bullwhip effects

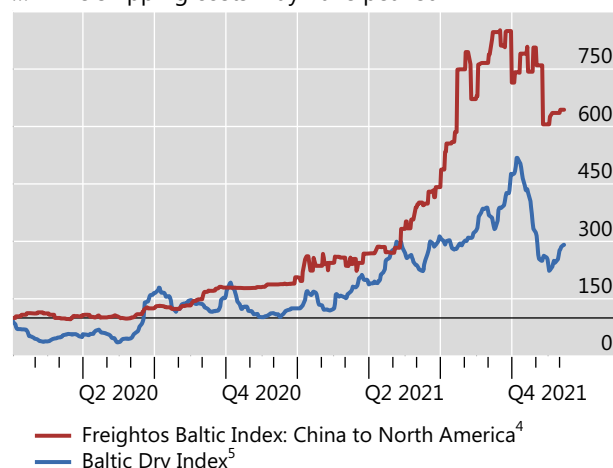
1 Jan 2020 = 100

Graph 1

Some price spikes were quickly reversed ...



... while shipping costs may have peaked



¹ Generic first futures price, random length lumber. ² Iron ore 62% Fe CFR China spot price index. ³ Generic first futures price, Zhengzhou thermal coal. ⁴ Seven-day moving average. Daily containerised freight rate index. Index values are calculated by taking the median price for all prices with weighting by carrier. ⁵ Daily dry bulk shipping rate index. The Baltic Dry Index is a composite of the Capesize, Panamax and Supramax Timecharter Averages.

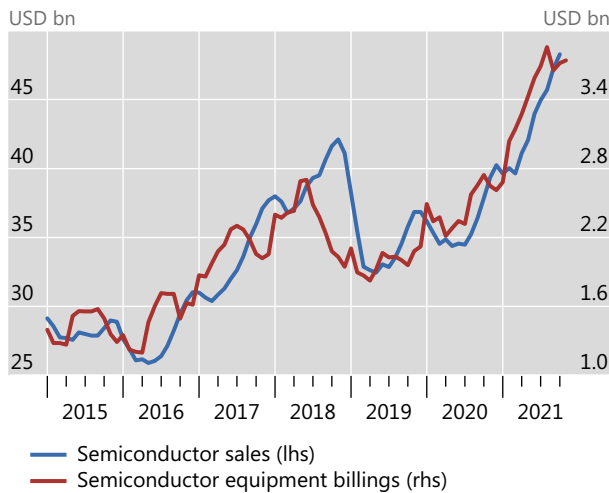
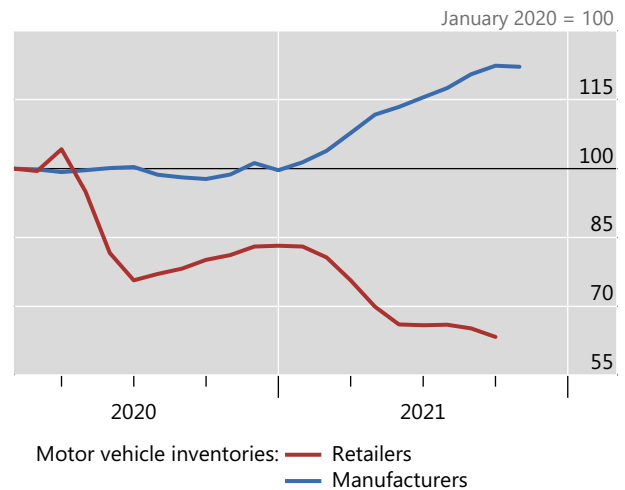
Sources: Bloomberg; Datastream; BIS calculations.

The case of shipping freight could be considered a more straightforward example of strong demand interacting with constrained supply, especially for trade between Asia and the United States. But here too prices have exhibited large fluctuations (Graph 1, right-hand panel). Shipping costs for bulk commodities rose sharply, only to retrace much of the gains later (blue line). More recently, container shipping prices have also started to decline (red line).

One sign that behavioural responses could be important comes from the pattern of inventories. The motor vehicle industry provides a good case study. Focusing on the United States, where we have the most comprehensive data, manufacturers' inventories are actually up slightly since the start of the pandemic, even as retail inventories have fallen significantly (Graph 2, right-hand panel). These contrasting trends may be symptomatic of bullwhip effects, as supply chain participants adjust in an uncoordinated manner, creating moving targets for others.

Indicators of supply chain pressures are far from uniform

Graph 2

Semiconductor sales and equipment billings jumped in 2021 as bottlenecks emerged

Motor vehicle manufacturers stocked up as retail inventories were squeezed


Sources: Federal Reserve Bank of St. Louis, FRED; Refinitiv Eikon; SEMI; BIS calculations.

The case of semiconductors is different again. Despite reports of disruptions at some specific factories, it is hard to find evidence of generalised contractions in supply. Changes in production relationships may also have exacerbated the behavioural responses, as firms that cancelled semiconductor orders early in the pandemic – automobile producers are the most cited example – found themselves at the back of the queue when demand returned. Indeed, available sales and billing data point to a strong increase in supply since the start of the pandemic (Graph 2, left-hand panel).

When taken as a whole, the signs point to strong demand that has outpaced supply capacity that is growing, but not growing fast enough. However, the key question is how much of this stronger demand can be attributed to the bullwhip effect. To what extent will the behavioural responses that gave rise to bottlenecks work in reverse to clear up backlogs once supply chain problems begin to ease? Depending on the answer, we may find that supply bottlenecks may be resolved faster than currently feared, just as they have persisted longer than initially expected.

Inflation

Let me now turn to inflation. Inflation has risen in many countries and bottlenecks have clearly played a significant role. But inflation has not risen uniformly (Graph 3, left-hand panel). Among advanced economies, the pickup in inflation has been most pronounced in the United States and the euro area, as well as in some emerging market economies, especially in Latin America. However, the increase in inflation has not been as evident in Asia. In Japan, consumer prices have barely grown over the past year. And inflation remains low in China.

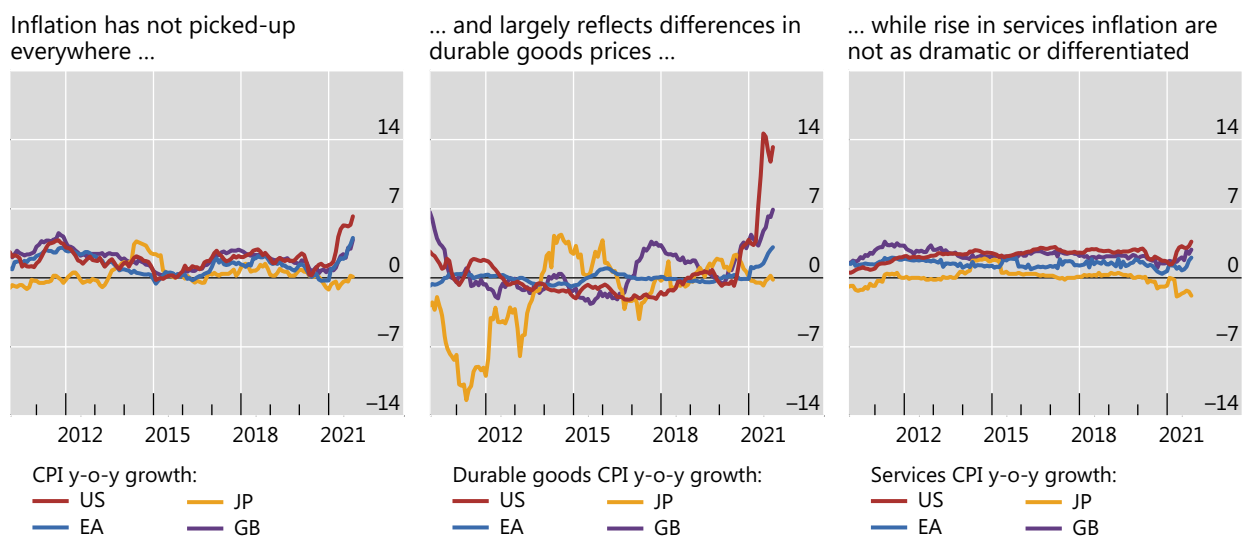
As well as the differences across countries, the differences across product categories are also notable. Durable goods prices have risen especially sharply since the start of the year (Graph 3, centre panel), breaking the trend of low or negative price changes over much of the past few

decades. The rise in the price of services has been much more modest, although it has picked up in recent months in some economies (Graph 3, right-hand panel), although not in Japan.

Durable goods drive the inflation rise

In per cent

Graph 3



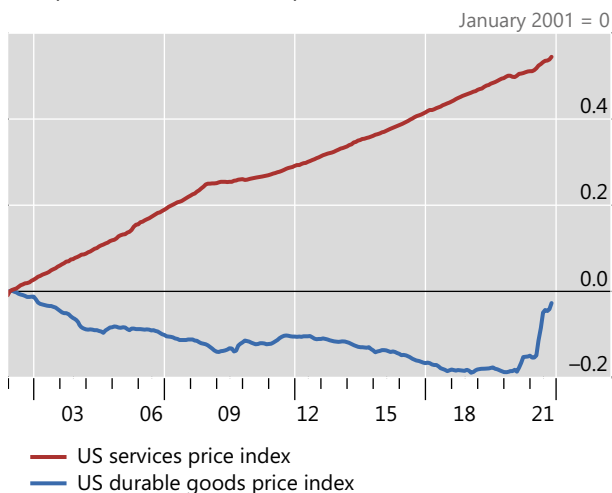
Sources: Federal Reserve Bank of St Louis, FRED; Eurostat; Portal Site of Official Statistics of Japan; UK Office for National Statistics; BIS calculations.

We should be wary of disregarding inconvenient price increases. Nonetheless, it is worth emphasising how unusual the recent rise in durable goods prices is when set against the experience of well-established long-term price trends. As the left-hand panel of Graph 4 shows, the rise in durable goods prices in the United States in recent months is much larger than any other seen over at least the past two decades. Although the rise in durables prices in other countries has not been quite as large, a prolonged period in which durable goods prices rise faster than those of services represents a sharp break from the trend over recent decades (right-hand panel).

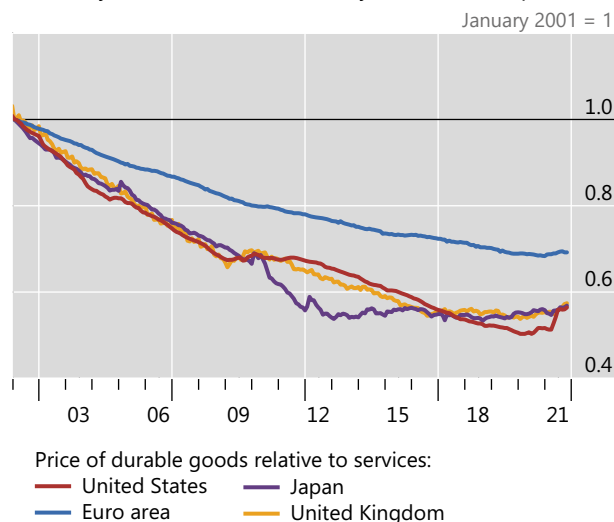
Price levels in services and durable goods

Graph 4

Sharp increases in durable prices are unusual...¹



... as they tend to rise more slowly than services prices



¹ Based on normalised logarithms.

Sources: FRED, Federal Bank of St Louis; national sources; BIS calculations.

However, there is something of a race against time. If the current inflation surge feeds a wage-price spiral reinforced by a possible unmooring of inflation expectations, bringing inflation under control will be a much more difficult task. That's why the labour market will be the key determinant of the course of inflation. This is where I would like to turn now.

Labour markets

Labour market conditions across countries have shared some similarities as well as some striking differences.

The overall trajectory in total hours worked has been quite similar since the start of the pandemic. As you see in Graph 5, they fell by 10–20% in the middle of 2020. Following these sharp declines, total hours worked have rebounded much more quickly than after recent recessions, although they remain 2–5% below their pre-pandemic levels.

However, these similar declines in hours came about in strikingly different ways. There are three ways in which hours worked could fall. The first is an increase in unemployment. The second is a drop in average hours worked per employee. The third is a decline in the participation rate of the labour force. The respective roles of these three factors differ widely across economies.

In the United States, the initial decline largely reflected a shift from employment into unemployment and, to a lesser extent, a move of workers out of the labour force. Although much of the rise in unemployment has been reversed, participation rates remain substantially below where they were before the pandemic, particularly for older workers.

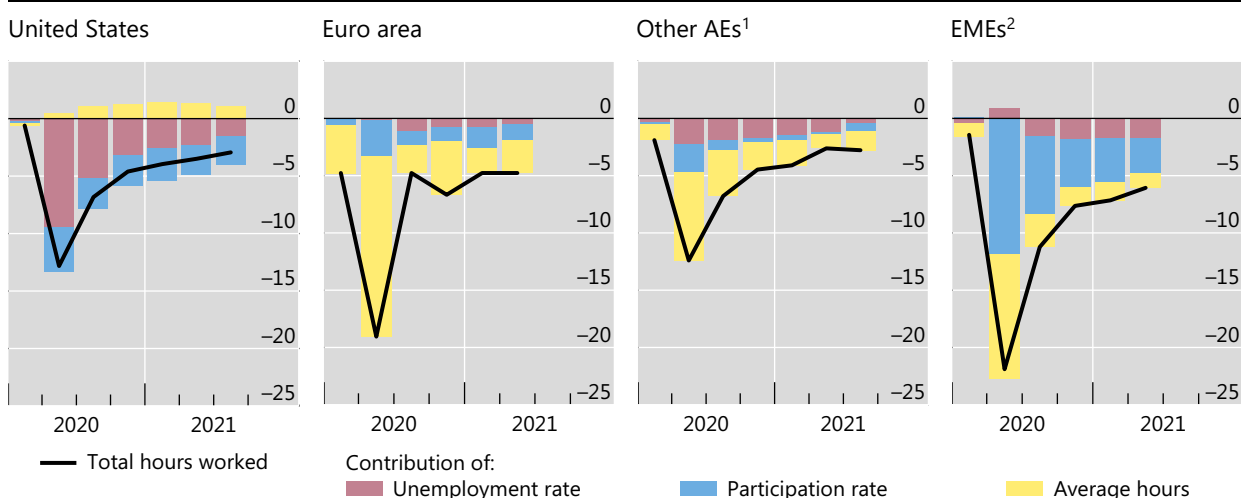
In most other advanced economies, the decline in hours worked reflected mainly a fall in average hours worked per employee, due largely to furlough schemes that kept worker-firm relationships intact.

In many emerging market economies, large numbers of workers left the labour force. Some of this could reflect a shift into the informal sector, although informal work was also hard hit by the pandemic.

Changes in hours worked since the start of the pandemic

Change in percentage points, since Q4 2019

Graph 5



¹ Simple average of AU, CA, GB, JP and SE. ² Simple average of CL, KR, MX, PL and ZA.

Sources: Eurostat; ILO; national sources; BIS calculations.

However, I would like to draw your attention to one key observation. The differences in the way that hours worked declined have also influenced the shape of the recovery. Specifically, in countries that saw large rises in unemployment at the height of the crisis (such as the United States), the labour market has been slower to spring back to its pre-pandemic setting.

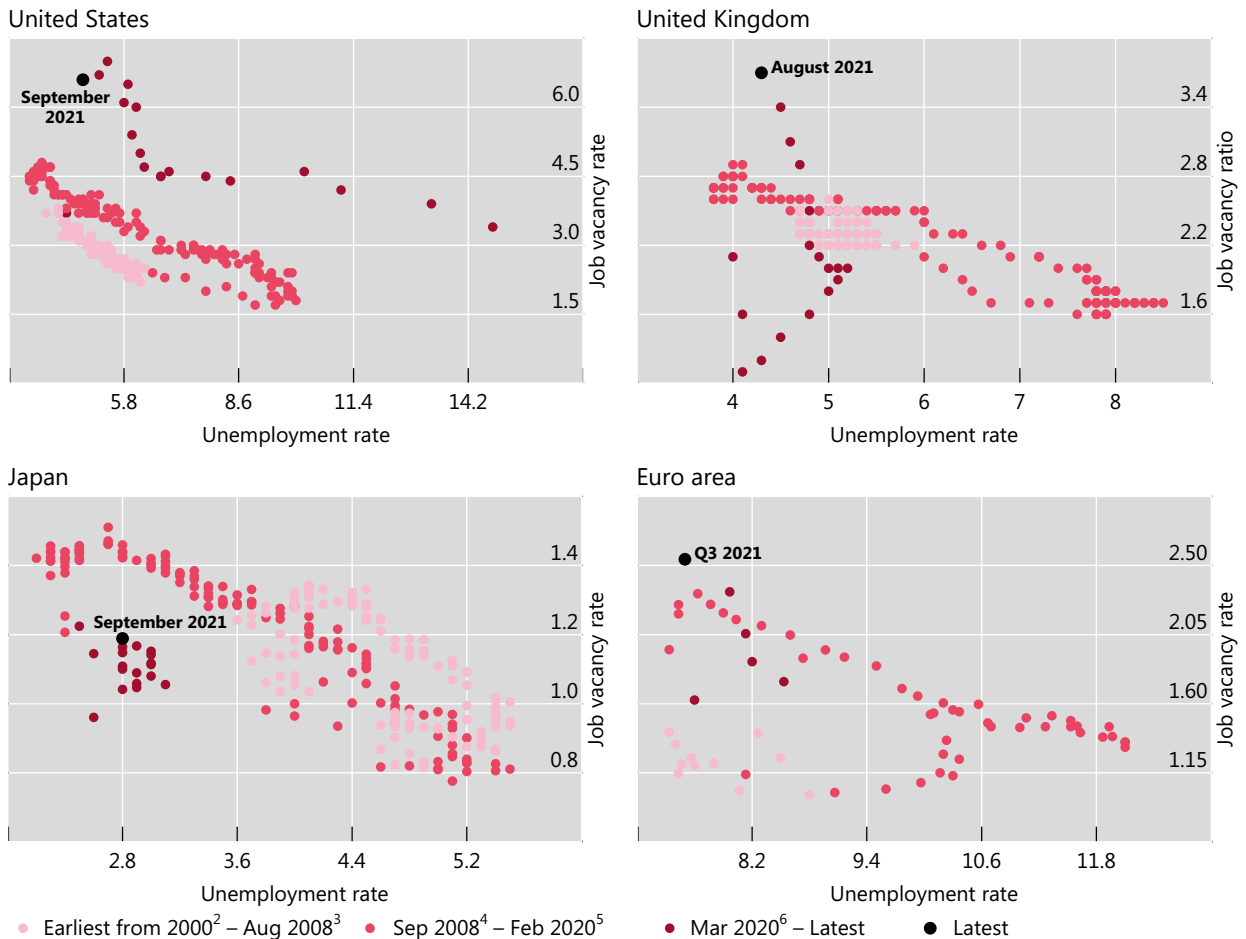
One way to see this is through the Beveridge curve, which shows the relationship between the unemployment rate and job vacancies. Normally, changes in economic activity would show up as shifts *along* the Beveridge curve, with stronger labour demand going hand in hand with lower unemployment and higher job vacancies. However, in the United States, the Beveridge curve has shifted out since the start of the pandemic (Graph 6, top left-hand panel). This means that many more job openings are on offer than previously for the same level of unemployment. The UK Beveridge curve has also started to drift out in recent months.

Importantly, no such rightward shift in the Beveridge curve is evident in jurisdictions such as Japan and the euro area, where worker-firm relationships remained largely intact.

Beveridge curves

In per cent

Graph 6



¹ Job vacancy rate computed as (number of job vacancies) / (number of occupied posts + number of job vacancies)*100. Job vacancy ratio computed as three-month rolling average ratio of vacancies per 100 employee jobs. ² For EA, Q1 2006; for GB, May 2001; for JP, January 2000; for AU, Q1 2000. ³ For AU and EA, Q3 2008. ⁴ For AU and EA, Q4 2008. ⁵ For AU and EA, Q1 2020. ⁶ For AU and EA, Q2 2020.

Sources: Datastream; national data; BIS calculations.

The conventional interpretation of the rightward shift in the Beveridge curve is a labour market mismatch between jobs and skills – say, due to the reallocation from the real estate sector after the Great Financial Crisis. To some extent, that may be true at present. At the same time, it is worth noting that job vacancies have risen most in some of the service industries that saw the largest job losses since the start of the pandemic. So, a simple sectoral reallocation story seems inadequate.

In any case, the contrast between the Beveridge curves *across* economies is very striking. In Japan and the euro area, there is no evidence of any deterioration of the jobs-skills match. Preserving the employment relationship appears to have kept the economy on a path where the recovery is closer to bringing the economy to its pre-pandemic state, at least in terms of the Beveridge curve relationship.

Getting to the bottom of the reasons for this contrast in labour market outcomes is an important task ahead for policy makers. Perhaps one way to approach this question is to start from the premise that firms and workers are part of the intricate web of relationships in the economy with relationship-specific capital that acts as the “glue” for the economy as a whole. Barry Eichengreen has written eloquently on this issue.⁴

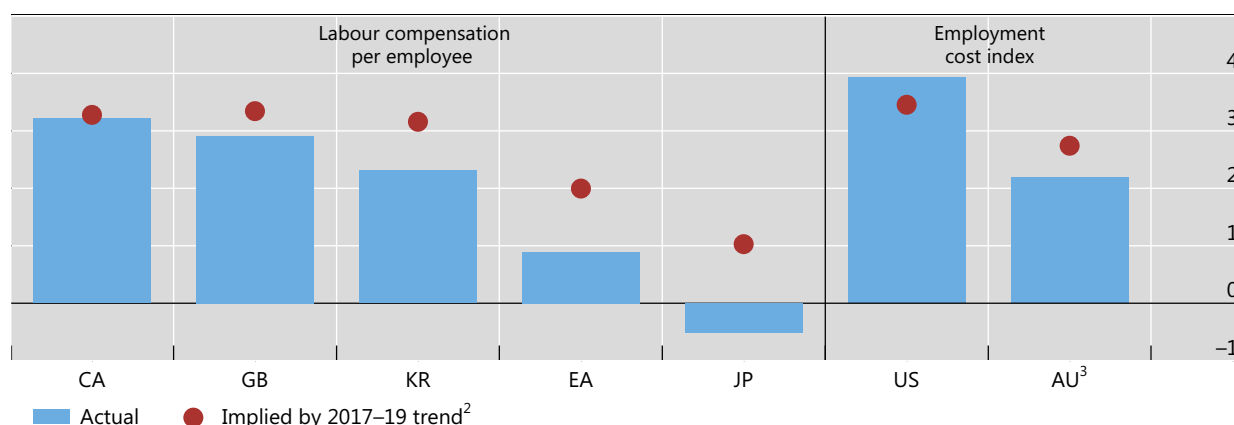
The ties that bind all of us as colleagues, neighbours, workers and employers arguably go beyond the transactional nature of the weekly payslip. Once these relationships are broken, attempts to put the pieces back together will not be able to draw on the same reservoir of relationship-specific capital that was in place previously. A more systematic analysis that draws on more than simple, atomistic optimisation models beckons. However, the recent upward drift in the UK Beveridge curve from the middle of 2021 suggests that any simplistic explanation will be found wanting, as the UK had also implemented furlough schemes similar to euro area economies.

More immediately, how these differences in labour market functioning will translate into differences in wage growth will be important for inflation developments. Unfortunately, the underlying pace of wage growth is particularly hard to read at the moment because of pandemic-related shifts in the composition of employment and the effect of furlough schemes.⁵

Wage growth vs pre-pandemic trends¹

In per cent

Graph 7



¹ Annualised growth between Q4 2019 and Q2 2021, except for the US and AU, where annualised growth between Q4 2019 and Q3 2021 are shown. ² Annualised growth implied by extrapolating the linear trend of each series calculated between Q1 2017 and Q4 2019. ³ Wage price index.

Sources: OECD; Datastream; national sources; BIS calculations.

Nevertheless, across most advanced economies, average wage growth since the start of the pandemic looks to have been in line with its pre-pandemic trends, or a little below, although this data will not capture the effect of recent inflation increases on wage negotiations. It is notable, however, that in the United States, where labour market changes are most apparent, wage growth

⁴ Barry Eichengreen, “The human capital costs of the crisis”, *Project Syndicate*, April 2020.

⁵ See Bank of England, “How strong is pay growth?”, *Bank Overground*, 31 August 2021, and G Koester and E Hahn, “Developments in compensation per hour and per employee since the start of the COVID-19 pandemic”, *ECB Bulletin*, no 8, August 2020.

has picked up despite labour market conditions that appear weaker than before the pandemic (Graph 7).

The theme chosen by the Indonesian G20 Presidency (“Recover together, recover stronger”) is especially apt for today’s discussion because it prompts us to consider both short-term and longer-term structural changes. The supply bottlenecks are a short-term issue, especially if the bullwhip effect goes into reverse. In this case, just as supply bottlenecks have persisted longer than expected, they may be resolved faster than currently feared.

However, the key to gauging where global inflation is headed is in the labour market, and whether the reduced efficiency of matches exhibited in the Beveridge curves of some economies translates into a more sustained wage-price spiral. In this respect, longer-term structural issues are more important in understanding the current state of the global economy, especially when we consider future inflation developments.