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

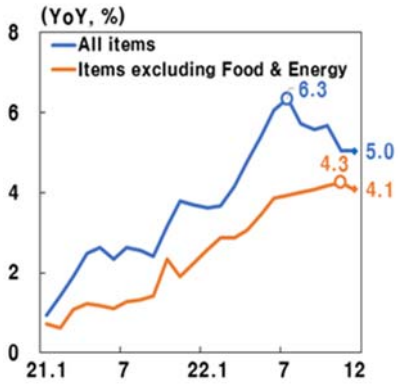
Korea's headline inflation accelerated to above 6% (6.3%, yoy) in July 2022, the highest since 1998, from a level below 1% at the onset of the Covid-19 pandemic. The jump in inflation is attributable to sizeable supply side factors, such as supply chain bottlenecks and a surge in commodity prices of 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.

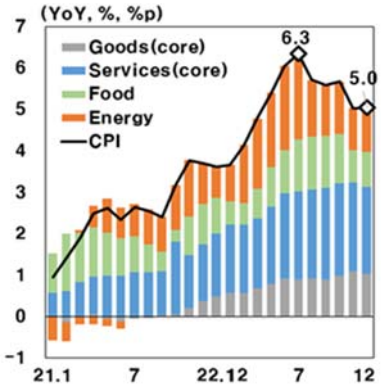
The recent development in short-term inflation expectations of households appears to be closely related to headline inflation, having peaked at 4.7% in July 2022 and since then fallen to a level below 4% at the end of last year. However, long-term inflation expectations among professional forecasters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

Trends in inflation — Graph 1

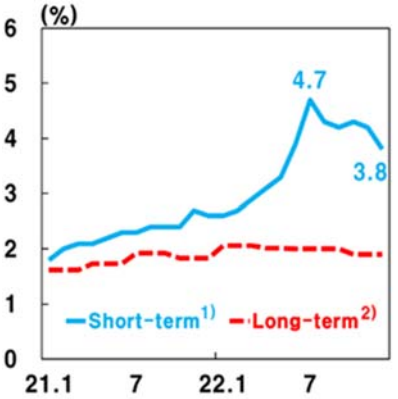
A. CPI inflation



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

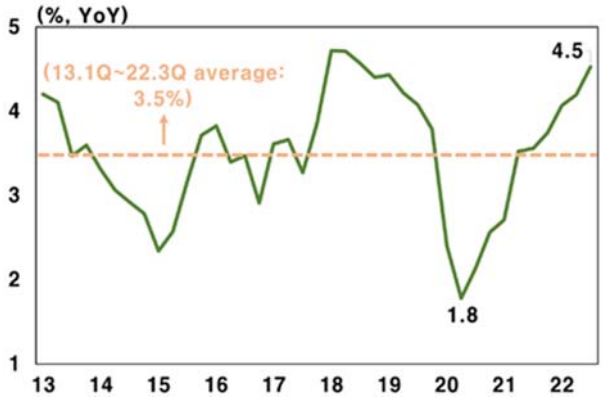
Nominal wages in Korea have shown a steep upward trend since 2021. From the first quarter of 2021 to the first quarter of 2022, the increase in nominal wages appears to be mainly attributed to a base effect in special payments. As employers adjusted their

special payments in response to business uncertainty, special payments decreased in 2020, which was followed by a significant rebound after 2021.

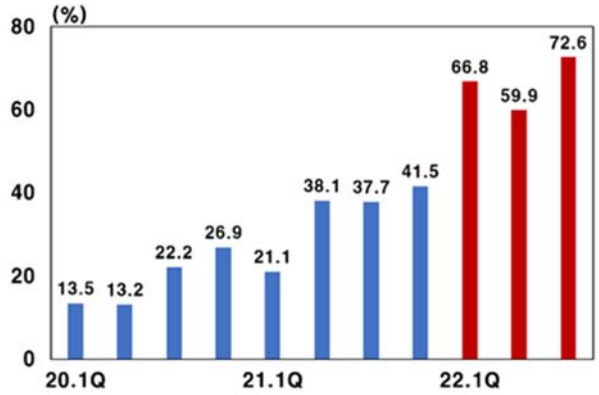
Unlike nominal wages, regular payments to permanent employees have shown a consistent upward trend since the second quarter of 2020. They rose by 4.5% in the third quarter of 2022, hovering above the long-term average of 3.5%. In addition, the rising trend in regular payments to permanent employees is 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.

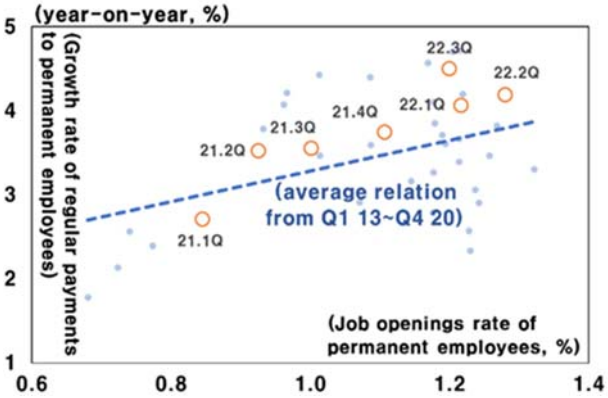
$$\pi_t = \alpha + \beta\pi_{t-1} + \beta x_t + \gamma E_t(\pi_{t+4}) + \varphi Z_t + \varepsilon_t. \qquad (1)$$

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

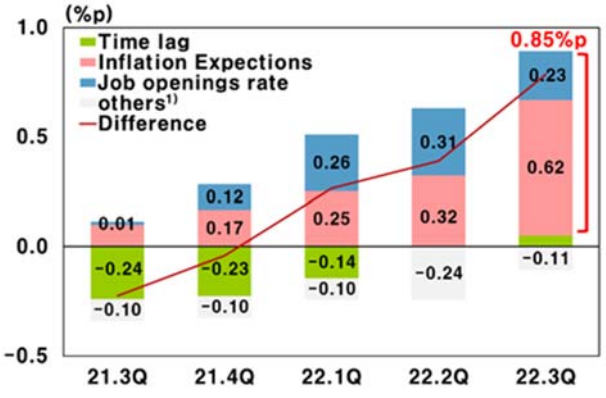
average of the growth rate of labour productivity and the growth rate in the population that are 15 years of age or older.

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

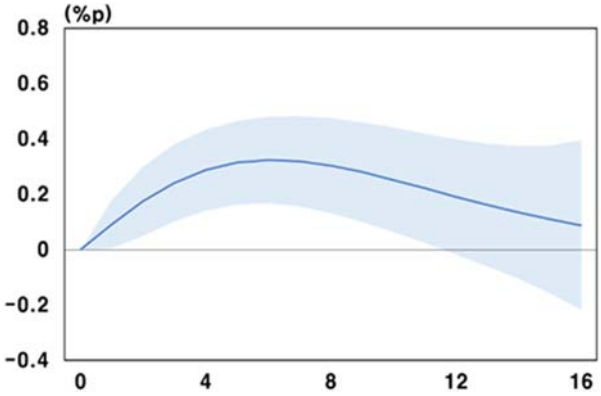
To estimate the effects of wage growth on consumer price inflation, we estimate a VAR model including three variables: consumer price inflation (%, yoy, headline), wage growth rate (%, yoy, regular payments to permanent employees) and the GDP gap.

$$Y_t = B_0 + B_1 Y_{t-1} + \cdots + B_p Y_{t-p} + A_0 \varepsilon_t \qquad (2)$$

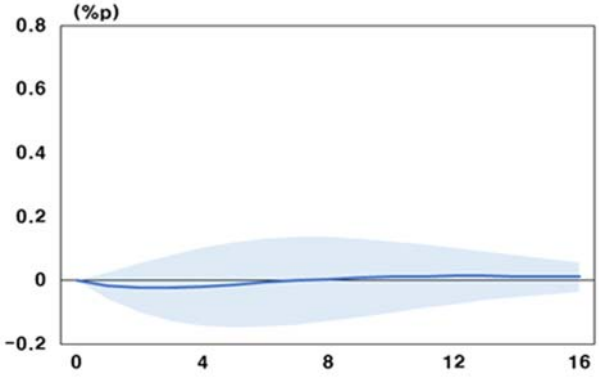
The sample period is from the first quarter of 1990 to the third quarter of 2022 and the lag length is set to one quarter, based on the Akaike information criterion (AIC).

The impulse responses of CPI inflation to wage growth — Graph 4

A. High inflation regime, 1990-99[1]



Low inflation regime, 2000-present[1]



[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).

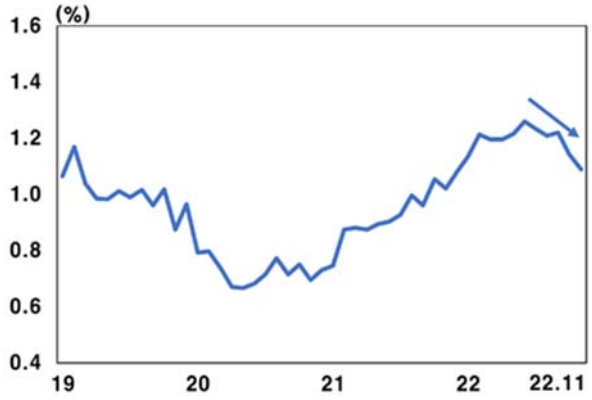
Second, short-term (one year) consumers' inflation expectations are also showing a downward trend mainly due to contractionary monetary policy and the possibility of an economic slowdown. A fall in inflation expectations will operate as a factor in lowering prices and wages. In addition, long-term (five 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.

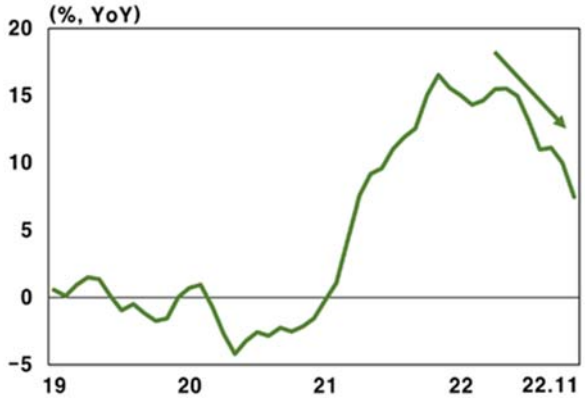
Fourth, intermediate goods prices, which showed a large upward trend until November 2021, have shown a downward trend since 2022 (see Graph 5.B). This shows the possibility that the degree to which wages transfer to prices has decreased compared with when wages and intermediate goods prices rose together.

Job vacancies and intermediate goods prices — Graph 5

A. Job vacancy rate



B. Intermediate goods prices



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	0.01	0.35***	0.56**
	(0.08)	(0.12)	(0.12)	(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 Phillis curve comparison of scatterplots[1] Graph 6

A. Before controlling for cost-push shocks[2]

B. After controlling for cost-push shocks[2]

[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.

References

Amiti, M, S Heise, F Karahan, A Sahin (2022): "Pass-through of wages and import prices has increased in the Post-Covid period," *Liberty Street Economics,* 23 August.

Bank of Korea (2022): "Economic outlook", November 2022.

Boissay F, F De Fiore, D Igan, A Pierres Tejada and D Rees (2022): "Are major advanced economies on the verge of a wage-price spiral?" *BIS Bulletin*, no 53, May.

Hazell, J, J Herreno, E Nakamura and J Steinsson (2022): "The slope of the Phillips curve: evidence from US states," *Quarterly Journal of Economics*, vol 137, no 3, pp 1299–344.

IMF (2022): "Wage dynamics post-Covid-19 and wage-price spiral risks," *World Economic Outlook*, October.

Jordà Ò, C Liu, F Nechio and F Rivera-Reyes (2022): "Wage growth when inflation is high," *FRBSF Economic Letters*, 6 September.

McLeay, M and S Tenreyro (2020): "Optimal inflation and the identification of the Phillips curve," *NBER Macroeconomics Annual*, vol 34, no 1, pp 199–255.

Oh, S, S-Y Song, C-S Han, J-H Lee and G-W Bae (2022) "Recent wage trends and the pass-through of wages," *BOK Issue Note*, no 44.