

ARTICLE – The Phillips curve and monetary policy

This article aims to describe the relationship between resource utilisation and inflation in light of low wage increases in Sweden in recent years. The relationship between resource utilisation and wage development looks to have weakened in Sweden. The Riksbank's forecast is still based on the assessment that wage development is affected by resource utilisation with a certain time lag, but takes into account that the relationship seems to have weakened. However, the relationship between resource utilisation and inflation does not seem to have weakened. Inflation is affected by several factors in addition to wage growth, including productivity growth, energy prices and the exchange rate. It is not possible therefore to say in advance how monetary policy might change if wage increases turn out to be lower than forecast.

In many countries, wage growth and inflation have been relatively subdued in recent years, despite unemployment having declined and resource utilisation having increased. This has led to a discussion on whether the relationship between the development of the real economy and price and wage growth has changed.¹² Most of this discussion is based on the so-called Phillips curve, of which there are a number of different variants.¹³ The idea behind the relationship is that when economic activity is strong and unemployment is low, many employers compete for employees, which leads to higher wages, faster cost increases and higher inflation.

The debate about the Phillips curve has taken place in many different countries around the world but has also applied to developments in Sweden. Some analysts have drawn the conclusion that the Swedish Phillips curve has collapsed.¹⁴ The Riksbank has previously analysed and discussed the correlation between resource utilisation on the one hand and wage development and inflation on the other.¹⁵ This article aims to shed further light on the Phillips relationship in Sweden and the scope for monetary policy to keep inflation around the target in light of the low wage increases in recent years.

What does the Phillips curve look like in Sweden?

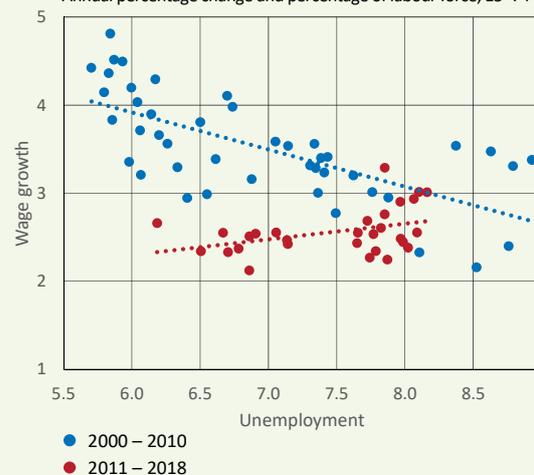
Figure 1:13 shows the relationship between wage growth and unemployment in Sweden since 2000. We clearly see that the relationship is negative for the period 2000–2010, in

accordance with a classic Phillips curve, but seems to have weakened since then.

Figure 1:14 shows a similar relationship between CPI inflation and unemployment. The relationship is slightly

Figure 1:13. Phillips curve with wage growth and unemployment

Annual percentage change and percentage of labour force, 15–74 years.



Note. Wages according to short-term wage statistics. Blue and red lines show the estimated regression correlation for the period 2000–2010 and 2011–2018 respectively.

Sources: National Mediation Office, Statistics Sweden and the Riksbank

negative for the period 2000–2010 and, in contrast with the relationship between wages and unemployment, looks to have strengthened somewhat in recent years.¹⁶

¹² See, for instance, J. Cunliffe, "The Phillips curve: lower, flatter or in hiding?", speech, Bank of England, 14 November 2017, and O. Blanchard, "The US Phillips Curve: Back to the 60s?", Policy Brief, Peterson Institute, 2016.

¹³ The Phillips curve is named after William Phillips, who presented a study in 1958 that showed a negative relationship between nominal wage increases and unemployment in the United Kingdom in the period 1861–1957. Similarly, Samuelson and Solow established a negative relationship between inflation and unemployment in the United States during approximately the same period. The work of Friedman and Phelps questioned the existence of a permanent relationship between inflation and unemployment and developed the so-called expectations-augmented Phillips curve.

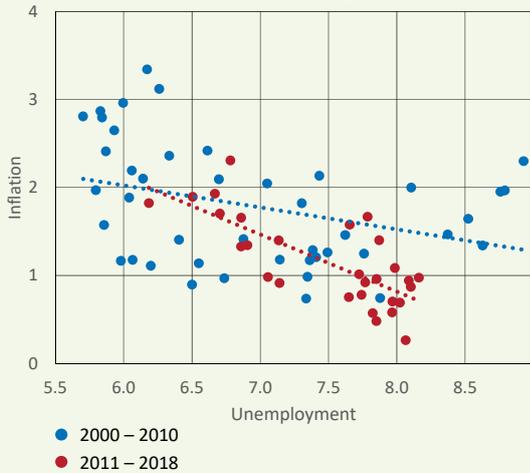
¹⁴ See for instance Industriarbetsgivarna (Swedish Association of Industrial Employers), "Den svenska Phillipskurvan har kortslutits [The Swedish Phillips curve

has short-circuited]", January 2017, and "Strukturella faktorer försvagar Phillips/kurvan [Structural factors weaken the Phillips curve]", 13 March 2018.

¹⁵ See for instance the article "The relationship between resource utilisation and inflation" in Monetary Policy Report, October 2016, Sveriges Riksbank and the article "Strong economic activity but subdued wage increases" in Monetary Policy Report, July 2017, Sveriges Riksbank. See also P. Jansson, "The ideological debate on monetary policy – lessons from developments in Sweden", speech, Sveriges Riksbank, 6 December 2017, and H. Ohlsson, "Data, correlations and economic policy challenges", speech, Sveriges Riksbank, 29 May 2018.

¹⁶ The conclusion that the relationship has not weakened after the crisis was also reached in the article "The relationship between resource utilisation and inflation" in Monetary Policy Report, October 2016. See also S. Karlsson and P. Österholm, "A

Figure 1:14. Phillips curve with inflation and unemployment
Annual percentage change and percentage of labour force, 15–74 years



Note. Inflation refers to the CPIF. Blue and red lines show the estimated regression correlation for the period 2000–2010 and 2011–2018 respectively.

Sources: Statistics Sweden and the Riksbank

In the monetary policy analysis, the Riksbank uses broader measures than solely unemployment to assess resource utilisation in the economy. In addition, the effects from resource utilisation on wage growth and inflation often occur with a significant time lag. Figure 1:15 therefore illustrates the Phillips relationship in the form of time series with wage development, CPIF inflation and the Riksbank’s indicator for resource utilisation (the RU indicator) 6 quarters earlier.

Figure 1:15. Short-term wages, the CPIF and the RU indicator 6 quarters earlier

Annual percentage change and standard deviation respectively



Note. The National Mediation Office’s forecast for definitive outcomes for short-term wages 2017Q2–2018Q1. The RU indicator is a measure of resource utilisation. It is normalised so that the mean value is 0 and the standard deviation is 1.

Sources: National Mediation Office, Statistics Sweden and the Riksbank

The RU indicator summarises the information in survey data and labour market data and often gives a similar picture of resource utilisation in the economy to the one provided by the GDP gap or the hours worked gap. The figure shows that there has historically been a clear relationship between resource utilisation and wage and price growth. As resource utilisation has strengthened in recent years, inflation has risen in line with previous relationships. Wage growth has not increased in the same way, however. Figure 1:15 also shows how the Riksbank’s wage and inflation forecasts relate to resource utilisation.

Why then does the relationship between resource utilisation and wages seem to have weakened, while the relationship with inflation has not weakened in the same way?

Low wage increases in recent years

Wage growth is partly determined by expected productivity growth and expected inflation. Expected productivity growth reflects the scope for real wages, which, together with expected inflation, reflects the scope for nominal wages. Furthermore, wage growth is affected by the labour market situation, the negotiating strength of wage-earners and international competitiveness, which is often discussed in terms of wage growth in Sweden’s most important competitor countries.

Table 1:3 summarises how these factors may have affected wage development in Sweden in recent years.

Table 1:3. Possible explanatory factors behind recent wage development

Explanatory factor	Possible recent effect on wages in Sweden
Productivity growth	— Lower productivity growth is deemed to have reduced the scope for real wages.
Expected inflation	+ Higher expected inflation may have contributed to higher nominal wages.
Labour market situation	+ Rising resource utilisation may have helped sustain wage growth.
Negotiating strength among wage-earners	— Increased and changed labour supply may have subdued wage demands.
International competitiveness	— Low wage increases in the euro area have probably subdued wage development in Sweden as well.

There is strong support for some factors, whereas others are to be interpreted as plausible contributory factors. Weak productivity growth has probably held back wage increases, while higher inflation expectations and the strong economic and labour market situation may have had the opposite effect. At the same time, wage increases may have been

Note on the Stability of the Swedish Phillips Curve”, Working Paper 2018:6, Örebro University School of Business.

subdued by a number of factors, including a changed labour supply, and relatively weak wage development in the euro area.

... but inflation still close to target

Despite relatively low wage increases in recent years, inflation has still risen towards the target of 2 per cent. Inflation is affected by a number of different factors in addition to wage development. One important factor is domestic cost pressures for companies, which are largely determined by how much wages increase in relation to productivity growth in the economy. For a small, open economy like Sweden, import prices also have a significant impact on companies' costs and on consumer prices. The cost of imported goods is determined by both global market prices and the exchange rate. Company mark-ups, which reflect how much companies increase their prices in relation to their costs, play a role in price-setting as does expected future inflation; the more companies expect prices in general to rise, the greater their propensity to raise their own prices today.

Table 1:4 summarises how these explanatory factors may have affected inflation in recent years.¹⁷

Table 1:4. Possible explanatory factors behind recent inflation

Explanatory factor	Possible recent effect on inflation in Sweden
Domestic cost development	— Low wage increases have held back cost development.
	+ Lower productivity growth has helped sustain cost development.
Global market prices	+ Higher oil prices, among other factors, have contributed to higher import prices.
Exchange rate	+ Weaker krona has contributed to rising costs via higher import prices in Swedish krona.
Price mark-ups	— Lower price mark-ups may partly reflect increased competition.
	+ Price mark-ups may also reflect the economic situation and have risen as economic prospects have improved
Expected inflation	+ Higher expected inflation has contributed to higher prices in companies.

The low productivity growth has probably held back wage development while sustaining the rate of increase in domestic cost pressures. Recently rising oil prices and the weakening of the krona have also contributed to pushing up

costs and inflation, without a direct link to wage development in Sweden.

Increased competition from, for example, e-commerce may have made many companies reduce their mark-ups, although these are also driven by the demand situation and economic activity.¹⁸ It is the Riksbank's assessment that the ever-stronger economic situation in recent times has enabled companies to increase their price mark-ups.

Against this background, it is not very surprising that the observed relationship between resource utilisation and wage or price growth – the Phillips curve – can look different over different time periods. There are thus several feasible explanations for the recent development of moderate wage increases and inflation that has nevertheless been close to target.

The risk of low wages going forward – how will inflation be affected?

Figure 1:16 shows the Riksbank's wage forecast together with estimated empirical relationships from a number of different models that explain wage growth in terms of expected productivity growth, expected inflation and resource utilisation in Sweden and the euro area.¹⁹

The Riksbank's forecast implies that the rate of increase in Swedish wages is picking up, but will remain lower than is indicated by historical relationships.

The fact that productivity is only expected to increase at a moderate pace in the years to come means, however, that domestic cost pressures will grow by about 2 per cent a year in the Riksbank's forecast, despite wage increases remaining relatively moderate (see Figure 1:17).

The high resource utilisation will also continue to enable companies to maintain their margins. These factors will counteract the dampening effect on inflation of the expected appreciation of the krona going forward. Overall, these factors contribute to the expectation that CPIF inflation will remain close to 2 per cent in the years ahead (see Figure 1:17).

An uncertainty factor in the Riksbank's forecasts is that the factors that have held back wage increases in recent years may be more permanent and that wage growth in the period ahead will not increase in the way the Riksbank expects. If wage development is weaker than expected, there are several feasible scenarios for inflation.

¹⁷ See also "Why inflation has risen", article in Account of monetary policy 2017 and "Evaluation of the Riksbank's forecasts", Riksbank Studies, March 2018, Sveriges Riksbank.

¹⁸ See for instance M. Jonsson, "Increased competition and inflation", Economic Review 2007:2, Sveriges Riksbank, for a more detailed description of how increased competition can affect company pricing. The fact that both eCommerce and

economic activity affect company pricing is confirmed by the Riksbank's Business Survey; see "The Riksbank's Business Survey: The economic upswing is continuing", June 2018, Sveriges Riksbank.

¹⁹ See the article "Strong economic activity but subdued wage increases" in Monetary Policy Report, July 2017, Sveriges Riksbank, for a more detailed description of the estimates.

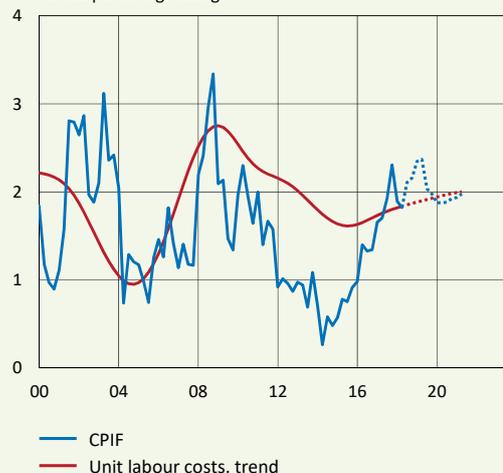
Figure 1:16. The Riksbank's wage forecast and empirically estimated correlations



Note. Wages according to short-term wage statistics. The National Mediation Office's forecast for definitive outcomes for short-term wages 2017Q2–2018Q1. The field contains adjusted values between 2012Q1 and 2018Q1 and model forecasts thereafter.

Sources: Swedish National Mediation Office and the Riksbank

Figure 1:17. Inflation and unit labour costs



Note. The trend in unit labour costs (for the entire economy) has been calculated using a so-called HP filter based on the Riksbank's forecast in July 2018 and an assumption that unit labour costs will increase by 2 per cent across the forecast horizon.

Sources: Statistics Sweden and the Riksbank

One scenario is if *both wages and inflation are lower than in the Riksbank's forecast*. Continued low wage increases for competitiveness reasons could be a factor behind such a scenario.²⁰ Domestic cost development and inflation would probably then be lower than in the Riksbank's forecast. As inflation has been below target for several years, such a development could weaken the inflation target's contribution as an anchor for price-setting and wage formation, even if the Riksbank deems there to be scope to make monetary policy more expansionary if necessary, or to maintain the expansionary monetary policy for longer.

Another scenario is if *wages increase more slowly than expected but inflation nevertheless rises in line with the Riksbank's forecast*. This could happen if lower wage increases reflect slower productivity growth, so that cost pressures nevertheless develop as expected, and company pricing otherwise follows the assumptions in the Riksbank's forecast.

As mentioned earlier, inflation is affected by many other factors, including developments in energy prices and the exchange rate. It is hence not possible to say in advance exactly how the inflation forecast and monetary policy would change if wage increases continue to be low instead of rising in accordance with the Riksbank's forecast.

²⁰ The fact that there are now signs of wages abroad increasing more rapidly reduces the risk for this scenario.