Economic activity and the labour market

This boxed article analyses the relation-ship between developments in eco-nomic activity and the labour market. **The results do not support the view that the Swedish labour market has in general been unusually weak over the past one to two years. Both employment and unemployment have, if anything, been surprisingly positive given the economic climate. On the other hand, hours worked appears to have had an unusually weak development. The relationship between the labour market developments and the recent increase in productivity is also discussed.**

Last year open unemployment increased by 0.9 percentage points, employment fell by 0.2 per cent and the number of hours worked declined by 1.3 per cent. However, forecasters such as the Riksbank and the National Institute of Economic Research succeeded fairly well in assessing developments in open unemployment and employment (see Figures B1 and B2). With regard to employment, the forecasts at the beginning of the year even indicated a slighter weaker development than the actual outcome. This was mainly due to an initial underestimation of employment in the public sector.
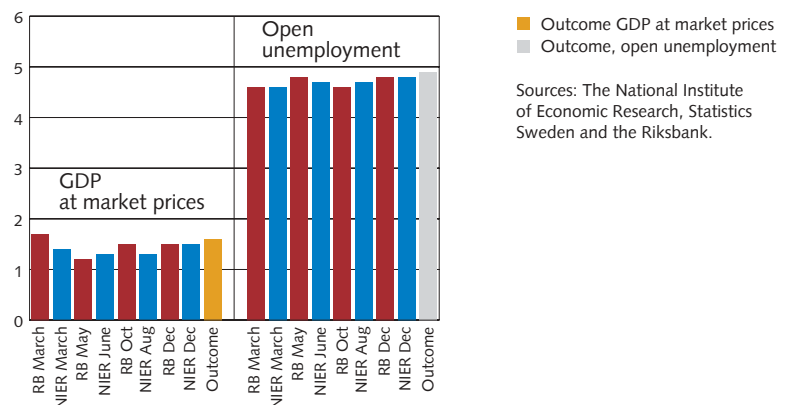
With regard to developments in the economy as a whole, it was only the change in the number of hours worked that was surpri-singly negative. [10] Although the forecasts were gradually adjusted downwards over the year, the reduction was still being underestimated as recently as in December. This applies in particu-lar to the Riksbank's forecast (see Figure B2). At the same time, the assessments of GDP growth for the whole of 2003 were largely in line with the actual outcome (see Figure B1).

*Some similarities between Swedish and US labour markets*

It is not only Sweden that has experienced weak labour market development recently. Despite the fact that the US recovery has now been in progress for a couple of years and

has moreover been stronger than the Swedish recovery, employment has not yet picked up. This phenomenon, known as jobless growth, was observed in the United States during the previous upturn, but it is even more evident in the present recovery. The fact that US employ-ment growth has been even weaker than that in Sweden is illustrated by the size and scope of the misjudgements by various forecasters. In the case of the United States, both employment and the number of hours worked were substan-tially overestimated in both 2001 and 2002 (see Figure B3).

Figure B1. GDP growth and open unemployment 2003: forecasts by National Institute of Economic Research and the Riksbank and outcome.
Annual percentage change and per cent

■ Outcome GDP at market prices
■ Outcome, open unemployment

Sources: The National Institute of Economic Research, Statistics Sweden and the Riksbank.

Figure B2. Employment and number of hours worked 2003: forecasts by National Institute of Economic Re-search and the Riksbank and outcome.
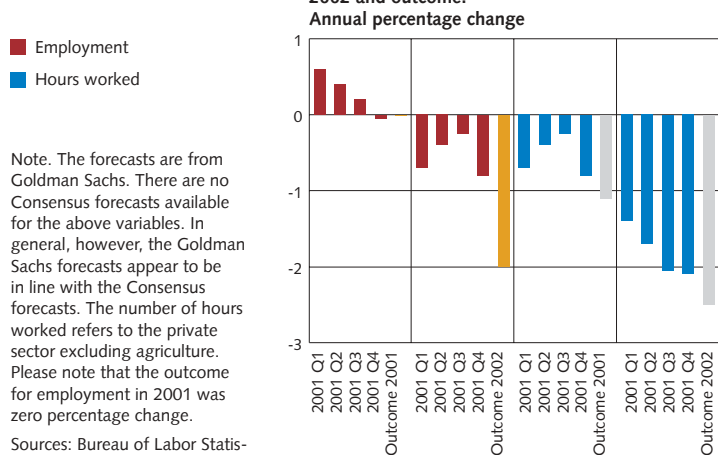**Annual percentage change**

■ Outcome, employment
■ Outcome, hours worked
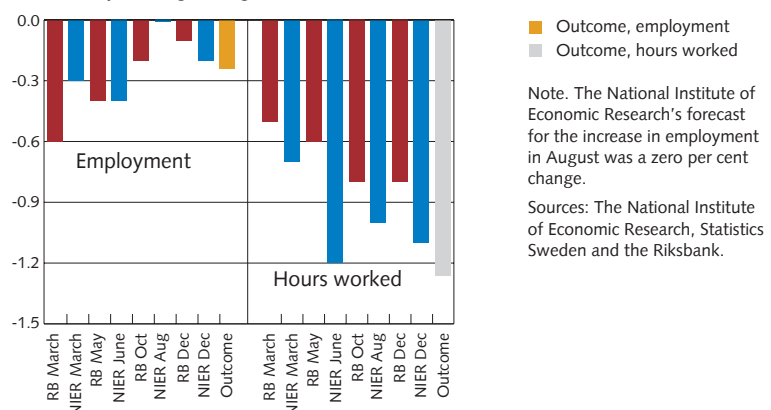
Note. The National Institute of Economic Research's forecast for the increase in employment in August was a zero per cent change.

Sources: The National Institute of Economic Research, Statistics Sweden and the Riksbank.

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10 As the forecasts for employment were fairly accurate, the forecast errors for hours worked are largely due to an overestimation of the average working hours. The picture for the business sector is largely the same.

Figure B3. Forecasts for changes in employment and number of hours worked in the United States 2001 and 2002 and outcome.
Annual percentage change

■ Employment
■ Hours worked

Note. The forecasts are from Goldman Sachs. There are no Consensus forecasts available for the above variables. In general, however, the Goldman Sachs forecasts appear to be in line with the Consensus forecasts. The number of hours worked refers to the private sector excluding agriculture. Please note that the outcome for employment in 2001 was zero percentage change.

Sources: Bureau of Labor Statistics and Goldman Sachs.

A relatively high level of GDP growth and weak development in the number of hours worked is normally reflected in rapid productivity growth. In Sweden, productivity growth has been around 3 per cent on average over the past two years, which can be compared with around 2 per cent during the years 1995-2001. The figure for the business sector was an increase of around 4 per cent in 2002-2003, which is approximately two percentage points higher than in 1995-2001. In the US business sector, productivity increased by an average of 3.9 per cent in 2001-2003, which is just over 1.5 percentage points higher than in the period 1995-2000. As the development of hours worked was overestimated in both Sweden and the United States, the increase in productivity in both countries was also unexpectedly high.

There is nothing remarkable about a productivity increase in an economic upturn. During the initial phase of the upturn, firms increase their rate of utilisation of the existing labour force instead of recruiting new staff. After a while, when the economic upturn has been underway for some time and has been consolidated, a need to recruit new staff arises. At this stage, productivity normally slackens

and employment begins to increase. However, the long period of high productivity that has characterised the US economy in particular raises certain questions regarding this explanation for the increase in productivity. One possible interpretation is that this development is linked to the large-scale IT investments made at the end of the 1990s and that these are now beginning to provide productivity gains even outside of the actual IT-producing sectors (see the boxed article "How persistent is the recent rise in productivity?" in this report).[11] The question that arises here is whether this can be an explanation of why the labour market has shown weak development in Sweden, too, or whether the cause is instead simply that the Swedish economic recovery has not been in progress as long or been sufficiently strong.

Okun's law describes how economic activity affects the labour market

A well-known relationship between the economic cycle and the state of the labour market is that described as Okun's law. This can be interpreted as a short-term correlation and expresses the relationship between changes in economic activity and cyclical activity in the labour market.[12] Okun's law is therefore a natural starting point for a discussion of how economic activity affects the labour market. This article presents estimates applying Okun's law to three different measures of activity in the labour market: unemployment, employment and number of hours worked. By studying how well this law manages to predict recent labour market developments, it is possible to obtain an indication of to what extent developments can be regarded as cyclical or due to other factors unrelated to the economic cycle.[13]

Making estimates according to Okun's law requires a measure of the economic cycle.

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11 Another hypothesis is that tax changes to stimulate investment and low interest rates, combined with a continuing rise in labour costs have led to an increase in capital intensity. This has in turn contributed to both increased productivity and weak developments in employment.

12 During the first months of the Kennedy administration, economist Arthur Okun was asked by the Council of Economic Advisers to estimate the increase in GDP that would follow on from a reduction in US unemployment from 7 per cent to 4 per cent. This led to Okun's well-known discovery that an increase in US production of 3 per cent went hand in hand with a reduction in unemployment of approximately 1 percentage point. See Okun, A.M., "Potential GNP: Its Measurement and Significance", in *Proceedings of the Business and Economic Statistics Section*, American Statistical Association, Washington, D.C., 1962, pp 98-103.

13 Okun's law is "one of the best empirically fitted economic relationships" according to Nobel prize winner James Tobin. See Gylfason, T. (ed.), *The Swedish model under stress*, Economic Policy Group report 1997, Centre for Business and Policy Studies (SNS), Stockholm.

One possible measure is the output gap, which measures deviations in aggregate production from a long-term trend, sometimes known as potential production. The simplest method, which is used here, is to assume a linear relationship to estimate the trend. [14] The gap – or the cyclical component of GDP – is then calculated as the difference in per cent between actual GDP and trend GDP. The cyclical components in unemployment, employment and the number of hours worked can be calculated in a corresponding manner. These labour market gaps are related in the estimates to the production gap. To capture persistency in the data and obtain the best possible fit, the estimated equations include time lags of both the labour market gap and the production gap.

Estimates of Okun's law on the Swedish labour market

The estimates of the various Okun relationships are reported in Table B2. The results show that an increase in the production gap of approximately 1.5 percentage points is related to a reduction in the labour market gap of around 1 percentage point within just over one year (coefficient *b* in Table B2). This estimate is in

line with earlier studies. [15] However, the active labour market policy in Sweden means that open unemployment also varies according to changes in measures by the National Labour Market Board (AMS). If the corresponding estimate is instead made for total unemployment (including AMS measures) a stronger exchange is obtained between the economic cycle and unemployment and an almost 1:1 relationship; an increase in the GDP gap of 1 percentage point is then linked to an equally large reduction in the total unemployment gap.

It is more difficult to obtain a clear preliminary perception of how the estimated relationships between economic activity and the cyclical components in the number of hours worked and employment respectively should look, as these relationships are not as empirically fitted. The estimates based on the number of hours worked give a 1:1 relationship one year ahead, just like the estimates based on total unemployment.

The estimates of the cyclical component of employment give an even larger exchange with economic activity than the estimates based on the number of hours worked. An increase in the output gap of 1 percentage point is connected with an increase in the employment gap of 1.4

Table B2. Estimate result of Okun's law applied to three different labour market gaps for the period Q1, 1980 to Q4, 2001.

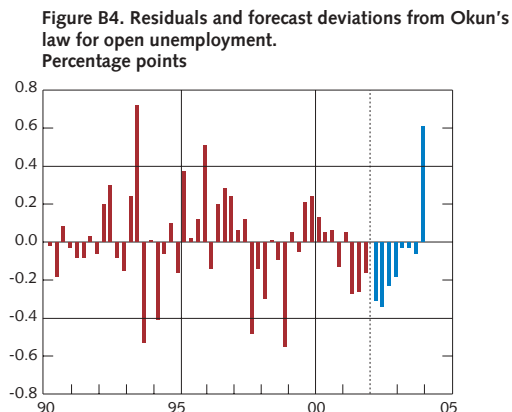| Estimated coefficients	Open unemployment	Employment	Hours worked
a_0	-0.12 (4.73)	0.20 (4.86)	0.53 (6.17)
a_1	-0.03 (1.06)	0.07 (1.29)	0.08 (0.65)
a_2	-0.05 (1.66)		-0.23 (2.06)
a_3	0.04 (1.52)	-0.06 (1.24)	-0.05 (0.59)
a_4	0.03 (1.17)	0.04 (0.68)	
b	-0.64	1.39	1.01
adjusted R^2	0.98	0.99	0.91
Box-Ljung Q(9)	0.14	0.33	0.59
No. of observations	84	84	85

Note. The estimated equations are $x_t = \Sigma\, a_i y_{t-i} + \Sigma\, c_i x_{t-j} + e_t$, where y is the output gap, x the labour market gap and e a residual. The figures in parenthesis are t-values. Box-Ljung is a test for serial correlation which indicates significant serial correlation if the value is below 0.05. The total "long-term" effect is calculated as $b = \Sigma\, a_i /(1 - \Sigma\, c_j)$.
Sources: Statistics Sweden and the Riksbank.

14 The reason for selecting a linear trend is that this method is very simple and proves to work well with regard to estimates of Okun's law. In practice, a trend has been calculated using an HP filter, where the variability of the trend is very low (the adjustment parameter has been set at 100,000). It should be noted that this trend differs from the trend that forms a basis for the calculations of the output gap in Figure 43 of this Inflation Report.
15 Later estimates of Okun's law on US data have observed a relationship of 2:1, that is to say, that a reduction in the GDP gap of 1 percentage point increases the unemployment gap by around half a percentage point. Estimates using Swedish data also usually give this relationship. See, for instance, Gylfason, T. (ed.), The Swedish model under stress, Economic Policy Group report 1997, Centre for Business and Policy Studies (SNS), Stockholm, and Apel, M. and P. Jansson, "System Estimates of Potential Output and the NAIRU", Empirical Economics 24, 1999, 373-388.
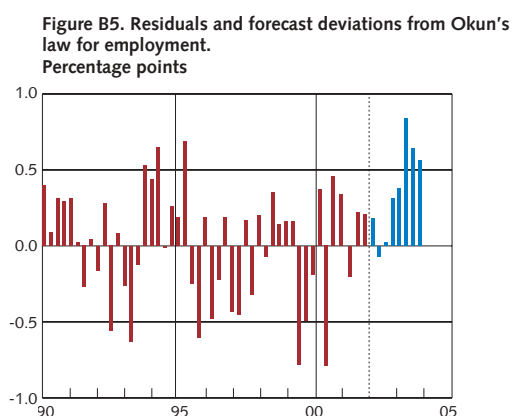
Figure B4. Residuals and forecast deviations from Okun's law for open unemployment.
Percentage points

■ Residuals

■ Forecast errors

Sources: Statistics Sweden and the Riksbank.

Figure B5. Residuals and forecast deviations from Okun's law for employment.
Percentage points

■ Residuals

■ Forecast errors

Sources: Statistics Sweden and the Riksbank.

Figure B6. Residuals and forecast deviations from Okun's law for the number of hours worked.
Percentage points

■ Residuals

■ Forecast errors

Sources: Statistics Sweden and the Riksbank.
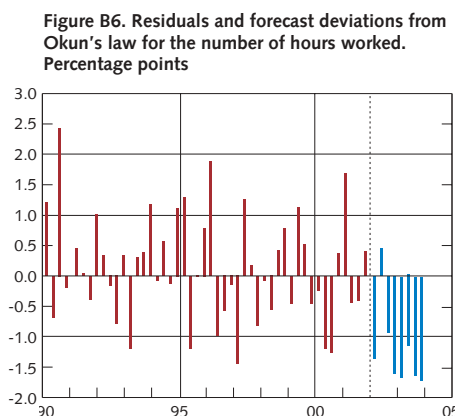
percentage points five quarters ahead, that is to say, an increase in cyclical employment of 1 percentage point goes hand in hand with an increase in the output gap of 0.7 percentage points.

The estimates in Table B2 refer to the period Q1, 1980 to Q4, 2001. Using these estimates as a basis, it is possible to calculate an expected development for the labour market gap in 2002 and 2003 (referred to hereafter as "forecast").

These "forecasts" are then compared with the corresponding "actual" gap, which is calculated using actual outcome and a trend throughout the entire period (up to end of Q4, 2003) for unemployment, employment and number of hours worked. If the differences between the actual gap and the forecasts are substantial and systematic (series correlated) there are signs that developments deviate from earlier patterns, that is to say, it does not appear that economic activity alone can explain developments in the labour market. Figures B4-B6 show both the residuals from the estimated relationships up to the end of Q4, 2001 and the differences between outcome and forecasts for 2002 and 2003. [16]

The relationships indicate surprisingly positive developments in unemployment and employment

The deviations from forecast for the unemployment gap show that (cyclical) unemployment was lower in 2002 than indicated by historical relationships (see Figure B4). For 2003 the deviations are small, apart from Q4, when unemployment was much higher than normal for the corresponding phase in the economic cycle. All in all, it can be observed that forecast errors indicate slightly greater systematics than previously, but that the errors imply that unemployment has rather been surprisingly low over the past two years (with the exception of Q4, 2003). However, the forecast errors can hardly be said to be particularly large from an historical perspective; the residuals have on several earlier occasions been much larger than the forecast errors in 2002 and 2003.

The forecast deviations for the employment gap show a systematic underestimation of cyclical employment, especially during 2003 (see Figure B5). This means that the employment gap developed more positively than the development indicated using Okun's law. As in the case of the unemployment gap, the picture here is rather that developments have been surprisingly strong, given the economic situation. In relation

16 The forecasts are based on the actual GDP developments in 2002 and 2003.

to the relationship's earlier residuals, the forecast errors appear to be slightly larger than for the unemployment gap, but they are still not of a remarkable size.

The number of hours worked is overestimated by Okun's law

However, the picture is different with regard to the forecast errors for the estimates based on the number of hours worked. It is quite clear that the forecast errors are both very systematic and unusually large in an historical perspective (see Figure B6). As the forecast errors are negative throughout, applying Okun's law in this case gives a clear overestimate of the actual developments. It is worth emphasising that the results for the number of hours worked differs significantly on this particular point from the results for unemployment and employment. It is only for this variable that the results indicate that developments in 2002 and 2003 were actually unusually weak (disregarding the increase in unemployment Q4, 2003).

To summarise, the analysis in this article does not support the view that the Swedish labour market has in general been unusually weak over the past one to two years. A simple correlation between economic activity and activity in the labour market shows that both employment and unemployment have, if anything, been surprisingly positive given the economic climate. However, the picture is quite different for the number of hours worked. Here the relationship gives a relatively significant overestimate of developments in both 2002 and 2003. It is interesting to note that this pattern for forecast errors also applies to the actual forecasts of the National Institute of Economic Research and the Riksbank, despite the fact that they are not based on such a simplified relationship.

The fact that the development in the number of hours worked does not appear to be a simple cyclical phenomenon raises interesting questions regarding the recent growth in productivity. If the number of hours worked does not increase to the same extent as in previous economic upturns, this may be an indication of a productivity increase of a more radical nature, perhaps similar to that observed in the United States. However, it is important to note in this context that the US economy is characterised by an economic upturn that has been in progress for longer and been stronger than what we have seen in the Swedish economy so far. In addition, there are differences in the developments of the labour markets. In contrast to Sweden, developments on the labour market in the United States have been very weak during the past two or three years and characterised by both unexpected declines in employment and falls in the number of hours worked. Given this, there is reason to closely follow productivity growth in Sweden in the near future and to be aware of its consequences for developments in the number of people employed and for unemployment (see also the boxed article "How persistent is the recent rise in productivity?" in this report).

It should also be emphasised that the results in this article may be affected by the choice of measuring the trend and cyclical components in the variables examined. However, the general conclusion should remain: employment and unemployment have not developed in a particularly unusual manner in recent years, taking into account the economic situation. On the other hand, the number of hours worked has.