



SPEECH

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■ Potential GDP, resource utilisation and monetary policy

It is always a pleasure to take part in Statistics Sweden's conferences in Saltsjöbaden. This is the tenth conference in which economic analysis and economic statistics meet in a constructive dialogue. Questions regarding productivity have been in focus ever since the first conference in 2001. At that time I was Director General of Statistics Sweden and I had been inspired by the analyses of productivity made by *Statistics Canada*. I thought there should be scope for more of this in Sweden, too. It is therefore very gratifying to see that this work is continuing.

My main message today can be summarised in two points. The first is that I wish to show that it is difficult to estimate potential GDP and resource utilisation. Different methods give different results. At present this is, moreover, particularly difficult because of the financial crisis and the deep recession we are now recovering from. Secondly: despite the difficulties in making such estimates, I would nevertheless like to claim that potential GDP has probably fallen as a result of the crisis, which is significant for monetary policy.

My own assessment is that the GDP gap was around + 2 per cent in 2007, prior to the start of the crisis, and that potential GDP has declined by around 4 per cent as a result of the crisis. The GDP gap therefore only fell by around 6 per cent between 2007 and 2009, despite actual GDP declining by around 10 per cent in relation to the trend. The GDP gap was thus approximately – 4 per cent in 2009 when the recession was deepest. According to current forecasts, the GDP gap will have closed by the end of the forecast period three years from now.

I intend to begin by talking about what the real economy – in other words, production and employment – means for monetary policy. I shall then go on to talk about how one can measure potential production and resource utilisation – two central concepts in this context. Then I shall discuss what has happened to GDP in conjunction with the financial crisis. After that, I will describe what different methods can tell us about potential GDP and resource utilisation. Finally, I intend to talk about the significance of resource utilisation for inflation and current monetary policy.

■ What does the real economy mean for monetary policy?

The overall principles for monetary policy are described in the publication *Monetary Policy in Sweden*.¹ It states the following:

- "According to the Sveriges Riksbank Act, the objective for monetary policy is to maintain price stability. The Riksbank has specified this as a target for inflation, according to which the annual change in the consumer price index (CPI) is to be 2 per cent."
- "At the same time as monetary policy is aimed at attaining the inflation target, it is also to support the objectives of general economic policy with a view to achieving sustainable growth and high employment. This is achieved through the Riksbank, in addition to stabilising inflation around the inflation target, also striving to stabilise production and employment around long-term sustainable paths."

Production and employment are thus included in the monetary policy analysis in two ways. Firstly, stable production and employment around levels that are sustainable in the long run are important objectives for economic policy. Secondly, the level of production and employment in relation to potential production and employment – or put another way, resource utilisation – is an indicator of future inflationary pressures.

How are potential GDP and resource utilisation measured?

Resource utilisation can be measured in many different ways. I would like to focus on the GDP gap. The GDP gap has the advantage of providing the most comprehensive picture of the extent to which resources in the economy are being used and GDP is the central forecasting variable. The GDP gap is the difference between actual GDP and potential GDP. By potential GDP, I mean the level of GDP that is compatible with a use of the available resources that is sustainable in the long term and that does not push up inflation. Resource utilisation may be either positive or negative.

Potential GDP is often measured by using what is known as an HP trend. This is a statistical method used to show the underlying trend in GDP. By simultaneously trying to minimise deviations from actual GDP and to show the most even curve possible, the HP trend provides something in-between the often jagged curve which shows the actual GDP outcomes and a linear trend. An HP trend is a fairly good measure of the underlying long-term development in GDP during normal cyclical fluctuations.

One problem with an HP trend as a measure of potential GDP is that its terminal point is normally close to the terminal point of the actual time series. This makes it a poor measure of potential GDP towards the end of the series. Often, it is precisely the terminal point that one is interested in. Another problem with an HP trend is that it is not a good measure if there are structural shifts in potential GDP – and it is natural to believe that such shifts take place in connection with a deep recession.

¹ *Monetary Policy in Sweden*, Sveriges Riksbank, 3 June 2010.

■ These problems are clearly visible if one compares the most recent calculation of the GDP gap in the September Monetary Policy Update with the estimates made in real time. In the years before the crisis, resource utilisation was probably higher than the HP gap indicated at that point. This view is also suggested by the fact that GDP growth was high, employment was increasing rapidly, underlying inflation was rising to above 2 per cent, and that household borrowing and house prices were similarly rising rapidly. (Figure 1. GDP gaps in September and in real time)

This is a widely known problem that occurs internationally, and not just here. Orphanides says that one should not use the GDP gap as a measure of resource utilisation, due to the uncertainty in estimates of the gap. He shows, for instance, that the International Monetary Fund's (IMF) calculations of the GDP gap for the United States at different points in time have yielded conflicting results with regard to resource utilisation and that these have therefore led to incorrect economic policy recommendations. He draws the conclusion that one should focus more on GDP growth than on the GDP gap, which, he claims, may provide more robust decision-making data.²

There are also other ways of measuring resource utilisation. A common method is to use a production function where potential GDP is determined by potential labour productivity and the potential number of hours worked. Other possibilities include using so-called UC models,³ principal component methods⁴ or models where one estimates a flexible-price output gap.⁵ Resource utilisation can also be measured by the employment rate, unemployment and other measures. I will return to a number of these measures later.

What has happened to GDP in connection with the crisis?

During the years prior to the financial crisis, productivity growth in Sweden was rapid. At earlier conferences here in Saltsjöbaden, I have pointed to possible causes of the rapid growth in productivity.⁶ Examples of structural causes are deregulation of product markets, increased competition through globalisation, increased use of information technology or – the theme of this year's conference – a rising level of education and a changed work structure.

However, productivity also varies over the business cycle. In June 2007 – before the financial crisis began – our assessment was that productivity growth would be

² See, for example, Orphanides, A. (2010) "Monetary Policy Lessons from the Crisis", Central Bank of Cyprus, May 2010.

³ UC models (UC = Unobserved Components) involve using economic theory to identify which development of the non-observed potential variables is compatible with the development of observed variables, such as GDP, employment, unemployment and inflation.

⁴ Principal component analysis is a statistical technique for compressing information, reducing the number of variables and examining systematic variations in data. The method entails calculating new latent variables, principal components, which can explain most of the variation in the process.

⁵ The flexible-price output gap is mentioned in modern research into monetary policy, where one often talks about flexible-price production instead of potential GDP. Flexible-price production means the production that would arise if both prices and wages were entirely flexible. However, determining this gap is sensitive to how one models the economy and interpretation may be difficult in the absence of in-depth knowledge of the model's properties. For a discussion of the flexible-price output gap and monetary policy, see Jonsson, M., Nilsson, C. and Palmqvist, S. (2008), "Should monetary policy stabilise resource utilisation?" *Economic Commentaries* 1, Sveriges Riksbank.

⁶ Öberg, S. (2007), "Productivity and monetary policy", 7 June 2007 and Öberg, S. (2008), "Monetary policy and productivity", 29 January 2008.

■ lower in the coming years. But we did not foresee that productivity would fall as heavily as it did. In June 2007, we were assuming that productivity would increase by a total of around 5 per cent during the years 2008 and 2009. Instead, it fell by around 5 per cent. The main reason for this fall was an exceptionally steep decline in demand. GDP fell by a total of 5.5 per cent during the years 2008 and 2009, instead of increasing by an almost equivalent percentage, as predicted.

Experiences from previous deep recessions in Sweden in recent decades indicate that such steep declines in GDP have long-lasting consequences. During the recessions of the second half of the 1970s and the early 1990s, the GDP level did not return to the previous trend during the ten-year period following the decline in GDP. (Figure 2. Historical GDP trends)

In connection with financial crises, it is normal for GDP growth to be significantly lower and unemployment higher for an extended period after the crisis, as compared to a period of equivalent length before the crisis. Reinhart and Reinhart have described this in a paper recently presented at a conference at Jackson Hole.⁷ This is partially because credit expansion and increasing real property prices prior to a crisis tend to be followed by tightening and falling prices after the crisis. They also note that dampened growth and higher unemployment after a financial crisis may result in lower investment and the depreciation of human capital, which, in turn, may lower both the level and the rate of increase of potential production.

Also in connection with the current crisis, the Riksbank expects lower GDP in the long term than we did before the crisis. We are now expecting GDP to be approximately 4 per cent lower at the end of the forecast period than we expected two years ago. Lower productivity is responsible for virtually the entire decline, while the number of hours worked is estimated to remain largely the same. However, it should not be assumed that this fall can be attributed solely to the crisis. Many other events have also affected the assessment. (Figure 3. GDP, hours worked and productivity)

How large is potential GDP and how high is resource utilisation?

I now intend to discuss what different methods have to say about the levels of potential GDP, the GDP gap and resource utilisation, and I will start by comparing the GDP gaps based on HP trends (HP gap) that the Riksbank usually presents with the GDP gaps used by the National Institute of Economic Research and the Ministry of Finance. The pre-crisis GDP gaps reported by the latter two are less positive than the GDP gap we publish, namely around 2 and 3 per cent respectively, as opposed to approximately 4 per cent. The fall up to 2009 is roughly the same according to all three, with the negative gap in 2009 thus being greater for them than it is according to our HP gap. (Figure 4. The GDP gap according to the Riksbank, the National Institute of Economic Research and the Ministry of Finance)

⁷ Reinhart, C. M. and Reinhart, V. R. (2010), "After the Fall", National Bureau of Economic Research Working Paper No. 16334. See also Reinhart, C. M. and Rogoff, K. S. (2008), "The Aftermath of Financial Crises", National Bureau of Economic Research Working Paper 14656.

■ The OECD, the IMF and the European Commission also report GDP gaps for Sweden. According to the OECD and the European Commission, the GDP gap for 2007 is on approximately the same level as the Riksbank's HP gap, approximately + 4 per cent. The negative gap at the recession's lowest point in 2009 has been estimated at – 4 per cent by the European Commission and at – 7 per cent by the OECD. The GDP gaps of 2010 and 2011 according to both of these institutions can be disregarded, as their reports were compiled before the summer and, since then, GDP outcomes have been surprisingly high. In its latest report, the IMF reckons with a GDP gap of approximately 2.5 per cent for 2007, followed by a decrease to almost – 5 per cent in 2009 before reaching – 1.5 per cent in 2011.⁸ (Figure 5. The GDP gap according to the Riksbank, the OECD, the IMF and the European Commission)

All three organisations reckon that potential GDP has fallen in conjunction with the crisis. For example, the OECD estimates that potential GDP has decreased by an average of approximately 3 per cent for the countries in the OECD area, as a consequence of the crisis. Approximately two-thirds of this decrease is due to higher capital costs caused by the return to normal risk and interest rate levels after the abnormally low levels prevailing prior to the crisis, which is having a dampening effect on capital intensity. The remaining third is due to an increase in structural unemployment and a decrease in labour supply. As regards Sweden, the dampening effects of structural unemployment and falling labour supply are deemed to be below average, however.⁹

Another question is whether long-term GDP growth has fallen as a result of the crisis. Experiences from previous financial crises indicate that there frequently is a connection. However, in the report mentioned, the OECD writes that it does not expect any decline in long-term GDP-growth (after 2015) due to the crisis. The OECD states that it will indeed decline, but as a result of demographic developments. At the Riksbank, the crisis has not led us to make any new assessment of the long-term GDP growth used in our models. We expect long-term GDP growth to be just above two per cent per year.

Resource utilisation can also be measured in the labour market by, for instance, the employment rate¹⁰, unemployment, the employment gap and the hours gap. The employment gap and the hours gap have been estimated with the aid of HP trends and are thus subject to the problems entailed by such estimates. In contrast, the employment rate and unemployment are not associated with the same type of technical problems, but here it is instead difficult to know what can be considered to be normal levels for the respective variables. In the Figure, they have been included as deviations from the average in 2000–2007, without taking a stance on which levels should be considered normal. They may have been affected both by the reforms made and by the deep recession. These are, of course, important issues to be addressed, but I will not go into them today. (Figure 6. Labour market gaps)

⁸ IMF (2010), *World Economic Outlook October 2010*.

⁹ See OECD (2010), *OECD Economic Outlook*, no. 87, May 2010.

¹⁰ The employment rate is defined as the proportion of the population aged 15–74 in employment, expressed as a percentage.

■ The various labour market gaps co-vary for natural reasons. However, the employment rate, the employment gap and the hours gap reach zero at the start of 2011 and are faintly positive for the rest of the forecast period, while unemployment is above average over the entire forecast period. It is common for unemployment to increase rapidly in a deep recession and decrease slowly during the recovery. However, it is also possible that we are underestimating the strength of the recovery in the labour market – as, indeed, we have done recently. It can also be noted that the positive deviations from the average are of the same magnitude in 2007 as they were at the previous peak in 2001.

The National Institute of Economic Research's Economic Tendency Survey can also be used to describe resource utilisation. There exists a clear connection between various variables in the Survey. For example, companies' planned price increases co-vary with the other variables, for example shortage of labour. (Figure 7. Indicators for the business sector)

However, most of these reported variables are ones that show changes. This is true of demand, for example. The question is whether it is expected to become better or worse. Consequently, these variables are not good measures of the level of resource utilisation, but rather of whether this is increasing or decreasing. However, the business tendency surveys also include variables that measure levels. For example, this applies to the shortage of labour in the business sector and capacity utilisation in the manufacturing industry. These have both increased recently and it cannot be ruled out that these will reach normal levels by the end of this year. (Figure 8. Shortage of labour in the business sector and capacity utilisation in the manufacturing industry)

It is also interesting to compare shortage of labour with unemployment. These co-varied significantly before the crisis. However, shortage of labour is now increasing more rapidly than unemployment is falling. This indicates that there may be significant matching problems in the labour market long before unemployment comes down to a normal level. (Figure 9. Shortage of labour in the business sector and unemployment)

At the Riksbank, we have also developed a special indicator to measure resource utilisation, the so-called RU indicator.¹¹ This uses a principal component method to extract common information from a large number of business cycle indicators in levels. The RU indicator also indicates that resource utilisation in Sweden was about as high in 2007 as at the previous peak in 2000. This contrasts with the GDP gap based on HP trends, which was much higher in 2007 than in 2000. (Figure 10. The GDP gap and the RU indicator).

An indication of the significance of the crisis for potential industrial production can also be obtained by combining statistics on industrial production and capacity utilisation.¹² Industrial production fell by a maximum amount of 24 per cent from its peak in the first quarter of 2008 to its lowest point in the second quarter of 2009. Potential industrial production fell by 14 per cent with a time lag of two to three quarters and by approximately 20 per cent in relation to the previous trend. Such a fall in potential industrial production could explain a fall of approximately 4 per cent in potential GDP, as the level of value added in the manufacturing

¹¹ A more detailed description of the RU indicator and its characteristics will be published shortly.

¹² Potential industrial production has been calculated as [Industrial production] x [Average capacity utilisation 1996-2007]/[Capacity utilisation].

■ industry was equivalent to approximately 20 per cent of GDP prior to the crisis. (Figure 11. Industrial production, capacity utilisation and potential industrial production).

To sum up, I can note that potential GDP and resource utilisation are difficult to estimate. Different methods give different results. This is particularly difficult right now due to the financial crisis and the deep recession from which we are emerging. At the Riksbank we are continuing to work with these issues and expect to take up resource utilisation in more detail in the next Monetary Policy Report in October. Uncertainty surrounding resource utilisation also makes it difficult to assess whether or not monetary policy is well-balanced.

My own assessment is that resource utilisation was more or less as high before the crisis as during the previous boom in 2000 and that the GDP gap was thus in the range of + 2 per cent in 2007. Here, I assume that the GDP gap based on HP trends provides a reliable measure of the GDP gap for 2000 and that other series, for example the RU indicator, indicate that the level of resource utilisation was approximately the same in 2007 as in 2000.

I also assess that potential GDP decreased by approximately 4 per cent in conjunction with the crisis. This is slightly above the OECD's calculations, but the OECD has only calculated the effect of certain identified changes within the framework of a production function. It has not considered other possible effects of the crisis on potential GDP, such as, for example, an abnormally high level of capital consumption. Swedish experiences of previous deep recessions and international experiences of financial crises both indicate that the effects can be greater. The difference from the GDP forecasts we made before and after the fall of GDP in 2009, as well as estimates of the manufacturing sector's potential production also indicate an effect of approximately 4 per cent. I also think that this reduction in potential GDP should be ascribed to the recession of 2009, rather than being spread out over a longer period of time before and after the recession.

This means that the GDP gap was approximately – 4 per cent when the crisis was most severe in 2009. Instead of increasing according to trend by over 4 per cent between 2007 and 2009, GDP fell by 5.5 per cent. This resulted in a fall in actual GDP of approximately 10 per cent in relation to the trend. However, potential GDP also fell as a result of the crisis by around 4 per cent. This means that the GDP gap only fell by around 6 per cent. The level of the GDP gap is significant for monetary policy. A large negative gap indicates both that inflationary pressures can be expected to be low and that there are more compelling reasons to support production and employment through an expansionary monetary policy.

My assessments indicate that the GDP gap was lower before the crisis than appears from a GDP gap based on HP trends. HP gaps do not work well as measures of resource utilisation in deep recessions. However, despite this, my own assessment corresponds fairly well with the level that the HP gap indicates for 2009. It is also compatible with current forecasts indicating that the GDP gap should be largely normal by the end of the forecast period. Total GDP growth for the three years 2010–2012 is just above 10 per cent, which is four percentage points more than growth according to trend of just above 6 per cent.

■ What does resource utilisation mean to inflation and current monetary policy?

Previously, I said that the Riksbank also strives to stabilise production and employment around development paths that are sustainable in the long term, and that by potential GDP I mean the level of GDP that is compatible with a utilisation of available resources sustainable in the long term and that will not push inflation up or down. As you know, the target for monetary policy is to keep inflation at a low and stable level. However, one problem when shaping monetary policy in practical terms is that the link between resource utilisation and inflation is not particularly clear. I will now discuss what resource utilisation means to inflation.

In Sweden, the link between resource utilisation and inflation has been weaker since the mid-1990s than it was previously. This is due to the fact that monetary policy has gained a high level of credibility. As long-term inflation expectations among households and companies are now solidly anchored around the inflation target of 2 per cent, there is simply not much scope for other variables to affect inflation. However, it is also due to the fact that inflation is affected by many other factors than resource utilisation, such as variations in energy prices, exchange rate fluctuations and changes in interest rates.¹³

However, the fact that it is difficult to estimate stable links between resource utilisation and inflation using econometric methods does not mean that these links do not exist. International experience indicates that minor variations in resource utilisation in normal times do not significantly affect inflation, but that a very low level of resource utilisation noticeably dampens inflation. In the current crisis, with a very low level of resource utilisation in the United States and the eurozone, underlying inflation has fallen from normal levels of around 2 per cent to around 1 per cent. As far as Sweden is concerned, it appears that, despite everything, there is a relatively strong link between underlying inflation and resource utilisation measured using the RU indicator with a time lag of one to two years. (Figure 12. The RU indicator and HICP inflation excluding energy¹⁴).

In Sweden, underlying inflation measured in terms of the CPIF (the CPI with a fixed mortgage rate) has stayed at, and even above, 2 per cent over the last two years despite the fall in resource utilisation. This is probably related to the substantial weakening of the krona in the most acute phase of the crisis. This contributed to rising import prices measured in Swedish kronor, which kept up inflation. The krona has now strengthened again and is more or less back to its pre-crisis level against the euro, and CPIF inflation has fallen back to below 2 per cent. (Figure 13. CPI and CPIF inflation).

During the forecast period, we expect CPIF inflation to first fall to around 1 per cent, but then to rise again to around 2 per cent at the end of the forecast period. CPI inflation fell dramatically during the crisis as a result of our repo rate cuts, but it will increase to a level higher than CPIF inflation as we increase the repo rate to a more normal level.

¹³ For a more detailed discussion see Adolfson, M. and Söderström, U. (2003) "How is the economy affected by the inflation target?" *Sveriges Riksbank Economic Review* 1/2003.

¹⁴ The HICP is the EU-harmonised consumer price index and largely corresponds to the CPIF, but is not affected by weighting changes at the end of each year.

■ When we compare various measures of resource utilisation with the forecasts we make for inflation in the latest Monetary Policy Update, the following picture emerges. Underlying inflation measured in terms of the CPIF begins to rise in 2011. By that time, resource utilisation measured in terms of variables such as the RU indicator, shortage of labour in the business sector, capacity utilisation in the manufacturing industry, the employment rate and the HP trend-based measures the employment gap and the hours gap will probably already have risen to above-normal levels.

Underlying CPIF inflation will then rise to 2 per cent at the end of the forecast period. Resource utilisation measured using the GDP gap based on HP trends will then have reached a normal level. The HP gap will then be more or less zero. My own assessment is also that the GDP gap will then have reached the zero level. However, even by the end of the forecast period, unemployment will not have reached the average level in the years before the crisis.

Our forecasts thus paint a rather complex picture. There is no simple link between one measure of resource utilisation and one measure of inflation. Resource utilisation can instead be measured in several ways, each of which has its strengths and weaknesses. Inflation can also be measured in a number of ways and we regularly utilise a large number of measures of underlying inflation. In this multi-faceted world, we make the best assessments we can of the direction of monetary policy.

At the latest monetary policy meeting on 1 September, we decided to raise the repo rate by 0.25 percentage points to 0.75 per cent, and our assessment was that the repo rate will gradually be increased to more normal levels as resource utilisation increases. The repo rate will nevertheless be abnormally low for some time to come in order to support the recovery in the economy. I supported the forecast for the repo rate made in the latest Monetary Policy Update – a forecast that I believe is well in line with the picture of a stable economic upturn in Sweden. (Figure 14. Repo rate).

For my part, I have felt very convinced of two things, which I clearly explained in the most recent minutes. Firstly, we ought to increase the repo rate in the months ahead, as the Swedish economy is developing so strongly. Resource utilisation is increasing, which will increase inflationary pressures over time. We should therefore ease up in order to avoid excessive inflation in the period ahead. Secondly, the long-term repo rate should be approximately 4 per cent, corresponding to inflation of 2 per cent and a real interest rate of 2 per cent. The latter figure is what the short real interest rate on government bonds has been, on average, in both the United States and the eurozone for long periods of time.

On the other hand, it is difficult to have a definite opinion of what the repo rate ought to be in two or three years. Neither our own nor the market's forecasting abilities are sufficient to make solid forecasts over such a period. Among other reasons, the repo rate will be dependent upon developments in the eurozone and in the United States, and the impact these may have on the Swedish economy. Weaker international development could entail weaker development in Sweden and a lower repo rate path in the long term. However, stronger development of the Swedish labour market could entail higher inflationary pressures and a higher repo rate path.

■ Despite this uncertainty, my view is that we should report the assumptions we make about the repo rate in conjunction with our forecasts. It would be remarkable if we reported all other circumstances surrounding the forecasts except the repo rate itself, which is the only one of these we take decisions on. Furthermore, it would not be wise to base our forecasts on the market's forward rate curve in those cases in which our assessment of the repo rate – as at present – deviates from the forward rate curve. We are also careful to point out that the repo rate is a forecast and not a promise. However, our possibilities of steering interest rates further ahead on the repo rate path are highly limited. What we can do is to communicate our own assessment, which is also associated with great uncertainty.

The statistics that have been reported after the most recent Monetary Policy Update indicate a stronger development in Sweden than we had expected. According to the National Accounts from September, GDP growth was more rapid in the second quarter of 2010 than was reported in August's flash estimate. The Economic Tendency Survey and purchasing managers' index for the manufacturing sector in September were positive and exceeded market expectations. According to the Labour Force Survey, unemployment fell in August by slightly more than we had expected. As regards international developments, however, the situation continues to be uncertain. Statistics and other information are occasionally above and occasionally below expectations. We will not present any new overall assessment of economic developments until after the next Monetary Policy Meeting on 25 October.