



SPEECH

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■ Productivity and monetary policy

Let me begin by thanking you for the invitation to come here and speak to you!

The rapid increase in productivity is the most important explanation as to why inflation has been low in recent years. The low inflation has in turn given us at the Riksbank the possibility to keep the interest rate at a low level. But productivity will probably show a slower increase in the future. Combined with higher wage increases, this indicates higher inflationary pressures and thereby higher interest rates over the coming years.

In the light of this I shall devote today's presentation to productivity and monetary policy. My speech will have the following structure: I shall begin with an introduction briefly describing how productivity has developed in historical terms. Then I shall move on to three important issues: The causes behind the strong productivity growth, developments in productivity over the coming years and the significance of productivity for monetary policy.

I would like to make it clear from the start that I will not be talking about current monetary policy. I would also like to make it clear that I will today give my own views on productivity and its significance, which are not necessarily the views of the Riksbank. How the Executive Board as a collective views these issues will be made clear in the next Monetary Policy Report published later this month.

Introduction

A measure of productivity that is often used is production per hour or labour productivity. Unless I say otherwise, it is labour productivity that I am referring to in this speech.

How has productivity developed over time? There was a considerable break in the rate of increase of productivity in the mid-1970s. From a rate of increase for the business sector of around 6 per cent a year during the 1960s, the trend increase fell to around 2 per cent a year during the second half of the 1970s and in the 1980s. Since then the trend has been rising.

In the long run, developments in productivity determine most of a country's GDP growth and prosperity. Another important factor is the development of the

labour force and employment. It is therefore important to be able to assess how these will develop in the long run when studying growth and its driving forces.

But also in the short term, productivity growth is important, particularly for monetary policy. Productivity affects a large number of other variables in our forecast work, such as employment and inflation. A good example of this is the calculations made with the aid of the Riksbank's general equilibrium model. They show that the main reason for the low inflation in recent years is precisely the surprisingly high productivity growth.

In a shorter-term perspective the past five years appears to have been a period of unusually high productivity growth. Productivity in the business sector increased by an average of around 4 per cent a year during the years 2002-2006. From this high level, the rate of increase in productivity is now declining. At the beginning of the period 2002-2006 employment fell, but in the past two years it has increased rapidly. This is the explanation as to why growth is still high, despite the fact that productivity is now increasing at a slower rate.

The statistics on productivity for the first quarter of this year are an excellent example of this. More or less the entire increase in GDP was due to the number of hours worked increasing rapidly, while productivity contributed to a very small degree.

Reasons for the strong productivity growth

I have now come to the first of the issues, which concerns the reasons for the strong productivity growth in recent years.

Structural changes have the greatest significance

The strong productivity growth in recent years is mainly due to structural changes – deregulation of product markets, increased globalisation, increased use of information technology, and so on. Economic activity is also significant in the short term, but developments in recent years have been dominated by structural changes.

Several markets were deregulated during the 1990s. This includes taxis, domestic airlines, post, telecommunications and electricity. Deregulation opens up the current market to competition, which triggers productivity. This is mainly due to companies rationalising their operations to manage the competition with other companies and to new companies being able to enter the market. There are several studies, made by for instance the OECD and the SNS, which have described this development.

Globalisation also reinforces competition and encourages productivity growth. This applies in particular during the past fifteen years, among other things as a result of the EU enlargement, China's rapidly growing international trade and the opening up of the previously planned economies in eastern Europe. For instance, Sweden's exports as a percentage of GDP have increased from around 30 per cent in 1990 to around 50 per cent in 2006. Traditionally, developments in trade are explained by income and relative price effects. A study made at the NIESR in London shows that this still applies, on condition that one also takes into account the trade agreements within the World Trade Organisation (WTO), the

■ development of the EU and the North American Free Trade Agreement (NAFTA).¹

The significance of IT is visible in two ways; in production and use. If we look at the production of IT, we can observe that the telecom industry's share of the total industry is substantial in Sweden compared with other countries. This means that the rapid development in productivity that has taken place in the telecom industry has significance for the development of productivity in the economy as a whole.

If we instead look at use, Sweden has a relatively large share of IT capital in the total capital stock, compared with other countries. The use of IT means that one can simplify and automate the work so that those who work can carry out more tasks in a shorter time, that is, productivity increases.

Cyclical factors have also contributed

But the economic cycle has also played a role in productivity developments over the past fifteen years.

At the beginning of the 1990s Sweden underwent the deepest crisis since the Depression of the 1930s. After the crisis, companies had unusually large scope to increase production using the existing resources. In addition, the substantial weakening of the krona contributed in autumn 1992 to a rapid increase in exports. When production and resource utilisation rose, this led to an upswing in productivity.

The fact that productivity has increased so rapidly in recent years is therefore partly due to the economic cycle. This is because the beginning of an economic upturn is normally associated with high productivity growth. The explanation for this is that, at the beginning of an upturn, companies have the capacity to increase their production using existing resources. With time, in response to the increasing need for more resources, companies start hiring staff. This implies a decline in the rate of increase in productivity. When the economic cycle enters a downturn phase, productivity develops even more slowly.

Growth accounting provides a systematic description

I am sure you recognise the explanations I have mentioned. But they need to be organised systematically into an analysis framework. A natural starting point is what is usually called growth accounting.²

The starting point for growth accounting is an assumption that a company uses two types of resources in its production; labour and capital. In addition to these, they also benefit from the available general technology, that is, how skilful we are at using capital and labour together. One classical example of this technique is the conveyor belt.

¹ Barrell et al (2007)

² This focus is based on what is usually called neoclassical growth theory. The starting point is considered to be two papers by Robert Solow (Solow, 1956 and 1957). A good and brief description can be found in, for instance, Romer (2005).

■ In the simplest example of growth accounting labour productivity is divided into two parts. One part is concerned with the capital-worker ratio, what is known as capital intensity. The other part of productivity, often known as total factor productivity (TFP) is concerned with the available general technology.

If we apply this division into developments during the period 1981-2004, the picture looks like this. The rate of increase in productivity for the whole economy during this period was around 2 per cent a year. The contribution from increased capital intensity and the contribution from total factor productivity were both approximately one percentage point.

However, the difference between the 1980s and the later years is substantial. The contribution from improved technology, that is from TFP, has increased substantially, while the contribution from capital intensity has remained roughly the same.

If I now return to my three explanations for the high productivity growth, they can be classified according to this division. The contribution from IT capital accounts for roughly half of the increase in total capital intensity during the 1980s, but significantly more over the past ten years. If we look at the deregulated product markets and globalisation, they instead influence total factor productivity. This contribution has increased significantly.

But the two reasons mentioned are probably do not entirely explain the increase. This is because total factor productivity is calculated as a residual. That which cannot be explained by capital intensity ends up in the residual.

But it is possible to make a better and deeper analysis. Higher productivity can be explained by other factors than general technological developments and increased capital intensity. One possibility is to make a more detailed division into labour and capital, and another is to divide the business sector into industries. The studies on which my figures are based give consideration, for instance, to the fact that there is both IT capital and other capital.

Similarly, one can take into account the fact that there are different types of labour. Merely counting the number of persons or hours is rarely correct. The increased level of education and competence among the staff also affects productivity. A study of Swedish data shows that such changes have contributed approximately 0.2 percentage points a year during the second half of the 1990s.³ The same picture, although applying to the situation in the United States, can be seen in US studies.⁴

Another possibility to improve the accounting is to look more closely at the link between labour and capital. So far the analysis has been based on the two resources in production being dealt with separately. But there are good examples of when labour and capital are interdependent. Technical knowledge becomes particularly valuable with regard to the development of programs and systems, the production of computer games, etc. Artists, film stars, elite athletes/sportsmen and others active in the experience industry get more out of their special skills through the developments in IT and communications.

The US central bank governor Ben Bernanke uses the company Walmart as another example.⁵ For the purpose of using the IT investments the company had

³ Forsling & Lindström (2004)

⁴ See, for example, Stiroh (2001) and Jorgenson et al (2006).

⁵ Bernanke (2005)

■ made, they reorganised their work, gave the staff further training and changed the relationship to their suppliers. This type of technique for general use, of which IT can be said to be an example, can in turn push up other investment, such as further education.

There are also other ways of developing the analysis. For instance, there are studies based on general equilibrium models indicating that the contribution of capital to productivity growth is underestimated in growth accounting.⁶ If we avoid such underestimations the residual item declines. Our knowledge has increased.

And it is important for us at the Riksbank to increase our knowledge of the development of productivity and of what might explain it. One of the current projects at the Riksbank aims to obtain greater knowledge of how IT investment, reorganisation and further education together affect productivity.

Better statistics lead to better analysis

I would like to conclude this section with a few words on the considerable significance of economic statistics for being able to analyse productivity and the driving factors behind it. The previous US central bank governor, Alan Greenspan, was famous for his ability to take in large volumes of statistics. He became legendary when in the mid-1990s he was the first to predict that productivity growth in the United States would strengthen as a result of increased use of IT. This led to the central bank being able to conduct a more expansionary monetary policy for a period, without inflation rising.

A few years ago I carried out an examination of economic statistics. My conclusions then were that these needed to be improved in four areas. All of them had in common that they were important to be able to analyse and understand productivity. They included better price indices in the private services sector to be able to better calculate volume growth and thereby productivity growth. Also better capital stock calculations, better input-output statistics and better IT statistics. Statistics Sweden has now received money to make these improvements. This can provide us with better conditions for understanding productivity and the driving forces behind it.

Productivity growth over the coming years

I will now move on to the second of my questions, the question of productivity growth over the coming years. My conclusion is that productivity will slow down in the near future. This is indicated by changes in both the economic cycle and structure.

Economic cycle indicates a slowdown

I shall begin with the cyclical factors. In February we estimated that the rate of increase for productivity in the business sector would decline from approximately 4 per cent a year over the past five years to an average of 2.4 per cent a year during 2007-2009.

⁶ Greenwood & Krusell (2007)

■ Productivity growth has been unusually strong in recent years. This can be partly explained by the normal course of events in an economic cycle. As I said earlier, productivity usually increases quickly in the initial phase of an economic upturn. When the cycle then enters a more mature phase, employment begins to rise. We have been in this phase for the past two years. Employment is now increasing rapidly. We expect to enter the next phase over the coming years when GDP growth will slow down. This indicates a lower rate of increase in productivity.

Another factor that indicates a lower rate of increase for productivity is the composition of the labour force. The rapid increase in employment means that an unusually large number of new job-seekers are entering the labour market. It is reasonable to expect that those who now obtain jobs have a slightly lower productivity than those who already have jobs. In addition, employment is mainly increasing in the service sector, which also indicates a lower rate of increase in the future.

Structural factors also indicate a slowdown

It is more difficult to assess how globalisation, deregulation, IT investments and other structural changes will contribute to productivity growth in the future. Some structural changes are of a one-off nature while others are ongoing processes without any clear ending. And even if these changes are of a one-off nature, such as the fact that Sweden joined the EU, they may have significance for a long period of time.

Globalisation is a factor that will probably continue to be a driving force behind productivity for a long time to come. Integration within the EU is deepening. The countries in eastern and central Europe who have moved away from planned economies have many years of rapid development ahead of them before they reach levels corresponding to those in western Europe. China, India and other emerging economies will continue to grow strongly and to account for an increasing share of the world economy. The international competition in the product and labour markets and the international financial integration process will thus continue to increase during the foreseeable future.

The deregulation of several markets during the 1990s has probably largely already made its impact on productivity. I interpret the SNS report published at the beginning of the year to say that the most likely development is that this factor will contribute less to the rate of increase in productivity during coming years.⁷ At the same time, there is still relatively large scope for continued reforms in this field. A survey indicates that around 32 per cent of consumption was exposed to competition at the turn of the millennium. This figure for Sweden can be compared with the figure for the EU of around 45 per cent.⁸ A similar picture is shown in a report by the Swedish Competition Authority.⁹ This states that around half of the higher prices compared with the OECD arise from a lack of competition in Sweden.

IT will probably fuel productivity for a long time. It takes time for companies to adjust to the new circumstances. This can be illustrated by means of a historical comparison. IT is just like electricity a technique for general use. The advent of

⁷ Lundgren et al (2007).

⁸ Braunerhjelm et al (2002).

⁹ Swedish Competition Authority (2002)

■ electricity had no noticeable effect on productivity until companies literally rebuilt their factories. Because this cost both time and money, it took a while before these changes were implemented.¹⁰

Conclusion – most indications point towards a slowdown

Historical averages are usually a fairly good starting point for forecasts of future developments, particularly in the slightly longer term. But in the case of productivity, history gives us different answers. The reason for this is that the trend in productivity growth has varied so substantially over time.

The average increase in productivity growth in the business sector was around 4 per cent a year during the past five years, but only around 3 per cent a year if one instead looks at the past fifteen years. If one goes further back in time, one can find both higher and lower rates of increase. During the 1960s the rate of increase was around 6 per cent a year and during the 1980s it was only 2 per cent a year.

It is thus not history giving us the answers, but the two parts I mentioned just now - changes in the economic cycle and structure.

The cyclical factors indicate a slowdown. Productivity has been unusually strong in recent years during the initial phase of the economic upturn, but will probably be weaker in future when economic activity slows down.

The structural factors also indicate a slowdown. While globalisation will continue to contribute to stiff competition and IT will in future contribute to continued rationalisation. However, the deregulation of the product markets will probably not contribute as much to productivity growth in future.

The significance of productivity for monetary policy

Regardless of how fast productivity grows in the future, the Riksbank must act accordingly and adjust its monetary policy to ensure that inflation remains at a low and stable level. This is what the third question concerns.

One difficulty when formulating monetary policy is to assess the level of the future long-term trend in productivity growth. As I have tried to show earlier, one can use a combination of statistical analysis and analyses of the long-term effects of various structural changes.

Another difficulty is assessing whether the current changes in productivity are due to cyclical fluctuations or to structural changes. It is only possible to gain a well-founded opinion of this after some years. The methods we use to estimate trends have the characteristic that they provide particularly uncertain results at the end of the period of time.

It is therefore necessary to proceed gradually and seek our way forward. This is not something that only applies to productivity or only to monetary policy. It also applies to other forms of decision-making where decisions are taken under considerable uncertainty.

¹⁰ See, for example, David (1990).

■ A third difficulty is assessing how a change in productivity will affect inflation. If the economy functions entirely without rigidities, that is to say with flexible wages and prices, a higher growth rate in productivity has no importance for inflation. If productivity increases, wages rise. This means that the companies' costs do not change and consequently inflationary pressures do not change.

But the economy does not function entirely without friction. If the growth rate of productivity changes, wages do not adjust immediately. This means that the adjustment, both upwards and downwards, comes after a time lag.

This is exactly what we have seen in recent years. An unusually high increase in productivity has coincided with a relatively moderate wage development. This is the most important explanation as to why inflation has been low, which in turn has given us at the Riksbank the opportunity to keep the interest rate at a low level.

If we look ahead, the situation is probably the reverse. Over the coming years, productivity will instead probably grow more slowly, while wages will increase more quickly than before. Altogether, this indicates higher inflationary pressures and thus a higher interest rate in the coming years.

References

- Barrell, R., Liadze, I. and Pomerantz, O. (2007), "Import Growth, Globalisation and the Impact of Trade Liberalisation", *National Institute of Economic and Social Research Discussion Paper* no. 294.
- Bernanke, B. (2005), "Productivity", Speech at the C. Peter McColough Roundtable Series on International Economics, Council on Foreign Relations, January 19.
- Braunerhjelm, P., Ganslandt, M., Nyberg, S., Stennek, J. and Wahl, N. (2002), *Gränslös konkurrens – Sverige i ett integrerat Europa (Unbounded competition – Sweden in an integrated Europe)*, SNS förlag.
- David, P. (1990), "The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox", *American Economic Review* 80, May, 355-361.
- Forsling, G. and Lindström, T. (2004), "Labor Quality and Productivity: Does Talent Make Capital Dance?", *Background Facts on Economic Statistics*, 7, Economic Statistics Department, Statistics Sweden.
- Greenwood, J. and Krusell, P. (2007), "Growth accounting with investment-specific technological progress: A discussion of two approaches", *Journal of Monetary Economics* 54, 1300-1310.
- Jorgenson, D., Ho, M. och Stiroh, K. (2006), "Potential Growth of the U.S. Economy: Will the Productivity Resurgence Continue?" *Business Economics*, January, 7-16.
- Swedish Competition Authority (2002), *Competition in Sweden 2002*, Swedish Competition Authority's report series 2002:4.
- Lundgren, S. (ed.), Edquist, H. and Wallgren, A. (2007), *Tillväxt i otakt (Growth out of time)*, SNS Förlag.

- Romer, D. (2005), *Advanced Macroeconomics*, McGraw-Hill/Irwin, 3rd edition.
- Solow, R. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics* 70, no. 1 (February), 56-94.
- Solow, R. (1957), "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics* 39, no. 3, 313-330.
- Stiroh, K. (2001), "What Drives Productivity Growth?" Federal Reserve Bank of New York Economic Policy Review, March.