

SPEECH

DATE: 26 November 2024
SPEAKER: Deputy Governor Anna Seim
VENUE: Sveriges Riksbank

Neutral interest rate – meaning, limitations and assessment*

It is now just over six months since I joined the Executive Board of the Riksbank. It was with great humility that I made the move from academia to practical economic policy-making. One factor that greatly facilitated the transition was that the principles of how best to design monetary policy are strongly anchored in research.

Today's seminar will focus on a theoretical concept that is firmly rooted in research but also has great practical significance – the neutral interest rate. The neutral interest rate is a concept I have of course considered in my previous role as a researcher, for example when I, together with Lars Calmfors and John Hassler, wrote an ESO report on the interaction between fiscal and monetary policy a couple of years ago.¹ We then developed measures of whether economic policy had been countercyclical, i.e. contractionary in an upturn and stimulative in a downturn. At that time, estimates of the neutral interest rate were necessary as a reference point. But never before have I had so much reason to ponder the importance of the neutral interest rate as in recent months.

I will start by discussing the concept of the neutral interest rate, how it relates to other similar concepts, what factors influence it, why it is important for a central bank and what its limitations are as a benchmark for practical monetary policy. I

* I would like to thank Mikael Apel and Liza Tchibalina for excellent help with the speech and Hanna Armelius, Anna Breman, Aino Bunge, Vesna Corbo, Charlotta Edler, Per Jansson, Tanja Lind, Henrik Lundvall, Åsa Olli Segendorf, Maria Sjödin, Ingvar Strid, Erik Thedéen, David Vestin and Anders Vredin for very valuable comments. I would also like to thank Elizabeth Nilsson for the translation into English and Emelie Nordeman for organising the seminar.

¹ Calmfors et al. (2022).

will conclude by presenting the Riksbank's updated assessment of the neutral interest rate.

What is the neutral interest rate?

It should first be noted that the definition of the neutral interest rate varies across studies and depends on the exact question asked, the type of model used and the choice of time horizon. There is also some ambiguity surrounding the two related terms "neutral" and "natural" interest rates. The two terms are often used synonymously, but sometimes they are assumed to mean different things.² A term that is also sometimes used, but is almost always used synonymously with the neutral interest rate, is r^* or r -star.

The most common definition of the neutral interest rate is the interest rate that is neither expansionary nor contractionary. This means that the real economy is in balance and inflation is stable. The real economy is usually represented by labour market outcomes or total output. If the central bank sets a policy rate that is lower than the neutral rate, this has an expansionary effect on the economy, as households want to consume and businesses want to invest, which increases aggregate demand in the economy. High demand makes it easier for companies to raise prices and inflation rises. If the policy rate is higher than the neutral rate, the effect is instead tightening, i.e. demand will be low, as will inflation. Somewhere between these two states is a policy rate that has neither an expansionary nor a contractionary effect on the economy, i.e. the effect on demand and inflation is neutral.

I personally think it is most constructive to divide the neutral interest rate into a long-term and a short-term component.³ Because the world's capital markets are so interconnected, the long-term neutral interest rate is largely determined by sluggish international factors and trends.⁴ The short-term neutral rate varies

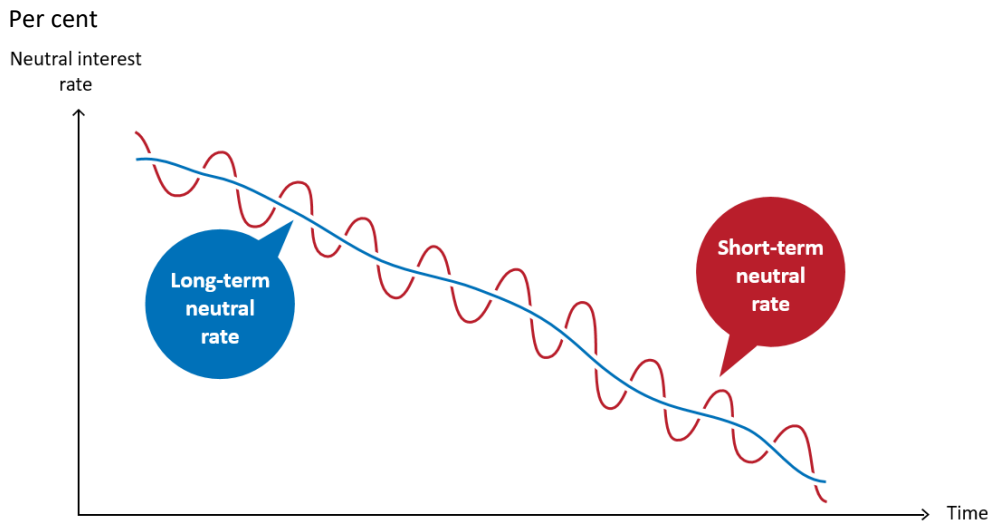
² The terms are considered synonymous in, for example, Boocker et al. (2023). The Swedish economist Knut Wicksell is often credited with first introducing the concept of a natural interest in the late 19th century (see Wicksell, 1936). He defined the natural rate of interest as the rate at which the demand for and supply of capital are in equilibrium in a non-monetary economy – basically the marginal product of capital in equilibrium under full employment and with flexible prices (see Obstfeld, 2023, p. 2). Woodford (2003) and Galí (2017) define it similarly as the real interest rate prevailing in equilibrium with flexible prices and wages.

³ For example, Platzer et al. (2022) make a similar breakdown.

⁴ Armelius et al. (2018) find that the Swedish neutral interest rate is largely explained by neutral interest rates abroad, with the greatest influence coming from interest rates in the United States. Lundvall (2023) also argues that the trends in Sweden's neutral interest rate are almost exclusively determined by structural changes abroad.

around the long-term rate but may temporarily deviate from it, as shown in Figure 1. I will come back to what affects the two components in a moment.

Figure 1. Neutral interest rate in the short and long term



The neutral interest rate is often referred to in real terms, i.e., excluding inflation. To obtain the *nominal* neutral interest rate, the inflation rate when the economy is in balance, i.e., when the inflation target is met, is added. Today, I will mostly focus on the nominal neutral interest rate.

The long-term neutral interest rate

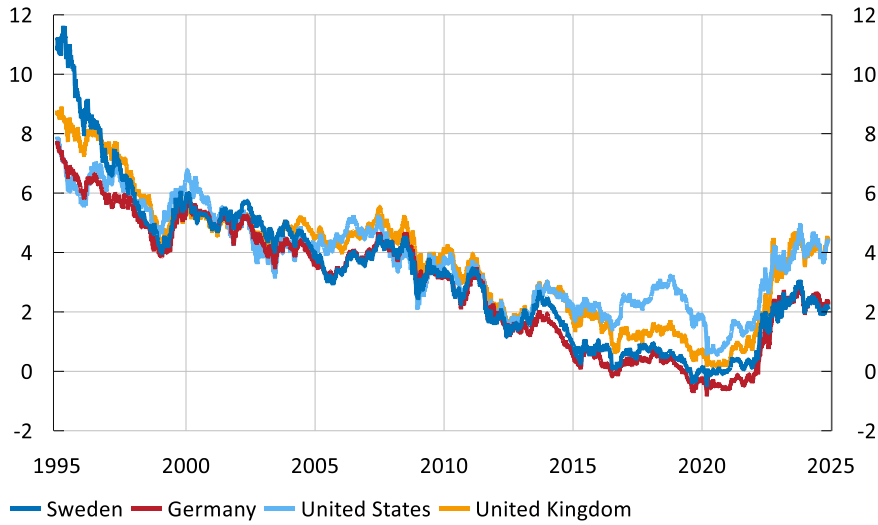
The neutral interest rate cannot be observed and there is therefore uncertainty about its level at any given time. But what we do know for sure is that it started trending downwards about three decades ago and reached historically low levels in the early 2020s.

In parallel with the fall in the neutral rate, general interest rates have fallen. This can be illustrated by the fact that long-term interest rates worldwide have been falling for a long time (see Figure 2). In recent years they have risen again, but it is unclear to what extent this reflects a rise in the neutral rate. I shall return to this shortly.

An interest rate is essentially determined by how much actors in the economy want to save in relation to how much they are willing to invest. If many people want to save and few want to invest, the equilibrium interest rate will be low, and vice versa. The long-term neutral interest rate is no exception, but is determined in much the same way by savings relative to investment at the global level.

Figure 2. Long-term decline in interest rates worldwide

Per cent



Note. 10-year government bond yields for each country.

Source: Macrobond Financial AB.

There is no single explanation for the decline in the neutral rate and different factors have most likely played different roles in different phases.⁵ One factor that most agree has had a major impact is how demographics have changed. In many countries, especially in advanced economies, the population has become older and is expected to live longer. This leads to an increase in saving as people expect that they will have to financially support themselves for longer. In China, saving has been high due to, among other things, a rapidly ageing population, declining effective remuneration levels in the public pension system. Institutional factors that have restrained private consumption in favour of high investment and rapidly growing exports have also contributed. When a country's population grows more slowly, the labour force does not increase as quickly as before. As a result, there have been fewer workers to supply machinery and other inputs, leading to lower investment demand.

Some studies have pointed to increased income inequality as an important driver of the trend towards lower interest rates. The idea here is that the propensity to save is generally higher among high-income households and if their share of total income in the economy increases, so does saving.

Weaker productivity growth and the associated deterioration in the long-term growth outlook for the world economy may be another explanation for the

⁵ For a more detailed discussion of the driving forces, see, for example, IMF (2023), Lundvall (2023) and Obstfeld (2023).

decline in the neutral interest rate. If people expect the economy and incomes to be weak in the years and decades to come, the incentives to save increase. Weaker productivity growth is also generally associated with lower investment opportunities, which reduces the demand for capital and drives down interest rates.

Furthermore, one explanation for the decline in interest rates focuses not only on the magnitude of saving relative to investment, but also on the composition of savings. It is based on the observation that firms' required rates of return seem to have remained at a high level even when interest rates have fallen.⁶ This may seem strange, as one would expect a close link between the interest rate and the required rate of return. If the required rate of return has remained high, this may explain why investment has not increased more than it has. If global investment has been held back by elevated required rates of return while saving has increased, this may have contributed to the decline in the neutral rate.

There are thus several possible explanations for the fall in interest rates, and different studies assign them different weight.

The neutral interest rate in the short term

If one considers that the neutral interest rate is mainly driven by sluggish trends in the global supply and demand for savings, it is natural to think of the neutral interest rate as a long-term phenomenon. But if one considers the very definition of a neutral interest rate – that it is the policy rate that has neither an expansionary nor a contractionary effect on the economy – it becomes clear that it must be able to change even in the shorter term.

One example of what can produce such short-term variations is fiscal policy. We can imagine a situation where the policy rate is at the neutral level, where the real economy is in balance and the inflation target is met. In this situation, let us assume that the government temporarily pursues a more expansionary fiscal policy that increases general demand and pushes up inflation. As the neutral interest rate is the policy rate at which the economy is in balance and inflation is stable, the neutral interest rate is also affected by the stimulus package. In other words, there has been a change in the economy that has caused the neutral interest rate to rise temporarily and, in order to stabilise inflation and the economy, the central bank needs to raise the policy rate. The reduction of the

⁶ There are several possible explanations for the high yield requirement. One possibility is a reorientation of savings as a result of households becoming more risk-averse, which pushes up risk premia and sustains the required rate of return at a high level, see for example Lundvall (2023).

surplus target to a balance target that has now been announced could thus push up the neutral interest rate in Sweden somewhat during the next review period.⁷

It may be worth adding that this example is not to say that monetary policy should always counteract fiscal stimulus. On the contrary, there is currently a discussion about how important it is to achieve a good policy mix in stabilisation policy, and that monetary policy and fiscal policy should interact more than has been the case in recent decades.⁸ But it illustrates that it is important to consider the overall stabilisation policy and also to keep more transitory factors in mind when discussing neutral interest rates.⁹

These shorter-term deviations from the long-term neutral interest rate can of course vary across countries. Therefore, although the long-term trend is essentially global, the neutral rate may periodically differ quite a lot, depending on the country-specific shocks that have occurred. This may also require different monetary policies in different countries.

The significance of the neutral interest rate for monetary policy

The neutral interest rate is a *reference value* for monetary policy, indicating whether monetary policy is expansionary or contractionary. The distance between the neutral interest rate and the current policy rate (*monetary stance*) thus also indicates *how* expansionary or contractionary the policy is. At least that is how it works in theory. But when it comes to translating this principle into practical policy, it becomes much more difficult, as is often the case. The main problem is that it is difficult to assess with sufficient precision the level of the neutral rate at a given point in time.

Although the neutral interest rate is conceptually important, precise point estimates of it are therefore unlikely to play a particularly central role in practical monetary policy. The American economist John H. Williams described the problem well in the early 1930s (Williams, 1931):

“The natural rate is an abstraction; like faith, it is seen by its works. One can only say that if the bank policy succeeds in stabilizing prices, the bank rate must have

⁷ See, for example, Calmfors (2024).

⁸ See, for example, Calmfors et al. (2022) and the Long-Term Survey (2023).

⁹ Other temporary changes, such as in productivity, are assumed to have a similar impact on the short-term neutral interest rate.

been brought in line with the natural rate, but if it does not, it must not have been.”¹⁰

Mr Williams describes quite well how I see it, and probably how many others involved in practical monetary policy do too. At each decision point, the central bank assesses how the economy will be affected by the interest rate decisions it makes, and it is of course possible to conduct monetary policy without having an idea of exactly where the neutral interest rate is at the moment.

The further the policy rate is from the neutral level, the easier it is to determine whether monetary policy is expansionary or contractionary. For example, it was clearly contractionary during the inflationary peaks in recent years, which was of course the intention. But the closer it gets to the neutral level, the harder it is to determine whether you are on the right track. This means relying on forward-looking indicators and models and continuously trying to assess the impact of policies on the economy using incoming statistics as much as possible. The important thing here is that the central bank monitors developments closely and does not lock itself into a preconceived view.

Nevertheless, it can be said that the downward trend in the neutral interest rate has had rather large implications for monetary policy. The benchmark for what constitutes an expansionary or contractionary policy is quite different today than in the past. A policy rate that was clearly expansionary in the mid-1990s was instead contractionary a couple of decades later. For monetary policy to keep inflation on target, policy rates around the world have therefore had to be reduced to lower and lower levels with each economic cycle. It also explains why many central banks, including the Riksbank, set their policy rates at zero or negative values before the period of higher inflation in recent years.

For various reasons, policy rates cannot be cut too far below zero before further reductions become ineffective. We thus speak of an effective lower bound for the policy rate. Before the 2021–2022 inflation surge, there was therefore an international discussion on whether monetary policy was running out of steam and, if so, how best to deal with it.¹¹ This problem was perceived as less acute when inflation went up worldwide. The international debate today centres on

¹⁰ This statement has been referred to by, for example, Orphanides and Williams (2002), Powell (2017) and Obstfeld (2023). It is worth noting that the author is thus a different John Williams than the one who has become renowned in recent decades for, among other things, his estimates of r^* . The latter, Mr John C. Williams, is President of the Federal Reserve Bank of New York.

¹¹ For example, the problems of persistently too low inflation played a central role in both the US Federal Reserve’s 2020 monetary policy review and the European Central Bank’s 2021 strategy review, see Powell (2020) and ECB (2021).

whether the neutral interest rate is still low or whether it has risen, or will do so in the future.

Can economic policy influence the neutral interest rate?

As noted earlier, the neutral interest rate is driven by factors over which monetary policy has no obvious influence. The long-term trend in the neutral rate is affected by global saving and investment patterns, which in turn are affected by factors such as demographics and productivity trends.¹² As I mentioned earlier, more short-term movements are affected by, for example, the stance of fiscal policy.

The neutral interest rate – and in particular its trend decline – has often been neglected in the Swedish media debate on monetary policy.¹³ As a result, monetary policy has been criticised for circumstances over which it has little influence. A common argument in the Swedish debate is that monetary policy has been systematically too expansionary and that this is the root cause of the rise in housing prices and household indebtedness. This ignores the fact that housing price developments depend to a large extent on the functioning of the housing market, but also that the decline in the neutral interest rate has played a key role in this context.

The rise in housing prices and indebtedness in the Swedish economy has taken place parallel to the trend decline in the neutral interest rate since around the mid-1990s. If general interest rates in the economy trend downwards, households may borrow more to finance their house purchases, often leading to higher indebtedness and higher house prices. This prolonged decline in general interest rates is therefore one explanation for the trend of rising debt and housing prices.

But it is also not a law of nature that lower interest rates always lead to higher housing prices. The decline has been international and there are examples of countries that have experienced the same trend decline in interest rates, but where house prices have risen much less than in Sweden. These countries are usually characterised by a better functioning housing market than in Sweden. An example often mentioned here is Finland. In Finland, the economy has been governed by the European Central Bank's policy rates. If anything, they have been

¹² It is worth mentioning that there are theories that global long-term real interest rates are influenced by the monetary policies of major central banks rather than by global saving and investment patterns (see, for example, Borio et al., 2022). Even if this were to be the case, the development of the neutral interest rate would be exogenous for central banks in small open economies, such as the Riksbank.

¹³ This is something that others on the Executive Board of the Riksbank have also pointed out, see for example Jansson (2023).

lower than those of the Riksbank during the period in question, but despite this, housing prices have not increased in the same way.

Over the past year, the concept of a neutral interest rate has begun to attract more attention in the Swedish media debate as well.¹⁴ Awareness of the importance, but also the limitations, of the neutral interest rate improves the conditions for a nuanced discussion of monetary policy.

Future development of the neutral interest rate

There is thus a broad consensus that the neutral interest rate fell over a number of decades, reaching historically low levels in the early 2020s. But what can we say about future developments? There are a number of challenges here. To begin with, it can be noted that there are no clear-cut answers as to how important various factors were in the decline in the neutral rate, although some explanations are more plausible than others. This means that it is even more difficult to predict how the neutral interest rate will develop in the future. It is not enough to have an idea of how important different factors are for the neutral interest rate. It is also necessary to try to forecast how these factors will develop.

As I noted earlier, there is a lively international discussion on the likely development of the neutral rate. Because this is such a central issue, it has engaged many well-known economists, who often have different views.¹⁵ My interpretation of the discussion is that it is still unresolved. Some argue that the forces that contributed to lowering the neutral interest rate have not really abated and that the effective lower bound for the policy rate will continue to be a recurring challenge for monetary policy.¹⁶

Others argue that the neutral rate has risen slightly, or will do so in the future. Here one often refers to the need for major investments to cope with the climate transition and the need to increase defence spending in an increasingly uncertain world. These investments are thus seen as more long-term and structural, which means that they may push up the neutral interest rate for a long time. These investments are thus different from the more short-term fiscal policy stimulus I used in the previous example. This view has also left its mark, albeit a rather limited one, on various numerical assessments of the neutral interest rate.¹⁷ A

¹⁴ See, for example, Carlström (2024) and Munkhammar (2024).

¹⁵ One example is the debate between Olivier Blanchard and Lawrence Summers at the Peterson Institute for International Economics 2023, see Peterson Institute (2023).

¹⁶ See, for example, IMF (2023) and Obstfeld (2023).

¹⁷ For example, the Bank of Canada has revised its estimate of the neutral rate marginally upwards from 2.00-3.00 per cent to 2.25-3.25 per cent; see Adjalala et al. (2024). The National Institute of Economic Research has also made a marginal upward revision to what it considers to be a neutral policy rate ten years

cautious summary of this discussion is that there is little to indicate that we are in a completely new world where the neutral interest rate has risen sharply, or will do so in the near future.

The Riksbank's assessment of the neutral interest rate

Over the years, the Riksbank has repeatedly discussed the neutral interest rate in speeches and reports, not least in the annual accounts of monetary policy. In these reports, which we compile as a basis for the Committee on Finance's assessment of monetary policy, we have often discussed the trend decline in the neutral interest rate and the implications for monetary policy.¹⁸

However, the Riksbank has not presented any estimates or made any statements about the probable level of the neutral interest rate in recent years. In an article in the Monetary Policy Report in February 2017, the Riksbank assessed that the repo rate, the then equivalent of the current policy rate, could be expected to be between 2.5 and 4 per cent in the long term.¹⁹ This assessment thus refers to the long-term definition of the neutral interest rate, the trend in Figure 1. This was a downward revision of previous estimates, reflecting the fact that Swedish domestic interest rates are largely influenced by international factors and that interest rates had trended downwards globally. The Riksbank then communicated in 2019 and 2022 that it was likely that the level was in the lower part of, or slightly below, the range from 2017, that is, that the neutral interest rate had continued to fall since then. Analysis presented in the March Monetary Policy Report this year suggests that the structural factors that had caused the neutral interest rate to fall have not changed significantly in recent years and that any changes in the neutral interest rate are likely to be small, relative to the trend decline that has already taken place.²⁰

However, there are reasons to be more precise than that. Based on what I have covered so far, it should be clear that no single estimation method can be expected to provide a reliable and precise answer. One needs to weigh up the information from different sources and make an overall judgement.

ahead (2.6 per cent), although it also considers that the uncertainty surrounding the estimate has increased, see Österholm (2024).

¹⁸ See, for example, Chapter 4 Sveriges Riksbank (2021, 2022, 2023 and 2024a).

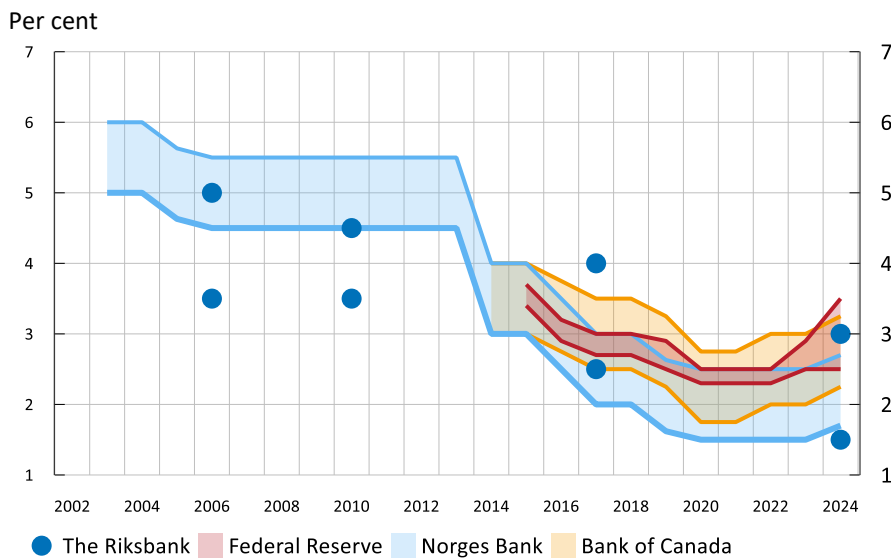
¹⁹ Sveriges Riksbank (2017).

²⁰ Sveriges Riksbank (2024b). See also Flodberg (2024), who develops the reasoning.

We have therefore reviewed international studies, assessments by other central banks and information from financial markets, both from pricing and surveys.²¹ During the autumn, we have also used Swedish data to estimate various models that feature prominently in the literature on neutral interest rates.²²

Based on our analysis, we assess that the long-term neutral interest rate, and thus the long-term normal policy rate, is probably between 1.5 and 3 per cent. This is one percentage point lower than the range we published in 2017.

Figure 3. The Riksbank's and other central banks' assessments of neutral interest rates



Source: The Riksbank and the respective central bank.

Note. The assessment for Norges bank is from the article "Anslag på nøytral realrente" (Estimates of the neutral real interest rate), in the Monetary Policy Report 2/2023. For the Bank of Canada, the estimates are retrieved from the publications "Potential output and the neutral rate in Canada", "The neutral rate in Canada" and "Monetary Policy Report". For the Federal Reserve, the range is calculated as the difference between the highest and lowest assessments of the long-term policy rate made by the members of the Federal Open Market Committee (the so-called "dot plots"), with the three highest and the three lowest assessments excluded. The Riksbank's earlier estimates come from the articles "What is a normal level for the repo rate?" 2006:2, "What is a normal repo rate?" February 2010 and "The repo rate in the long term" February 2017.

²¹ The pricing information refers to the so-called "5Y-5Y forward inflation expectation rate", which shows the average expected inflation rate over the five-year period starting in five years' time. The survey information refers to money market participants' expectations for the policy rate in five years' time according to Prospera. These two series have a similar evolution.

²² The models of which we have estimated variants are Laubach and Williams (2003), Berger and Kempa (2014) and Armelius et al. (2018).

Figure 3 shows how the assessment compares with those of other central banks, in this case Norges Bank, the Bank of Canada and the US Federal Reserve. The assessments are fairly well aligned. Estimates of the neutral rate tend to be slightly higher in the United States and Canada than in Europe, which is usually attributed to the assumption that these economies are more flexible. The US also tends to have slightly higher productivity and trend growth.²³ As the assessments for the other countries have been made more continuously, it also appears that they reached their lowest levels in the early 2020s in the context of the pandemic. After that, there is a tendency for them to have risen slightly, but the change is, as I noted earlier, marginal.

It may be perceived as frustrating that the assessment is not more precise. There is of course a difference between a policy rate averaging 1.5 per cent over a number of decades and a rate of 3 per cent. But it reflects the uncertainty that we believe exists and that we cannot ignore.²⁴

I would like to emphasise that the assessment refers to the neutral interest rate in the long term. As I said earlier, the neutral rate can also be affected by more temporary factors. These may be covered by the range, but there is no guarantee that this is the case. We report a range because of the uncertainty in the assessment of the long-term neutral rate, not because we are trying to ensure that we also capture short-term variations. Estimates of the long-term neutral interest rate provide the Riksbank with information on what a normal interest rate situation is likely to be in a number of years. But as I noted earlier, the effects of monetary policy on the economy need to be monitored on an ongoing basis, both to assess where we are today and to be able to identify more precisely where we are heading.

Will we get back to interest rates as low as they were before the high inflation?

One should be aware that the policy rate can be both significantly higher and significantly lower than the range. If the policy rate is normally somewhere between 1.5 and 3 per cent, one cannot rule out the possibility that it may need to be reduced to zero or even negative levels again. In the event of an economic slowdown or deep recession, a policy rate cut in the order of 1.5 to 3 percentage points is not particularly exceptional.

²³ For estimates indicating a higher neutral rate in the United States than in the euro area, see, for example, Williams (2024).

²⁴ More details on this assessment will be published in a staff memo shortly.

One aspect of this, which could be important here, but which has been discussed somewhat less than how the neutral interest rate might be affected by structural factors such as demographics and productivity developments, is how it is affected by underlying inflationary pressures.

Before the pandemic, phenomena such as globalisation and digitalisation were said to have a dampening effect on world inflation – an assessment I share. They thus contributed to lower inflationary pressures without being clearly linked to the structural factors affecting the neutral interest rate.²⁵ Nevertheless, they probably contributed to the need to keep policy rates lower than otherwise.

In recent years, there has instead been talk of a trend towards less globalisation, including an increase in trade barriers and so-called *reshoring* or *nearshoring*, i.e. moving production back to one's own country or regions that are closer. The outcome of the US election is also likely to lead to the implementation of various trade barriers, which could create some inflationary pressures due to supply constraints. Digitalisation is more difficult to predict, but it is conceivable that the most obvious benefits of digitalisation have already largely been reaped and that its dampening effect on inflation is starting to fade.

All in all, this could imply that monetary policy will be conducted in an environment of stronger underlying inflationary pressures going forward. In practice, this means that the neutral interest rate will be slightly higher than in recent decades. This could indicate that going forward it will be less common to have long periods when central bank policy rates need to be kept exceptionally low for inflation to reach the target. But whether this will actually happen is something that is difficult to predict. As with regard to so many other things, the future will have to tell.

References

Adjalala, Frida, Felipe Alves, H el ene Desgagn es, Wei Dong, Dmitry Matveev, Laure Simon (2024), "Assessing the US and Canadian neutral rates: 2024 update", Staff Analytical Note 2024-92, Bank of Canada, <https://www.bankofcanada.ca/2024/04/staff-analytical-note-2024-9/>

²⁵ There is of course a link between, for example, digitalisation and productivity growth, but it is nevertheless reasonable to imagine that digitalisation may also affect inflation via other, more direct channels. For example, digital developments have led to an increase in e-commerce, which has increased competition and made it more difficult to raise prices.

Armelius, Hanna, Martin Solberger and Erik Spånberg (2018), "Is the Swedish neutral interest rate influenced by other countries?", *Sveriges Riksbank Economic Review*, no. 2018:1, Sveriges Riksbank.

Berger Tino and Bernd Kempa (2014), "Time-varying equilibrium rates in small open economies: Evidence for Canada", *Journal of Macroeconomics* 39, pp. 203–214.

Boocker, Sam, Michael Ng and David Wessel (2023), "What is the neutral rate of interest?", Commentary, The Brookings Institution, <https://www.brookings.edu/articles/the-hutchins-center-explains-the-neutral-rate-of-interest/>

Borio, Claudio, Piti Disyatat, Mikael Juselius and Phurichai Rungcharoenkitkul (2022), "Why So Low for So Long? A Long-Term View of Real Interest Rates", *International Journal of Central Banking*, vol. 18, No. 3, pp. 47–87.

Calmfors, Lars (2024), "Nu är det dags att höja inflationsmålet eller öka statskulden" (Now is the time to raise the inflation target or increase government debt), *Affärsvärlden*, 2 August 2024.

Calmfors, Lars, John Hassler and Anna Seim (2022), *Stability in the Balance - A Report on the Roles of Fiscal and Monetary Policy to the Expert Group on Public Economics*, report to the Expert Group for Public Economic Studies 2022:3, Ministry of Finance.

Carlström, Johan (2024), "Kan mystisk stjärna visa vägen mot billiga bolån?" (Can a mysterious star show the way to cheap mortgages?), *Svenska Dagbladet*, 22 June.

ECB (2021), "The ECB's monetary policy strategy statement", https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_mon_pol_strategy_statement.en.html

Flodberg, Caroline (2024), "Structural factors determine long-term interest rates", *Economic Commentary*, No. 5, Sveriges Riksbank.

Galí, Jordi (2017), *Monetary Policy, Inflation and the Business Cycle*, Princeton University Press.

IMF (2023), "The Natural Rate of Interest: Drivers and Implications for Policy", Chapter 2 in *IMF World Economic Outlook: A Rocky Recovery*, April 2023, International Monetary Fund.

Jansson, Per (2023), "The gap in the monetary policy debate", speech at Danske Bank, 12 December.

Laubach Thomas and John C. Williams (2003), "Measuring the Natural Rate of Interest", *Review of Economics and Statistics* 85, pp. 1063–1070.

Long-Term Survey (2023), "Long-Term Survey 2023 – Fiscal policy stabilisation", SOU 2023:85.

Lundvall, Henrik (2023), "Drivkrafter bakom globala trender i den neutrala räntan" (Driving forces behind global trends in the neutral interest rate), Annex 2 to Long-Term Survey 2023, SOU 2023:87.

Munkhammar, Viktor (2024), "Räntan som gäcker alla" (The interest rate that baffles everyone), *Dagens industri*, 16 July.

Obstfeld, Maurice (2023), "Natural and Neutral Real Interest Rates: Past and Future", NBER Working Paper 31949.

Orphanides, Athanasios and John C. Williams (2002), "Robust Monetary Policy Rules with Unknown Natural Rates", *Brookings Papers on Economic Activity*, 2:2002, pp. 63–145.

Peterson Institute (2023), "Summers and Blanchard debate the future of interest rate", Unedited Transcript, <https://www.piie.com/sites/default/files/2023-03/2023-03-07transcript-summers-blanchard.pdf>

Platzer, Josef, Robin Tietz and Jesper Lindé (2022), "Natural versus neutral rate of interest: Parsing disagreement about future short-term interest rates", *Column*, VoxEU, 26 July, <https://cepr.org/voxeu/columns/natural-versus-neutral-rate-interest-parsing-disagreement-about-future-short-term>

Powell, Jerome H. (2017), "The Economic Outlook and Monetary Policy", speech at the Forecasters Club of New York Luncheon, New York, 22 February.

Powell, Jerome H. (2020), "New Economic Challenges and the Fed's Monetary Policy Review", speech on 27 August 2020, Federal Reserve.

Sveriges Riksbank, (2017), "The long-term repo rate", article in Monetary Policy Report, February 2017.

Sveriges Riksbank (2021), "Account of monetary policy 2020".

Sveriges Riksbank (2022), "Account of monetary policy 2021".

Sveriges Riksbank (2023), "Account of monetary policy 2022".

Sveriges Riksbank (2024a), "Account of Monetary Policy 2023".

Sveriges Riksbank (2024a), "Structural factors determine interest rates in the longer run", analysis in the Monetary Policy Report, March 2024.

Wicksell, Knut (1936), *Interest and Prices*, Macmillan, London. English translation of *Geldzins und Güterpreise*, published in 1898 by Gustaf Fischer Verlag Jena.

Williams, John C. (2024), "R-Star: A Global Perspective", speech at the ECB Forum on Central Banking, Sintra, Portugal, 3 July,
<https://www.newyorkfed.org/newsevents/speeches/2024/wil240703>

Williams, John H. (1931), "The Monetary Doctrines of J. M. Keynes", *Quarterly Journal of Economics*, vol. 45 (August), pp. 547-87.

Woodford, Michael (2003), *Interest and Prices*, Princeton University Press.

Österholm, Göran (2024), "Real interest rates ten years ahead", NIER Commentary, September 2024.