

## ARTICLE - The Riksbank's monetary policy development work

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In 2024, the Monetary Policy Department has concentrated its resources on analytical work, both with regard to important themes in the monetary policy drafting process and more strategic analytical issues. The analytical work also reflects what has been formulated in the overall strategic plan for the entire Riksbank, for example, to harness the potential of data and to establish partnerships to strengthen our strategic shifts. Key issues have been the drivers of inflation, the transmission of monetary policy, the assessment of the neutral policy rate level, companies' pricing behaviour, and the effects of geopolitical uncertainty and increased trade barriers. Increased focus has been placed on developing and expanding the use of modelling in analytical work in general. The Riksbank also continued to deepen its analytical work through international cooperation.

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### Resource mobilisation around analytical work

#### **Important monetary policy themes**

As of 2024, the Riksbank switched to having eight regular monetary policy meetings, which meant that the drafting work was expanded. Understanding the drivers of inflation and the implications for, but also the effects of, monetary policy is at the core of the continuous analytical work that precedes these decisions. Important monetary policy analysis themes are identified and analysed based on their implications for inflation, the real economy and monetary policy in Sweden.

Supply shocks have been important in recent years and are expected to remain important in the future. We have seen increased geopolitical tensions and, in addition, shocks to supply chains, mainly during and immediately after the pandemic. The overarching theme of how changes in the supply side of the economy affect monetary policy ties together several of the analytical projects that the Riksbank has worked on during the year, such as trade barriers, demographics, labour market matching and pricing patterns.

The issue of the possible implications of increased protectionism became increasingly relevant in 2024. The Riksbank's analysis indicated that increased trade barriers would have a negative impact on global economic activity and this is an important issue for an export-dependent country like Sweden. Import tariffs lead to higher costs for households and companies, especially in the country that has raised them. They also hamper trade and restrict competition, the pace of innovation and the opportunities to benefit from economies of scale. Overall, this ultimately leads to lower productivity

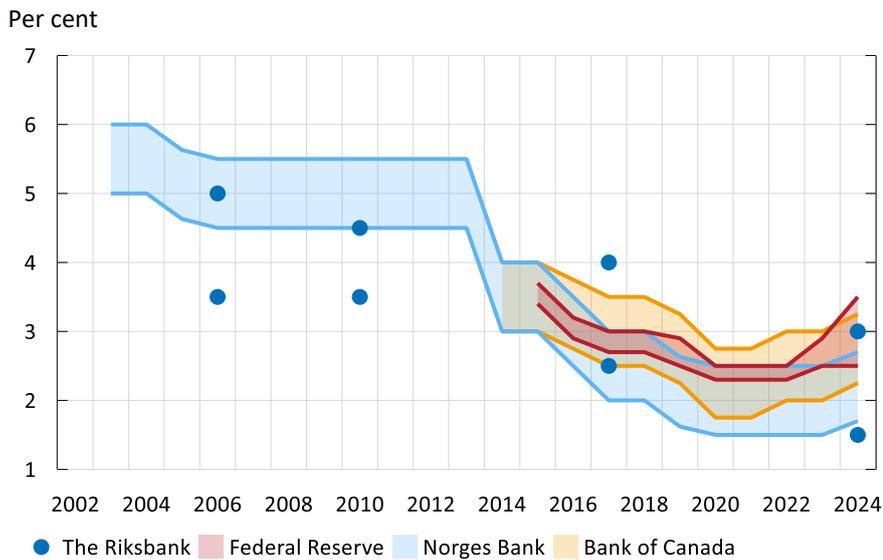
and GDP than would otherwise have been the case. The effects on inflation are more uncertain; there are factors indicating both lower and higher inflation.

Lessons learnt from the period of high inflation were accumulated during the year, including the methods developed to estimate whether inflation is driven by supply or demand shocks. The Riksbank also continued to monitor companies' pricing behaviour, including in a research project analysing microdata. Past results indicate that it is primarily the frequency, rather than the magnitude, of price changes that correlate with the aggregate rate of price change. This was particularly evident during the period of high inflation. In early 2024 companies changed their prices less frequently again, indicating that pricing behaviour was more in line with what it looked like before the period of high inflation. For goods and food, prices changed less frequently, while companies in the services sector continued to change their prices more often than usual. Analyses of the exchange rate also continued, as the development of the krona has an impact on inflation. These included a study on whether exchange rate pass-through differs when the krona depreciates against the dollar and the euro respectively.

What is usually referred to as the transmission mechanism - the effects of monetary policy on financial markets, inflation and the rest of the economy - is naturally something that the Riksbank needs to have a good understanding of. In the monetary policy work, it is an important focus area to constantly improve the understanding of the transmission mechanism in Sweden. It is essential for calculating the effects of various possible decisions on the policy rate. But it is also important for constructing alternative scenarios, which the Riksbank does in connection with monetary policy decisions to evaluate different policy alternatives and assess risks. The Riksbank continuously reviews the analysis on which the assessments of the effects of monetary policy are based, and in 2024 a number of projects were carried out with a particular focus on this. Part of the work involved the Riksbank estimating effects using new methods and new data, which were compared with updated estimates using more traditional methods. Although the results are relatively concordant, it is important to be aware of the uncertainty that is always present in empirical estimates. The uncertainty is considerable and the estimated effects are affected by a number of different assumptions. The calculations are part of the Riksbank's overall assessment of the effects of monetary policy on the Swedish economy.

One tool for communicating monetary policy is to publish forecasts of the policy rate, something the Riksbank has done since 2007. Forecasts of the policy rate several years ahead are associated with considerable uncertainty. At the same time, however, they provide an indication of the expected neutral level of the policy rate in the long term. During the year, the Riksbank has reviewed its assessment of the long-term neutral interest rate.

A new assessment was produced on the basis of international studies, assessments from other central banks, information from financial markets and by the Riksbank estimating leading models in the literature using Swedish data. The Riksbank's new assessment is an interval between 1.5 and 3 per cent (see Figure 31).

**Figure 31. The Riksbank's and other central banks' assessments of neutral interest rates**

Sources: National central banks and the Riksbank. The assessment for Norges bank is from the article "Anslag på nøytral realrente" in the Monetary Policy Report 2/2023. For the Bank of Canada, the estimates come 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 level for the repo rate?", February 2010, and "The repo rate in the long run", February 2017 in Monetary Policy Reports.

### Strategic analysis issues

In addition to the increased drafting work with analyses linked to monetary policy decisions, the Monetary Policy Department also mobilised its resources around more strategic analytical work. The strategy work generally focused on developing and expanding the use of modelling in the analyses. The aim was to estimate the effects of monetary policy using new methods and new data, and to update existing macro models in the light of events in recent years. Experience showed that supply shocks may continue to be more relevant in the future and that these effects may vary over time, depending on the state of the economy. There was a clear need to find a flexible way of working with models, in order to deal more easily with such situations. To achieve this, both new models and new ways of working need to be explored.

Many other central banks, such as the Bank of England, the Bank of Canada and Norges Bank, are making similar changes. In the work on formulating a strategy for developing the models and working with them more flexibly, the Riksbank has had exchanges with other central banks during the year and shared experiences. Two specific areas of modelling development during the year were the Riksbank's review of the neutral interest rate assessment and the estimated effects of monetary policy.

The development work included re-estimating the Riksbank's structural macro-economic model Maja.

In the Riksbank's overall strategic plan, one of the shifts is to harness the potential of data.<sup>65</sup> The monetary policy data team is working to streamline and create better conditions for working with data, both in the forecasting work and other monetary policy analysis projects.

One way to harness the potential of data is to explore how new data sources can help us understand the economy in new ways. One concrete project initiated during the year was the development of AI models for short-term forecasting, exploring the application of machine learning models, in particular random forests and neural networks. The advantages of such models are that they can effectively capture non-linearities in economic data and that they can be easily estimated on large volumes of odd data, without encountering the challenges that befall more common methods. Working with these models thus provides the conditions for incorporating new data into the drafting process in an efficient and structured manner. A comparison of the forecasting performance of these AI-based models with traditional benchmark models suggests that the Riksbank's forecasts for 1–12 months ahead can be improved by using machine learning methods. The study also highlights the importance of non-linear models over merely the expansion of datasets.

The Riksbank's other development work during the year included sustainability and monetary policy. Research on how society's transition to a sustainable economy can affect monetary policy is under development and staff at the Riksbank have contributed to this growing research literature.

### **International cooperation**

The Riksbank's overarching strategic plan states that the Riksbank's strategic shifts shall be strengthened by establishing and developing cooperation projects, both within Sweden and internationally. This allows us to learn from others and in this way find new solutions to complex problems. The Riksbank's international work aims, among other things, to exchange information with other central banks and international organisations. This work continued in 2024. During the year, the Riksbank deepened its cooperation with Norges Bank, for instance in connection with estimates of the neutral interest rate and the analytical shift in the monetary policy drafting process. The Riksbank's geo-economics network also invited the Institute for Emerging Economies at the Bank of Finland to a seminar and round table discussion on economic developments in China and Russia.

Since 2018, the Riksbank has participated in the Network for Greening the Financial System (NGFS), a global network of central banks and supervisory authorities with a focus on climate aspects in the work of these authorities. The Riksbank contributed by

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<sup>65</sup> See the Riksbank's website, <https://www.riksbank.se/globalassets/media/riksbanken/lagar-regler--policy/the-riksbank-strategic-plan-2024-2027.pdf>.

raising issues such as the design and analysis of climate scenarios, biodiversity and nature-related risks, and the impact of climate change on monetary policy.<sup>66</sup>

The Riksbank also organised several scientific conferences during the year. A conference was organised with researchers from the IMF and Stockholm University to discuss lessons learned from three decades of inflation targeting. Another conference was organised jointly with researchers from the Federal Reserve Bank of New York and Uppsala University. Papers on macroeconomics and financial economics with a historical perspective were presented at the conference.

Much of the analytical work carried out in the Monetary Policy Department is documented in publications published on the Riksbank's website. Table 2 summarises the studies published in 2024.

**Table 2. Monetary policy-related studies in 2024**

Year of publication 2024

<b>In-depth analyses in Monetary Policy Reports</b>
Structural factors determine interest rates in the longer run, March
Relationship between producer and consumer prices, March
Transmission of monetary policy to the money market, June
What factors drove the surge in inflation?, June
Microdata gives insights into how companies adjust their prices, September
Effects of monetary policy, September
Macroeconomic effects of higher US import tariffs, December
The Riksbank's assessment of the long-term neutral interest rate, December
<b>Economic Commentaries</b>
C. Håkanson and S. Laséen, "Cruising to victory or a dead heat? Central Bank Championships in forecasting ability 2021 and 2022", No. 1
J. Johansson and O. Tysklind, "Evaluation of measures of core inflation", No. 3
C. Flodberg, "Structural factors determine interest rates in the longer run", No. 5
A. Breman and B. Lagerwall, "Monetary policy and behavioural economics" No. 6
H. Armelius, S. Laséen and S. Mammos, "A surprising pattern is hidden behind the trend in long-term interest rates", No. 7
O. Tysklind and J. Johansson, "Price changes at different time horizons", No. 8
O. Tysklind and J. Johansson, "Characteristics of subgroups in the CPIF", No. 9
O. Tysklind, "Nya datakällor i prognosarbetet – högfrekvent data för livsmedel", No. 10
C. Flodberg and P. Wasén, "Lower response rates implies challenges for monetary policy in several countries", No. 11
S. Mammos and D. Stoyko, "Exchange rate pass-through to consumer prices in Sweden: the case of bilateral exchange rates", No. 12
B. Petersson, "What does an increased share of products with low import content mean for inflation?", No. 13
M. Klein, E. Skeppås and O. Tysklind, "Inflation dynamics in the high inflation period: insights from microdata", No. 14

<sup>66</sup> See "The green transition and the macroeconomy: a monetary policy perspective", technical document, October 2024, Network for Greening the Financial System.

M. Klein, E. Skeppås and O. Tysklind, "Price changes on goods and services during the high inflation period: insights from microdata", No. 15

B. Andersson and H. Lundvall, "Effects of monetary policy" No. 16

#### Economic Review

A. Breman, M. Eriksson and C. Kahn, "The Riksbank and changes in financial markets, a 30-year perspective", No. 1

#### Staff Memos

S. Laséen and C. Nilsson, "How does the Riksbank's monetary policy affect the Swedish economy: does inflation rise when the policy rate is raised?", January

I. Häkkinen Skans, D. Lööv and A. Westermark, "Effekter av prisregleringar" (in Swedish), February

B. Petersson, I. Strid and A. Österberg, "What is the relationship between Swedish and global inflation?", April

M. Almgren and D. Stoyko, "Is there state-dependence in the exchange rate pass-through to inflation in Sweden?", April

P. Kaplan and M. Njie, "What drives variable mortgage rates?", May

M. Löf and P. Stockhammar, "What drove the surge in inflation?", June

E. Berggren, S. Mammos and I. Strid, "The effects of monetary policy in Sweden during the inflation targeting period: estimates with structural VAR models", August

M. Löf and P. Stockhammar, "Indicators for short-term forecasting", October

M. Jonsson, C. Kamanzi, P. A. Kwizera and J. C. Niyonsenga, "Adverse weather shocks and monetary policy in Rwanda", November

#### Working papers

N. Amberg and B. Becker, "Banking Without Branches", No. 430

C. Bertsch, I. Hull, R. L. Lumsdaine and X. Zhang, "Four Facts about International Central Bank Communication", No. 432

R. Billi, J. Galí and A. Nakov, "Optimal Monetary Policy with  $r^* < 0$ ", No. 433

J. H. E. Christensen and X. Zhang, "Quantitative Easing, Bond Risk Premia and the Exchange Rate in a Small Open Economy", No. 434

M. Lenza and E. Savoia, "Do we need firm data to understand macroeconomic dynamics?", No. 438

G. Linderoth and M. Mueller, "Inflation-Dependent Exchange Rate Pass Through in Sweden: Insights from a Logistic Smooth Transition VAR Model", No. 439.

J. H. E. Christensen, N. N. Mirkov and X. Zhang, "Quantitative Easing and the Supply of Safe Assets: Evidence from International Bond Safety Premia", nr 440

D. Finocchiaro and P. Weil, "A Traffic-Jam Theory of Growth", No. 442

T. Jappelli, E. Savoia and A. Sciacchetano, "Intertemporal MPC and Shock Size", No. 443

J. Almerud, D. Krygier, H. Lundvall and M. Njie, "Measuring Riksbank Monetary Policy: Shocks and Macroeconomic Transmission", No. 445