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Dear readers,

This issue of Sveriges Riksbank Economic Review contains three articles that address topical issues in the discussion of monetary policy, both in Sweden and the rest of the world. These include monetary policy communication, lessons learnt from the period of high inflation, and fiscal policy frameworks and the interaction between fiscal and monetary policy.

- **Openness and clarity – key ingredients in Riksbank communication**

  Anna Breman and *Anna Seim*, First Deputy Governor and Deputy Governor respectively, write about key elements of the Riksbank's monetary policy communication. The Riksbank is often ranked highly in measurements of monetary policy transparency, which is largely because the Riksbank is one of few central banks that publishes a forecast for its own policy rate – an interest rate path – and includes the names of the Executive Board members when their contributions are reported in the minutes of the monetary policy meetings. Another element of Riksbank communication on monetary policy is the publication of so-called alternative scenarios in the Monetary Policy Reports. These three elements of the Riksbank's monetary policy communication fulfil different functions, which are described in more detail in the article. The article is based on presentations and speeches given in various international contexts during spring and summer 2025.

- **Lessons from the high inflation period**

  Selena Durakovic, *Jesper Johansson* and *Oskar Tysklind* summarise analysis and research conducted in recent years on the high inflation in Sweden during 2022-2023. The authors show that the surge in inflation was due to major changes in both supply and demand following the pandemic, and to Russia's invasion of Ukraine. They also ask whether the impact of the changes on inflation and the wider economy could have been better predicted using the economic models and data available at the time. Based on this analysis, they draw some conclusions for future forecasting work.

- **Fiscal rules and debt in the 21st century: a brief overview**

  Mika Lindgren and *Charlie Nilsson* provide an overview of some key fiscal policy themes over the past three decades. The background is the increased interest in recent years in the interaction between monetary and fiscal policy, and that fiscal policy in several large economies has come to be questioned from a long-term sustainability perspective. The authors focus in particular on fiscal policy frameworks, developments in public debt levels and fiscal sustainability.

Read and enjoy!
Marianne Nessén and Ulf Söderström

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Openness and clarity – key ingredients in Riksbank communication

Anna Breman and Anna Seim*
First Deputy Governor and Deputy Governor of the Riksbank

The Riksbank endeavours to be a transparent central bank where the basic premise is that open and clear communication builds confidence with the Riksdag (the Swedish parliament) and the general public. The Riksbank is also often ranked highly in measurements of transparency. This is largely because the Riksbank has chosen to go a little further than many other central banks when it comes to transparency in the communication of monetary policy. Three important elements of this communication are the interest rate forecast, alternative scenarios and the minutes of the monetary policy meetings. These three elements fulfil different functions, but they also create conditions for and interact with each other. The Riksbank's experience shows that such open communication entails challenges, but also that misgivings can sometimes be exaggerated. However, central banks are all different and the level of transparency they can provide is also affected by institutional conditions.

1 Introduction

The Riksbank endeavours to be a transparent central bank. There are several reasons for this. One is that it facilitates parliamentary scrutiny and accountability, which is important given the Riksbank's independent position. This helps to maintain confidence in the bank. Another reason is that transparency makes it easier for households, companies and markets to understand the Riksbank's monetary policy decisions and to predict how the Riksbank will act in different situations – what is usually referred to as the Riksbank's reaction function. This in turn contributes to making monetary policy more effective, as households, companies and market participants make decisions based on expectations of how the Riksbank will act. Expectations can thus make monetary policy more effective.

* This article summarises presentations and speeches on aspects of the Riksbank's monetary policy communication that we each gave in various international contexts during the spring and summer of 2025; see Breman (2025) and Seim (2025b,c). We would like to thank Mikael Apel, Jyry Hokkanen, Matilda Kilström, Mika Lindgren, Charlie Nilsson, Maria Sjödin and David Vestin who provided excellent background material for the speeches and presentations, and Björn Andersson who provided invaluable help with the editing of these into an article. We would also like to thank Marianne Nessén for her valuable comments. The opinions expressed in the article are our own and are not to be seen as the Riksbank's position.

The Riksbank is often ranked highly in measurements of monetary policy transparency (see, for example, Dincer et al. 2022). This is largely because the Riksbank is one of the few central banks that publishes a forecast for its own policy rate – an interest rate path – and includes the names of the Executive Board members when their contributions are reported in minutes of the monetary policy meetings. Another element of the Riksbank's communication on monetary policy, which is also linked to the efforts to be transparent and predictable, is the publication of so-called alternative scenarios in the Monetary Policy Reports. This particular element has attracted some attention from other central banks recently.

The purpose of this article is to describe the Riksbank's monetary policy communication with a particular focus on the interest rate forecast, alternative scenarios and the minutes. These three elements of the Riksbank's monetary policy communication fulfil different functions, which are described in more detail below. But they also create conditions for, and interact with each other. The Riksbank's overall communication on monetary policy is thereby strengthened. For example, alternative scenarios become more informative when they are complemented by interest rate paths that show how monetary policy could be conducted. It is also easier for the Executive Board to approve a Monetary Policy Report with forecasts, including an interest rate forecast, and alternative scenarios when the minutes provide an opportunity to convey personal judgements about the outlook and risks.

2 The interest rate forecast

In 2007 the Riksbank started publishing a forecast of its own policy rate. Since then, the interest rate forecast has been an important communication tool. It provides information about the Riksbank's actions should no new shocks hit the economy, which should make monetary policy more predictable.

2.1 The interest rate forecast provides information on the Riksbank's reaction function

It takes time for monetary policy to have a full impact on inflation, production and employment. Central banks therefore need to base their monetary policy decisions on forecasts of economic developments and central banks typically publish a selection of these forecasts, usually for key variables such as inflation, GDP and unemployment.

The forecasts need to be based on some assumption about how the central bank conducts monetary policy. This can be done in different ways. One approach would be to assume that the policy rate will remain unchanged throughout the forecast period, or that the policy rate will develop as financial market participants expect it to. If the forecast then shows that inflation for example is below the target towards the end of the forecast period, this is an indication that it may be necessary to conduct a more expansionary monetary policy than assumed in the forecast. Another approach would be to determine the policy rate forecast together with the other forecasts, so that the policy rate forecast is endogenous instead of an exogenous assumption. The policy rate forecast would then be adjusted to ensure that monetary policy is well balanced,

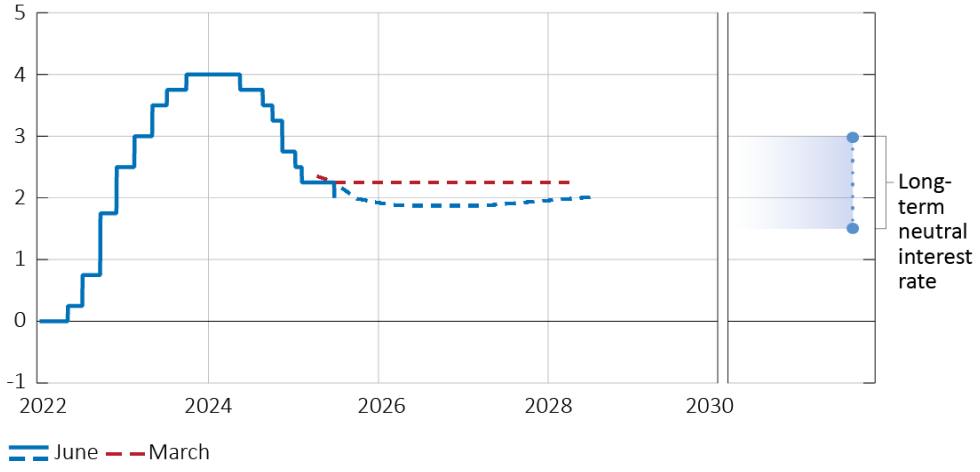
and the forecasts for inflation and the real economy are in line with the central bank's objectives.

Until 2005, the Riksbank's forecasts were based on the assumption of a constant policy rate. The Riksbank then switched to assuming that the policy rate would follow market expectations as reflected in the pricing of financial instruments. In 2007, the Riksbank chose instead to start making its own forecast for the policy rate, partly to achieve consistency between all forecasts. As a step towards increasing transparency, the Riksbank then also decided to publish the interest rate forecast together with the forecasts for inflation and the real economy that this monetary policy was expected to result in. The Riksbank saw few reasons to omit a forecast that was being produced anyway, especially such a central forecast. On this point, however, the Riksbank differs from many other central banks that forecast their policy rate. There are still only a few central banks that choose to publish this forecast.[1]

The interest rate forecast provides conditional guidance on monetary policy going forward: if the economy develops as the Riksbank's Executive Board expects, it reflects what the Riksbank intend to do, that is, it provides information on the reaction function (see Figure 1). The interest rate forecast is thus consistent with the forecasts for inflation and the real economy and reflects what the majority of the Board assesses will stabilise inflation at the 2 per cent target and contribute to the balanced development of production and employment. That is, it reflects a well-balanced monetary policy.

Figure 1. Policy rate forecast

Per cent



Note. The solid line refers to the outcome and the broken line refers to the Riksbank's forecast, in this case the forecast in the Monetary Policy Report in June 2025 together with the previous forecast in the March report. The shaded area shows the assessed interval for the neutral policy rate in the long run. Outcomes are daily rates, and the forecasts refer to quarterly averages.

Source: The Riksbank.

[1] The central banks of New Zealand, Norway, the Czech Republic and Israel publish their own interest rate forecasts. The members of the Federal Reserve's Monetary Policy Committee publish their own assessments of the appropriate level of the federal funds rate at the end of the following three-year period in a so-called 'dot plot'. The central bank of South Korea publishes similar assessments.

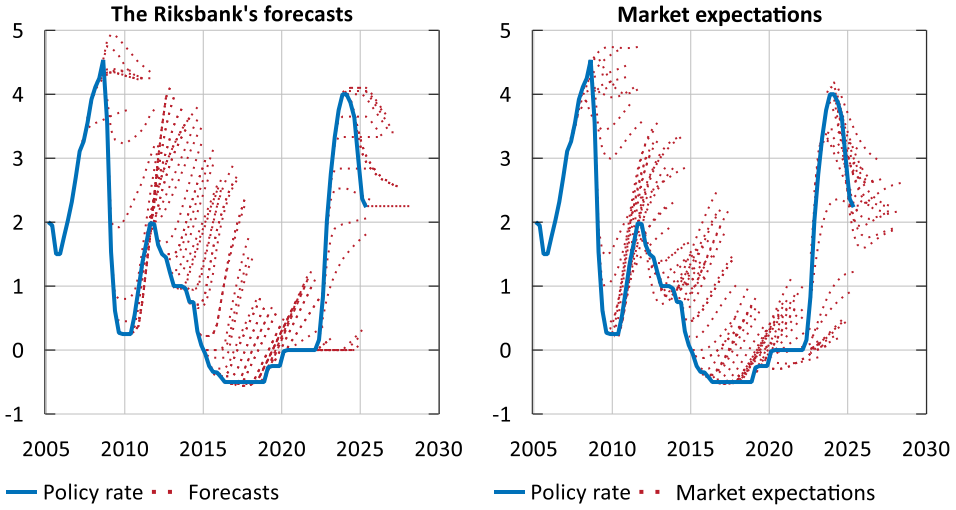
2.2 There are challenges in publishing an interest rate forecast, but the Riksbank's experience has been positive

There are various reasons why central banks may be reluctant to publish a forecast for their own policy rate. To begin with, the institutional conditions may pose practical challenges for the members of a monetary policy committee to agree on, or gather a majority for, a specific policy rate forecast. This was discussed extensively at the Riksbank before the start in 2007. However, although the five (previously six) members of the Executive Board do not seek consensus on monetary policy decisions, in practice it has proved unproblematic to reach a majority view on the interest rate forecast. One explanation for why this has worked well is that the Executive Board members' possibilities to nuance their positions in the monetary policy minutes has facilitated compromises on details (see also section 4 on the minutes).

Over the years, potential drawbacks of central banks publishing an interest rate forecast have been highlighted. When this was discussed in the early 2000s, one of the concerns was that, for reasons of prestige or fear of losing credibility, central banks would feel bound by a particular interest rate forecast, even when deviations would be justified. This has not materialised in the case of the Riksbank. The Executive Board has often taken interest rate decisions that have deviated from the previous forecast, which has given rise to forecast errors.

However, forecast errors as such are not problematic – they are unavoidable. As the economy is constantly impacted by shocks, the interest rate path that is expected to bring inflation back to target will need to be changed when new information is available. However, the forecasts should not systematically over- or underestimate the actual development of interest rates, as they have done periodically. During the 2010s, the Riksbank published forecasts based on the assumption that the historically low policy rate would normalise and return to a higher level. In practice, it was cut to ever lower levels (see the left-hand panel in Figure 2). Other analysts made similar forecasts (see the right-hand panel in Figure 2), but the Riksbank's forecast errors attracted much attention in the economic debate. For example, an illustration of the forecast errors, known as the 'Riksbank hedgehog', appeared in different market letters.

Figure 2. The Riksbank's forecasts and market expectations of the policy rate
Per cent



Note. Market expectations refer to expectations according to forward pricing the day prior to the monetary policy meeting. Quarterly data.

Source: The Riksbank.

The figure showing the development of the interest rate together with the Riksbank's forecasts over time is undeniably a striking illustration of the Riksbank's systematic forecasting errors. But it also shows how the Riksbank has changed monetary policy when developments have been different from those expected, which is exactly what a central bank is expected to do. In the case of the Riksbank, this has not involved any drama, which indicates that the Riksbank's message that the interest rate forecast is not a promise has been heard (see below). For example, there are no indications that the forecast errors have affected public confidence in the Riksbank's ability to fulfil its mandate. Households, businesses and markets are likely to realise that things would be much worse if monetary policy did not adapt to changing circumstances.

Another reason for not publishing an interest rate forecast may be the fear that it will be seen as a promise, and that the central bank will be criticised for having 'tricked' participants into making decisions based on a forecast that then needed to be changed. There are examples of how this can be a challenge when central banks provide guidance on monetary policy in the period ahead.[2] It is therefore crucial to clarify that the guidance is conditional. From the start in 2007 and for many years, the Riksbank repeated time and again the message that the interest rate path is 'a forecast, not a promise', and this now seems to be widely understood.

When central banks such as Norges Bank and the Riksbank considered publishing their own interest rate forecasts in the early 2000s, the possibility of influencing economic

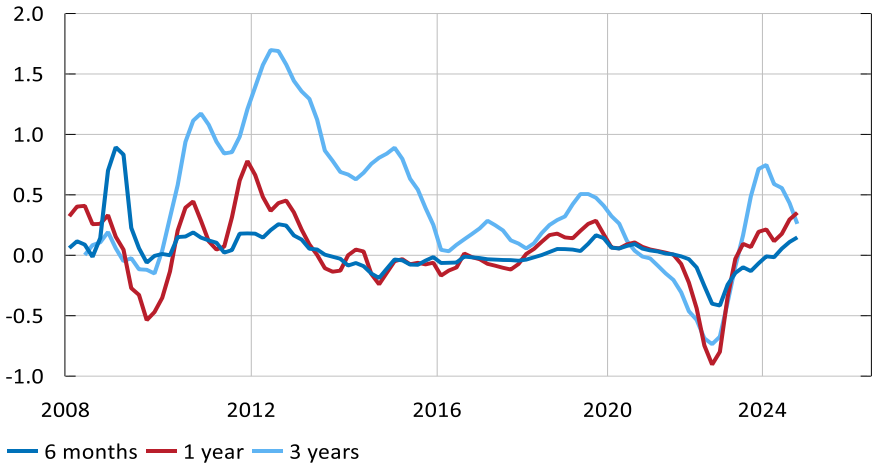
[2] See, for example, Thedéen (2025). Such forward guidance often consists of statements on how monetary policy is likely to be conducted over a certain period. However, the Riksbank's statements have never been 'promises', as they have always been conditional on the economy developing in a certain way. In the research literature this type of conditioned guidance is called 'Delphic' forward guidance, as opposed to 'Odyssean' guidance where the central bank commits itself to conduct policy in a certain way. See for example Calmfors, Hassler and Seim (2022) for a discussion.

agents' expectations of the interest rate was emphasised as a potential advantage. However, the debate also raised concerns that market participants would not only be influenced but would start relying entirely on the central bank's interest rate forecast and essentially stop seeking other information that could have an impact on long-term interest rates. The central bank would then lose an important source of information on market participants' views of the longer-term economic outlook.

However, it quickly became clear that this fear was not being realised either. Periodically, there have been relatively large differences between the Riksbank's interest rate forecast and the market's interest rate expectations. In the short and medium term, the differences have typically been small, and studies have shown that changes in the Riksbank's interest rate forecasts have had some impact on market rates, mainly on short-term rates (see, for example, Brubakk et al. 2021). The differences between the Riksbank's forecast and market expectations have mainly concerned the development of the interest rate in the longer term. This is illustrated in Figure 3, which shows the difference between the Riksbank's forecast for the policy rate at each monetary policy decision since 2008 and what the market's expectations of the policy rate were on those occasions. The lines show the difference between what the Riksbank estimated the policy rate would be in 6 months, 1 year and 3 years, respectively, and what the market expected the policy rate to be at the same horizons. As shown in the figure, the differences in the assessments of the policy rate have mainly related to longer-term developments, and they were particularly large in the first half of the 2010s.

Figure 3. Difference between the Riksbank's forecast and market expectations of the policy rate since 2008

Difference in percentage points



Note. Differences between the Riksbank's forecast for the policy rate and market expectations of the policy rate at the time of monetary policy decisions 2008–2025. Market expectations refer to expectations based on forward pricing on the day before the monetary policy meeting and have been converted to quarterly data. Differences over the one- and two-year horizon refer to moving averages of the past three observations, while differences at the three-year horizon refer to moving averages of the past six observations.

Source: The Riksbank.

These differences have been associated with certain challenges for the Riksbank, both analytical and communicative. For example, it has been unclear to what extent the differences reflect the market interpreting the longer-term forecast more as signalling from the Riksbank than as an actual forecast of the economic outlook. But even if there have been such reasons behind the deviations, this has not been reflected in the overall confidence in the inflation target or in the Riksbank in general.

To summarise, the Riksbank has had positive experiences of publishing forecasts for the policy rate. The forecast is one of the most important communication tools for illustrating and providing information about how the Riksbank conducts monetary policy. Several of the concerns that existed at the outset, and which to some extent are still being raised, have not been realised. This does not mean that it is unproblematic for a central bank to publish an interest rate forecast. The institutional conditions differ between countries and there are both practical and communication challenges that need to be addressed.[3]

It is important to constantly assess the effectiveness of monetary policy communication and make changes if necessary. In March 2024 the Riksbank made changes to its communication regarding the interest rate forecast to clarify the difference between how the Executive Board views the forecast for the policy rate in the near term and the longer-term forecast.[4] In the section of the Monetary Policy Report that includes the Executive Board's monetary policy deliberations, the focus now lies on the assessment of the policy rate over the next three quarters.[5] This signals that there is more information available on economic developments in the near term and that the forecast further ahead is increasingly uncertain due to new shocks continuously hitting the economy. The illustration of the interest rate forecast in this section of the report reflects this by both 'magnifying' the near-term forecast and using fading colours to illustrate the growing uncertainty in the overall interest rate forecast for the next three years (see Figure 4).

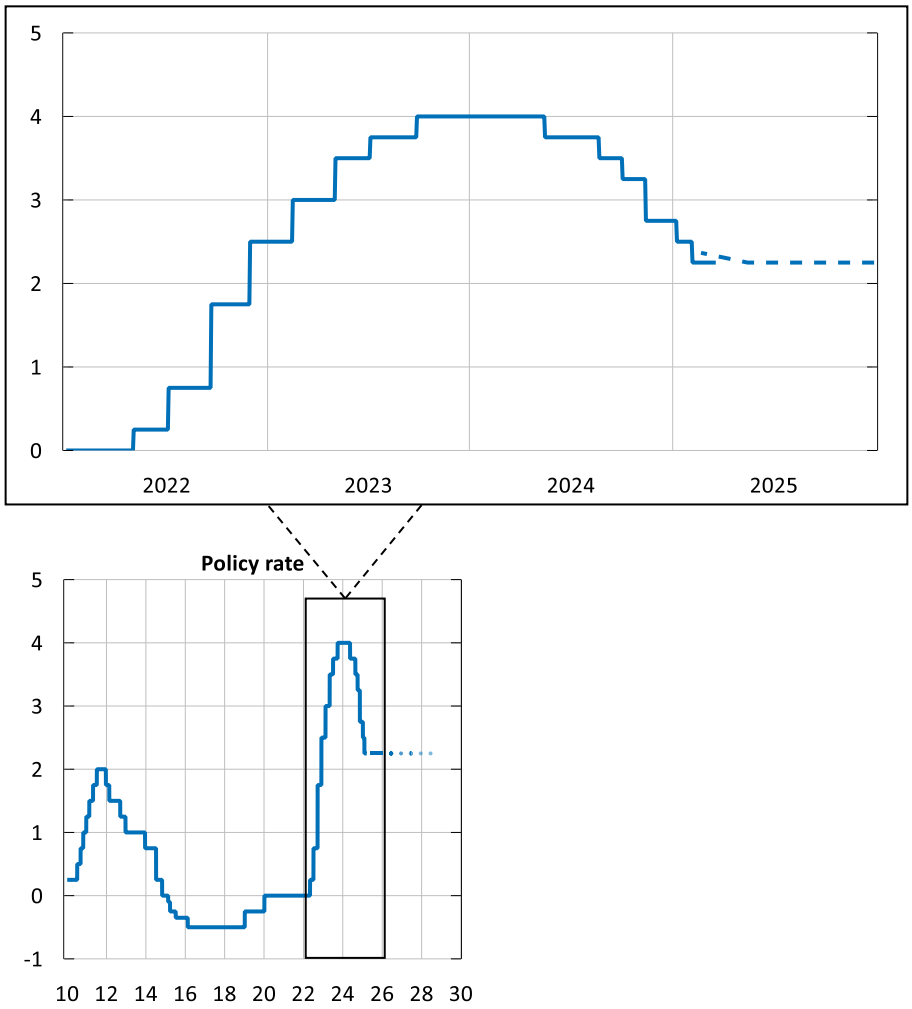
[3] See Sveriges Riksbank (2017) for an evaluation of the Riksbank's first ten years of publishing policy rate forecasts. See also Flodén (2024) for a discussion of challenges based on recent experiences.

[4] See Sveriges Riksbank (2025) for more details on the change.

[5] The full three-year interest rate path is commented on in a later chapter of the monetary policy reports.

Figure 4. Policy rate forecast in the long and short term

Per cent



Note. The figure is taken from the Monetary Policy Considerations section of the March 2025 Monetary Policy Report. Solid line refers to outcome, dashed/dotted lines represent the Riksbank's forecast. Outcomes for the policy rate are daily data, and the forecasts refer to quarterly averages. The upper image shows the forecast for the policy rate in the short run and is based on the long-term policy rate path in the lower figure. The dotted and faded line in the lower figure illustrates that the longer-term forecast for the policy rate is subject to considerable uncertainty.

Sources: Statistics Sweden and the Riksbank.

3 Alternative scenarios

For the Riksbank, scenarios have been a complementary tool to the interest rate path in both internal analysis and external communication since 2007.[6] Together with the interest rate path, alternative scenarios are the most important tool for illustrating how the Riksbank conducts monetary policy.

3.1 Scenarios are important in the internal process of producing an interest rate forecast

As described above, the Riksbank's interest rate forecast reflects a development of the policy rate that the majority of the Executive Board considers to be well-balanced, that is, it stabilises inflation at the target of 2 per cent and contributes to a balanced development of production and employment. While several different interest rate paths may be consistent with broadly similar developments in inflation and the real economy, the path chosen should also have other characteristics. Among other things, it should be consistent with the Riksbank's assessment of the long-term neutral interest rate level, and it should be effective, robust and predictable. Analysing scenarios is an important element in the process of arriving at such an interest rate forecast.

If monetary policy is *effective*, it should not be possible, with a different interest rate path, to stabilise inflation around the target but achieve better developments of the real economy. To avoid this, the Riksbank evaluates different interest rate paths. In such an analysis, it is essentially only the interest rate paths that distinguish different scenarios. Applying the same interest rate path in different macroeconomic scenarios, on the other hand, provides a picture of how *robust* monetary policy is, that is, to what extent the interest rate path gives rise to acceptable developments of inflation and the real economy, even if the economy should evolve in an unexpected way.

3.2 Scenarios are also useful in external communication to illustrate uncertainty and how monetary policy might react

The Riksbank also uses selected alternative scenarios in its external communication. Here, the scenarios illustrate the uncertainty regarding the economic outlook, provide information on the risks the Executive Board perceives as important and convey what monetary policy might look like if the scenarios are realised. That is, they provide information on the Riksbank's reaction function.

The forecast in the Riksbank's main scenario is uncertain and the actual development of the policy rate will differ from the interest rate path as the economy is hit by new shocks. In other words, we can be sure that the future will not be exactly as forecast. By supplementing the communication on the interest rate path with alternative scenarios, the Riksbank can illustrate how it will react to different shocks, which

[6] The forecast that the Riksbank publishes and often refers to as the 'main scenario' should not necessarily be interpreted as the scenario that the Riksbank considers most likely.

should make monetary policy more predictable.[7] Unlike summary measures of forecast uncertainty and forecast uncertainty bands, scenarios illustrate uncertainty by describing in concrete terms possible paths that the economy might take in the future and what monetary policy might look like in such cases.

Until 2015, the Riksbank described various scenarios in a separate chapter of the Monetary Policy Report. In connection with a review of the structure of the report, the Riksbank switched to including scenarios when it had reason to emphasise certain risks and uncertainties. From April 2023, the Riksbank has once again chosen to present alternative numerical paths for the policy rate, inflation and GDP growth in each Monetary Policy Report.

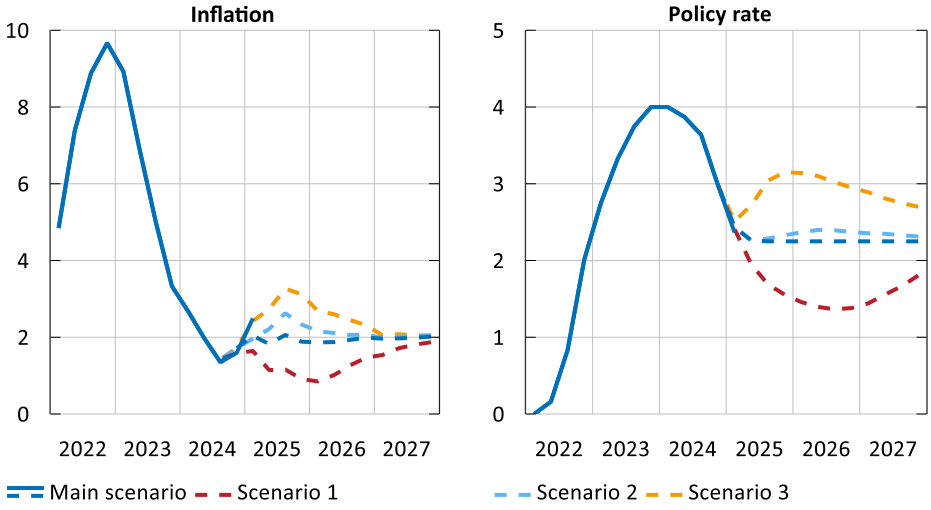
3.3 Scenarios require work to be fit for purpose

The Riksbank's experience shows that for scenarios to be fit for purpose, it is important to build a coherent narrative in each scenario, and to carefully explain the underlying assumptions about the functioning of the economy. This is important because a particular outcome for a variable, such as inflation, can lead to different responses from monetary policy depending on what has been driving the development. In the absence of details there is a risk that economic agents will interpret the scenarios too narrowly. They may then believe that it is enough for the outcomes for inflation, for example, to match with developments in the scenario for the Riksbank to also act exactly as in the scenario.

A concrete example is an alternative scenario in the December 2024 Monetary Policy Report (see Figure 5). In this scenario, geopolitical concerns continued to increase, leading to rising commodity prices and increased protectionism, and inflation rose towards 3 per cent. The monetary policy response in this scenario was to raise the policy rate to counteract secondary effects on inflation and the risk that long-term inflation expectations would start to rise above the 2 per cent target. Then, at the beginning of 2025, inflation increased roughly in line with the scenario, but for completely different reasons. The increase was mainly due to what the Riksbank judged to be temporarily higher prices of certain foodstuffs and to a technical factor, the so-called basket effect, which is a consequence of how the CPI is calculated. There was little evidence of the type of shocks and secondary effects on which the scenario was based and the Executive Board therefore chose not to react to the higher inflation. This illustrates the importance of explaining why monetary policy is conducted in a certain way. In its Monetary Policy Reports, the Riksbank has also begun to comment on previous alternative scenarios to clarify any differences.

[7] The usefulness of scenario analysis for this purpose has recently been highlighted by Bernanke (2024, 2025) in an evaluation of the Bank of England and in proposals for improved communication by the US Federal Reserve. Early on, the Riksbank was recommended to use alternative scenarios for sensitivity analyses and to discuss the implications for monetary policy; see Leeper (2003).

Figure 5. The Riksbank's scenarios for inflation and the policy rate
Annual percentage change (left) and per cent (right)



Note. Scenarios from the Monetary Policy Report in December 2024. Solid line refers to outcomes and extends to the first quarter of 2025. Inflation refers to the CPIF. Quarterly data.

Sources: Statistics Sweden and the Riksbank.

Making scenarios that can be used for monetary policy communication is no trivial matter. Essentially, this is an exercise in illustrating to economic agents that the future is uncertain by showing that developments, including monetary policy, may be different than in the main scenario. But of course, it is not possible to predict exactly how developments will differ from the main scenario. For example, at the end of 2019, few people would likely have considered a scenario where a pandemic would break out and paralyse the global economy.

In addition to engaging with the main scenario, the development of relevant scenarios also requires the Executive Board to discuss and identify 'what if' alternatives and which scenarios it would be appropriate to communicate. The focus then needs to be on what is relevant in the current situation, without ignoring other important risks. This can involve difficult trade-offs.[8] Should the scenarios be close to the main scenario or more extreme, and how specific and detailed should they be? One example of this difficulty is when inflation in the United States started to rise sharply in early 2021. At that time, the Riksbank, like several other central banks, anticipated that the rise in inflation would in principle be limited to the United States. With hindsight, it could be argued that it would have been useful to produce and communicate an alternative scenario in which inflation would spread globally and rise sharply. But at that time, inflation had been low for a long time, and it did not seem very likely that it would pick up. Moreover, even if the choice had been to communicate such a scenario, it is doubtful whether it would have assumed such dramatic developments as subsequently followed, with inflation in Sweden, for example, rising above ten per cent.

[8] In addition, in extreme situations, what is communicated may be particularly sensitive, for example if there is a risk of a self-fulfilling crisis.

Once the relevant risks have been identified, the next challenge is to analyse what the economic implications would be if the risks were to materialise. Such an analysis requires modelling tools. These are often based on historical patterns and are therefore better suited for developments closer to the main scenario than more extreme scenarios. Of course, historical patterns can also change. An obvious example is the current situation in which countries are imposing tariffs of varying sizes on different goods. Quantifying the impact of this is difficult given that we are in a new environment that is not reflected in historical data.

The Executive Board also needs to consider what monetary policy is likely to look like given the economic implications. It is an advantage if the scenarios are quantified, although this is not strictly necessary, and if interest rate forecasts are published, they become natural reference points in the scenarios. As the Executive Board supports the scenarios and the monetary policy they imply, the scenarios should ideally receive as much attention in the monetary policy preparation process as the main scenario. However, as the main scenario is central to the policy assessment, it is natural that it is analysed in more detail. Moreover, it is mainly the monetary policy in the main scenario that attracts external attention and scrutiny. The Riksbank's experience is also that it can be difficult to produce and communicate useful scenarios when there is a risk that monetary policy will have limited room for manoeuvre, for example because the policy rate is approaching a lower bound.

To summarise, there are a number of challenges in developing and communicating scenarios. But by being transparent about the risks a central bank sees ahead, and trying to describe alternative paths the economy and hence monetary policy might take, monetary policy should generally become more predictable and effective. That said, it is important to also adapt communication to the environment in which monetary policy operates. Alternative scenarios are likely to be most useful when there is considerable uncertainty about the economic outlook. In the recent environment of large and repeated shocks, the Riksbank has seen a greater need to illustrate alternative development paths for the economy and therefore emphasises scenarios more in its communication.

4 The minutes

The minutes of the monetary policy meetings fulfil an important function in the Riksbank's efforts to achieve transparency. In the minutes, each member of the Executive Board presents his or her assessment of the economic situation and outlook and states and justifies his or her position with regard to the new monetary policy decision. In the minutes the Board members are identified by name, which is unusual among central banks.

4.1 Few central banks are as transparent about monetary policy decisions as the Riksbank

The Executive Board of the Riksbank is an individualistic committee in the sense that its members are responsible for their own positions on monetary policy, and they are

expected to make these clear.[9] There is no effort to reach consensus on monetary policy decisions, which are taken by majority vote. Members with dissenting views enter a reservation, which is made clear immediately in the press release announcing the decision, and the main reasons for the reservation are recorded in the minutes published shortly after the decision.[10] The minutes are thus important for the Riksdag's insight into and scrutiny of the Riksbank, as well as for providing households, companies and markets with information on the motives for monetary policy decisions and the monetary policy reaction function.

Some central banks transcribe the proceedings of monetary policy meetings and publish these transcripts with a lag of several years.[11] Traditionally, the Riksbank's monetary policy minutes are lightly edited and not regular transcripts. In principle, however, they reflect everything that is said at the monetary policy meetings, that is the members' own contributions and the discussion between them.

Before 2007, the minutes did not indicate who had said what in the Executive Board. The minutes showed only that 'a member' had made a particular contribution and possibly what 'the same member' had said. As one of several measures implemented in 2007 to increase transparency, the Riksbank started to publish the names of who had said what at monetary policy meetings.[12] Among central banks, the Riksbank is still relatively alone in this respect.[13]

4.2 Increased transparency around individual members' deliberations has worked well in the case of the Riksbank

The Riksdag Committee on Finance is responsible for monitoring and evaluating the Riksbank's activities, including monetary policy. In addition to evaluating the conducted monetary policy on a yearly basis, the Committee on Finance also carries out a more comprehensive evaluation of monetary policy every five years, supported by a report prepared by foreign experts.[14] The first of these external evaluations was published in 2006 (Giavazzi and Mishkin 2006). One of the tasks of the evaluation was to analyse the Riksbank's transparency and communication, and in this context the evaluators discussed, among other things, the minutes. They argued that the minutes of the monetary policy meetings are an important information channel and that there are strong reasons to publish them. However, they advised against indicating which

[9] See Blinder (2007) for a discussion of different types of monetary policy committees.

[10] Over the years, the time taken to finalise the minutes has been successively shortened and they are currently published around five working days after the monetary policy meeting.

[11] For example, the Bank of England and the US Federal Reserve publish transcripts with a lag of eight and five years respectively.

[12] In addition to publishing an interest rate forecast and including names in the minutes, the Riksbank decided in 2007 to hold press conferences after each monetary policy meeting. In addition, it was decided to no longer signal future interest rate decisions between monetary policy meetings, as the need for such signalling decreased with the start of the publication of interest rate forecasts.

[13] Česká Národní Banka, the central bank of the Czech Republic, started publishing names in its minutes in 2020. Filáček and Kokešová Matějková (2022) discuss the central bank's experiences with this.

[14] Seim (2025a) describes how the Riksbank's monetary policy is evaluated. A webcast of the presentation is available at www.piie.com/events/2025/review-monetary-policy-strategy-central-banks. Information on the scrutiny of all of the Riksbank's activites is available at www.riksbank.se, under About the Riksbank/Tasks and Operations/How the Riksbank is scrutinised.

members are behind the views expressed in the meetings. The evaluators argued that the experience of publishing the transcripts of the Federal Reserve's meetings indicated that discussions at the meetings were inhibited and became less lively when members realised that statements were no longer anonymous.[15] The meetings would therefore be less effective if the names were published.

The fact that increased transparency can influence the behaviour of decision-makers is also something that has been highlighted in the theoretical literature. It may be that the greater transparency makes a member of a monetary policy committee reluctant to deviate from the majority view or, on the contrary, that the member wants to make a point of distinguishing herself from the rest of the committee.[16] Either case would result in lower quality monetary policy decisions. However, there are also theoretical arguments that increased transparency can improve decision-making through a disciplinary effect that makes members prepare more thoroughly for decisions.

Research at the Riksbank indicates that one effect of publishing the names of the members in the minutes is that the members explain their positions in more detail than before and also refer more often to their previous contributions and judgements (Apel et al. 2025). Whether, and if so how, this has affected monetary policy is difficult to say. To the extent that it reflects members taking greater responsibility for their positions over time and only changing their minds if they have a well-founded justification, it may have made monetary policy more consistent and predictable. On the other hand, it can be an encumbrance if members stick to a particular view for too long, for example for reasons of prestige.

In any case, the Riksbank's experience is that the format of the minutes facilitates the internal work of the Executive Board, which in turn contributes to more effective communication of monetary policy in general. Although the Executive Board does not seek consensus on monetary policy decisions, its members need to compromise on details in order for a majority to agree on the level of the policy rate and a report with forecasts, including an interest rate forecast. This is facilitated by the fact that the minutes provide scope for each member to nuance their positions, especially when it is clear from the minutes which member is making which contribution.

In parallel with the increasing preparation by Executive Board members of their contributions to monetary policy meetings, spontaneous discussions at the meetings have become less common. However, such discussions take place in a series of preparatory meetings leading up to the monetary policy meeting. Several of the external evaluations of the Riksbank's monetary policy have pointed to the lack of discussion in the minutes as a problem (Goodhart and Rochet 2011, Goodfriend and King 2016 and Flug and Honohan 2021). This has often been based on the view that

[15] It is worth noting that the background to the publication of names at that time was that the discussion in the meetings of the Federal Open Market Committee was recorded without the knowledge of the members and that, after this became known, the US Congress requested that transcripts of the meetings be made public.

[16] See, for example, Apel et al. (2025) for references to research on this aspect of committee decision-making.

the Executive Board in practice does not take the decision on monetary policy at the monetary policy meeting, but at some earlier meeting in the decision-making process.[17]

In responses to the evaluations, the Riksbank has emphasised that the formal decision on monetary policy de facto takes place at the monetary policy meeting (see, for example, Sveriges Riksbank 2011, 2016). But that meeting is the culmination of a weeks-long process of analysis and reflection in which the members form a view of the situation. Members therefore do not start from scratch at the monetary policy meeting and it is probably more the rule than the exception that they decide how to vote at some point in the process leading up to the meeting.[18] It is important to emphasise that the Riksdag considers that the minutes work well and has found no reason to comment on the Riksbank's internal decision-making process (Committee on Finance 2012, 2016). However, the Riksbank has taken on board the proposals to increase insight into the earlier part of the decision-making process. The minutes are therefore supplemented by a brief summary of the discussions held by the Executive Board during the preparatory meetings.

To summarise, the minutes of the monetary policy meetings fulfil an important function in the scrutiny and accountability of the Riksbank, to convey the Riksbank's reaction function and in the Executive Board's internal work. Naming the members in the minutes presents certain challenges, but the Riksbank's experience is that there are clear advantages in stating how different members have reasoned, what considerations they have made and what motives they have emphasised. This should make it easier for households, companies and market participants to understand both the monetary policy conducted by the Riksbank and how it might be changed. The media also routinely report on what the members have said in the monetary policy meetings and the minutes are now seen as one of the Riksbank's natural communication tools.

Few other central banks have so far chosen to publish names in the minutes. As we noted earlier, conditions differ between monetary policy committees and what works in one central bank may not necessarily work in another. It may also be, for instance, that a committee generally recognises the value of 'speaking with one voice' and believes that it would only add to uncertainty and confusion if individual, identifiable members were to detail their personal views on various issues − especially if they differ from those of the majority. For a time, persistent differences of opinion on monetary policy in the Executive Board of the Riksbank attracted some negative attention, but fears that disagreements that come to light may reduce confidence in the central bank are exaggerated.

[17] See also King (2025) who, partly with reference to the Riksbank's experience, suggests that central banks should stop publishing transcripts of monetary policy meetings. King argues that these do not increase transparency but rather distort the decision-making process, moving the real discussions on monetary policy to other meetings.

[18] This is also something that has been emphasised by previous Executive Board members; see, for example, Svensson (2009) and Flodén (2024).

5 Concluding comments

The fact that the Riksbank is placed high in rankings of transparency regarding monetary policy is the result of purposeful work over a long time. Transparency facilitates scrutiny and can at the same time make monetary policy more effective. An open and clear communication therefore builds confidence among both the general public and the principal, that is, the Riksdag.

This article has described three elements of communication in which the Riksbank has gone further than many other central banks: the interest rate forecast, alternative scenarios and the minutes. The Riksbank's overall aim with this openness has been to attempt to create a better understanding of monetary policy and of the often difficult trade-offs the Riksbank faces. Such an understanding increases confidence in monetary policy, which in turn makes the policy easier to conduct.

The arguments in favour of a central bank being transparent and predictable are general. But the conditions for conducting a predictable monetary policy vary with the economic environment and monetary policy communication needs to be adapted to it. Furthermore, how transparent a central bank is, and can be, also depends on institutional conditions which vary between countries. The fact that the Riksbank can be so transparent is explained not only by its long-held commitment to transparency, but also by favourable institutional settings. Compared to other central banks, the Riksbank is governed by a small Executive Board and has a staff that works closely with the Board and can continuously discuss prospects, forecasts and risks. For central banks with different circumstances, it may be difficult in practical terms to publish, for example, a report with forecasts for the policy rate in connection with the interest rate decision.

The experience of the Riksbank shows that central banks should not refrain from taking steps towards greater transparency because of fears that they would accidentally 'reveal too much' and that the confidence of households, companies and market participants in the central bank would therefore decline. Being transparent is not always easy and as we have tried to describe in this article, the Riksbank's open communication entails challenges. However, we would argue that the advantages outweigh the disadvantages, and that a high level of openness and clarity is generally something that facilitates monetary policy.

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Lessons from the high inflation period

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Inflation rose rapidly and unexpectedly in Sweden in early 2022. It then fell back at a similar pace, approaching 2 per cent in 2024. This surge in inflation was a result of major changes in both supply and demand following the pandemic and Russia's invasion of Ukraine. The large shocks to the economy at that time also changed the pricing behaviour of firms, which meant that the shocks had a faster and greater impact on inflation than before.

The pandemic and the economic disruptions that followed in its wake were not possible to foresee. Nor was the war in Ukraine. But it is reasonable to ask whether we as forecasters could have better understood the economic impact of these shocks on inflation and the wider economy using economic models and the data available at the time. In this article we summarize the analyses that the Riksbank and others have made to better understand the causes of the surge in inflation in Sweden. Based on this analysis we draw some conclusions for better forecasting in the future, the most important being that inflation dynamics can be very different in an environment with many and large shocks, and that it is important to be able to recognise such an environment at the earliest possible stage.

1 Introduction

In recent years, we have seen very large fluctuations in inflation both in Sweden and in other countries. Inflation rose rapidly in 2021 and 2022, before falling back almost as quickly again. In Sweden, CPIF inflation started to rise at the end of 2021 due to rising energy prices. Measured as the CPIF excluding energy, inflation only started to rise significantly in January 2022 (see Figure 1 on the next page). Inflation peaked around the turn of the year 2022/2023 and then fell back and was close in 2024 to the Riksbank's inflation target of 2 per cent.

However, while inflation has slowed, prices have remained at a higher level. In Figure 2 we can see the evolution of the price level in relation to a historical trend over these years. Here we see that the price increases have been largest for goods and food. It also shows that most of the price increase took place in 2022. Energy prices also rose

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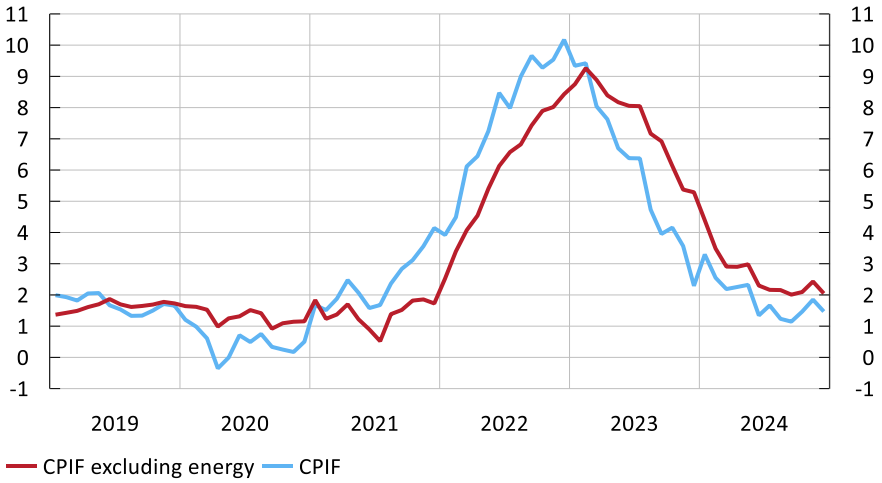
rapidly in 2022 but have since fallen back significantly and are now back roughly to their historical trend. Service prices have risen slightly less and more gradually than prices on goods and food.

Figure 1. The CPIF and the CPIF excluding energy 2019 - 2024

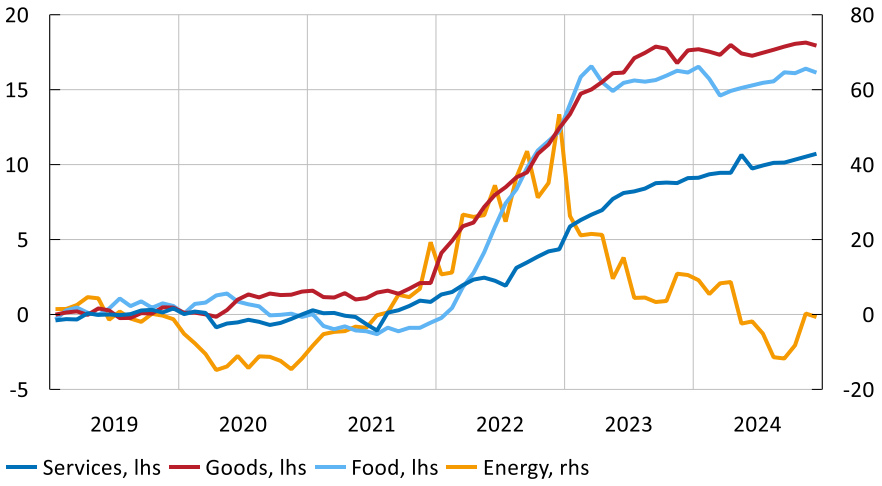
Annual percentage change



Sources: Statistics Sweden and the Riksbank.

Figure 2. Price levels in sub-groups of the CPIF

Deviation from historical trend, per cent



Note. The trend is estimated as an exponential trend over the period 2000–2021 and then projected at the same rate of increase for the years 2022 onwards.

Sources: Statistics Sweden and the Riksbank.

In this article, we summarise what we have learned from the analysis and studies published on inflation in recent years.[1] We also add new analysis to provide a

[1] In the past years the Riksbank has published a sequence of analyses that in different ways are about the surge in inflation, see for example Den Reijer et al. (2025), Håkansson and Laséen (2024), Johansson et al.

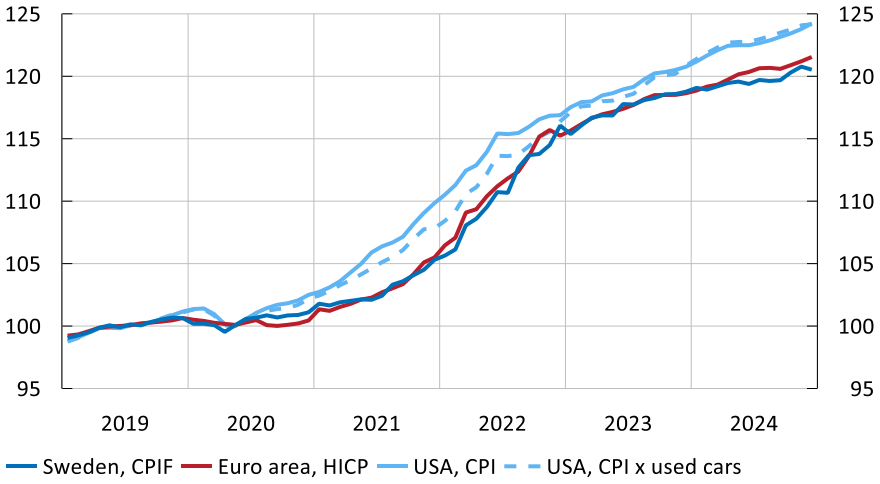
comprehensive picture of what was behind price developments during this period. Additionally, we try to gather lessons learnt for the future.

The article is organised as follows. First, we make a global comparison of inflation trends. We then take a closer look at macroeconomic developments in Sweden and firms' pricing behaviour to tell a coherent story about developments over the period. Finally, we discuss lessons learnt from this period and how they have affected, and will affect, the Riksbank's inflation analysis going forward.

2 A global comparison of inflation

It was not only in Sweden that inflation rose. Figure 3 below shows the price development of the CPIF in Sweden compared with the HICP in the euro area and the CPI for the United States.

Figure 3. Price developments in various countries and regions 2019 -2024
Index 2019 =100



Note. Figure refers to the CPIF for Sweden, the HICP for the euro area and the CPI for the United States.

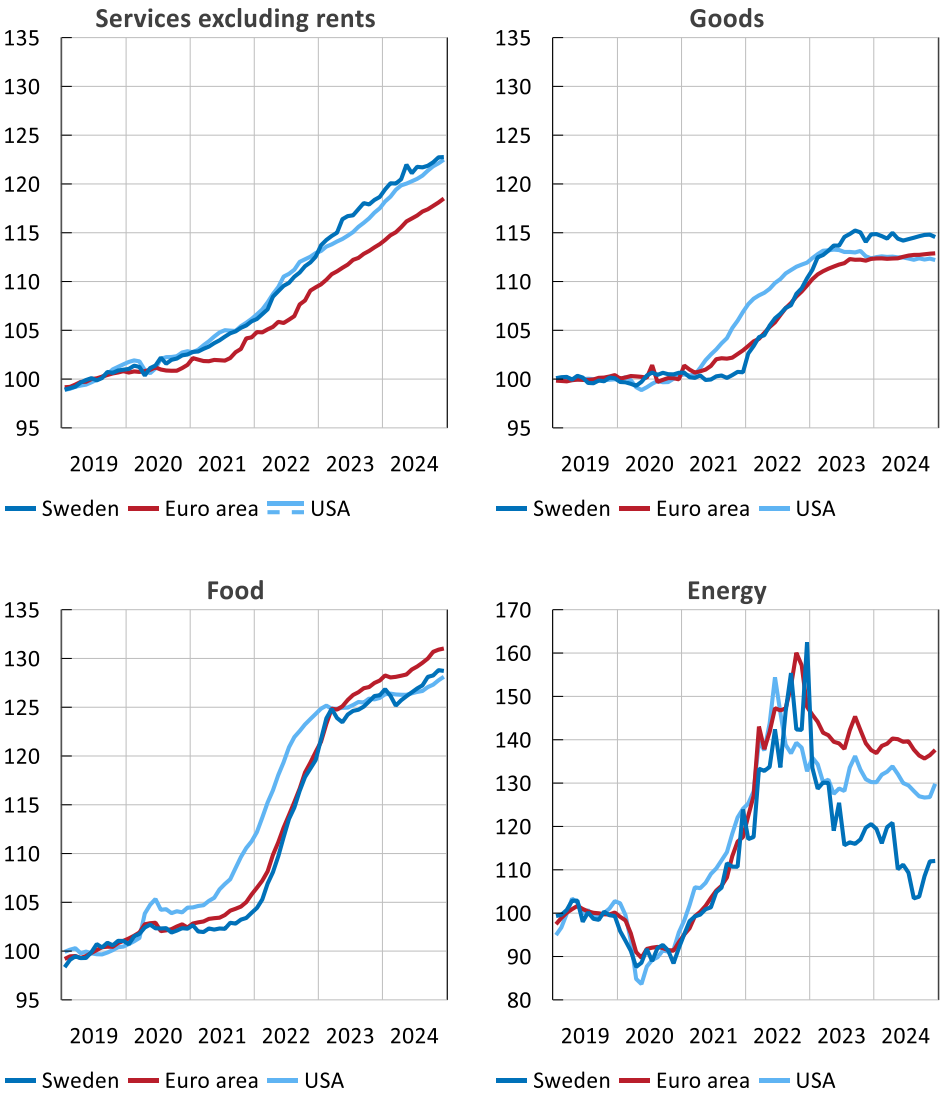
Sources: Statistics Sweden, Eurostat and the US Bureau of Labor Statistics.

What can be noted is that the price increase started a little earlier in the United States than it did in Europe, but that the development has been broadly similar. The fact that inflation started rising a little earlier in the United States has several explanations. One is that there are relatively large differences in the goods and services included in the index calculations and also in their weighting. In the United States, prices of used cars contributed to the initial increase. This is because used cars have a greater weight in the US index than in Europe and price increase there was greater in 2021. Excluding this component, the increase in inflation in the United States leads that in Europe by around three months.

(2022), Johansson and Tysklind (2024), Klein et al. (2024a and 2024b), Lindskog and Lovéus (2023), Löf and Stockhammar (2024), Petterson et al. (2024) and Tysklind (2024).

To enhance the comparability, we also look at measures where some of the weight differences and effects from index construction are smaller. One way to do this is to look at developments in different sub-aggregates. Figure 4 shows the price development of services excluding rents, goods, food and energy for the same regions.[2] Rents are excluded because they represent a large share of service prices – especially in the United States – and because rent setting works differently in different regions. Therefore, they are not deemed to reflect the underlying and comparable service price developments.

Figure 4. Index development for different sub-aggregates 2019- 2024
Index 2019 =100



Note. The figure refers to the CPIF for Sweden, the HICP for the euro area and the CPI for the United States.

Sources: Statistics Sweden, Eurostat and the US Bureau of Labor Statistics.

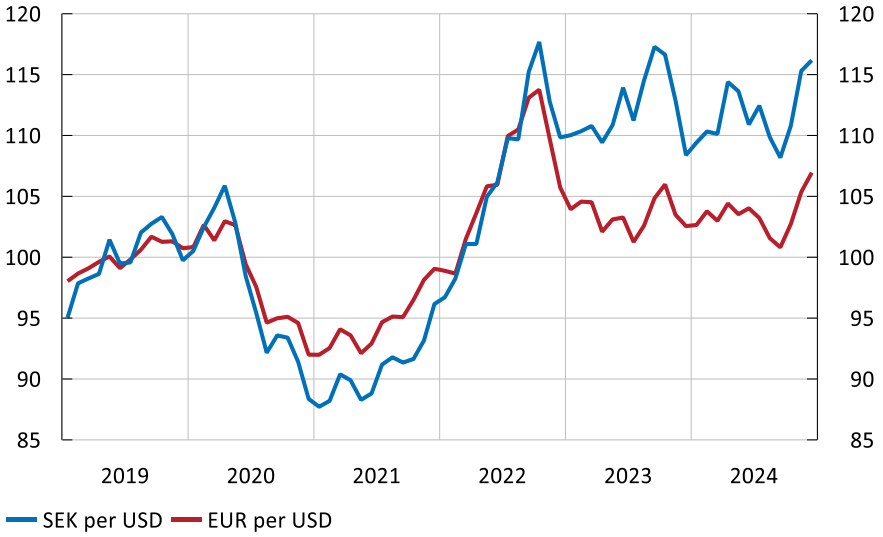
[2] The data In Figure 4 are not trend-corrected as in Figure 2. Therefore, the figures for Sweden differ between Figure 2 and Figure 4.

Even at the sub-index level, the price increases are similar. The main differences are that service prices rose a little later and a little less in the euro area and goods and food prices rose a little earlier in the United States. The rise in consumer energy prices was highly synchronised, but prices have since fallen back relatively quickly in Sweden compared with the United States and even more so compared with the euro area.

One explanation for the earlier rise in goods and food prices in the United States could be the weakening of the US dollar in 2020. Figure 5 shows the development of the exchange rate between the US dollar and the Swedish krona and the euro. A higher value implies a stronger US dollar. It can be seen that the dollar weakened relatively significantly in 2020 and 2021, which had a dampening effect on price developments in Sweden and the euro area relative to the United States. However, at the beginning of 2022, the dollar started to strengthen strongly in connection with Russia's invasion of Ukraine, while the Swedish krona in particular was relatively weak. The krona remains on a relatively weak level, which may have contributed to the fact that the overall increase in goods prices has been somewhat greater in Sweden than in other regions during the period.

Figure 5. Nominal exchange rate against the USD 2019 – 2024

Index 2019 =100



Note. The figure shows the development of the Swedish krona and the euro, respectively, against the USD. A higher value implies a stronger USD.

Source: Macrobond.

Nevertheless, overall, price developments are very similar in all three regions, and national factors such as the exchange rate and domestic wage developments seem to have played only a marginal role.

3 Why did inflation rise?

Given the similarity of inflation developments across the regions, it is reasonable to assume that inflation in these countries has been driven to a large extent by the same

global factors or at least similar forces. Looking back over the past few years, there have also been a number of major global events, the most notable being the coronavirus pandemic and Russia's invasion of Ukraine. In this section, we will focus on developments in Sweden, but the explanations presented largely apply globally as well.

3.1 Demand rose rapidly across sectors

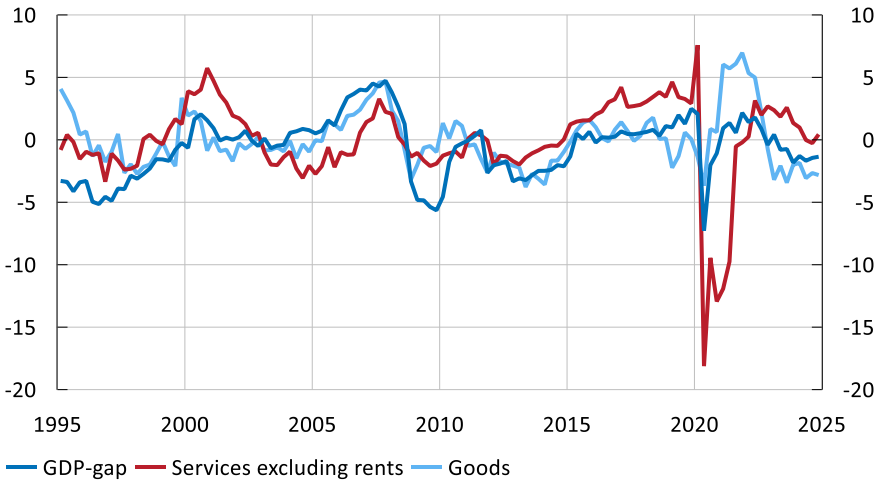
Aggregate demand, measured for example by the Riksbank's GDP gap, was at a high, but not exceptionally high, level when inflation picked up.[3] This could be interpreted as suggesting that demand was not a major factor behind the rise in inflation, as the GDP gap has been at higher levels in the past without inflation picking up (see Figure 6). However, what is not reflected in aggregate measures of demand is that there were large shifts in demand for goods across sectors during and after the pandemic. During the pandemic, demand was sustained by monetary and fiscal stimulus, while the restrictions imposed held back the consumption of services. Demand therefore shifted from services to goods during the pandemic. Once the pandemic was over and restrictions were lifted, demand for services increased rapidly.

One way to illustrate these developments is to construct measures of demand for different types of consumption. In Figure 6, the Riksbank's aggregate GDP gap is shown together with consumption broken down into goods and services, expressed as a percentage deviation from an estimated trend. These figures show, for example, that the demand for goods at the beginning of 2021 was at the highest level recorded during the inflation targeting period and that the demand for services was high in 2022. This demonstrates that although total demand as measured by the GDP gap has not been remarkably high over the period, it has periodically been so in different parts of the economy. What is also evident is that consumption fluctuated very strongly at the sectoral level over the period. This pattern is not seen just in Sweden, but in many other countries as well.

[3] The GDP gap describes the evolution of GDP relative to an estimated trend level.

Figure 6. GDP and consumption gaps 1995 - 2024

Deviation from trend, per cent



Note. The GDP gap is the Riksbank's estimated gap. Gaps for goods, services refer to the percentage deviation from the HP trend of seasonally adjusted data at constant prices as shown in the national accounts.

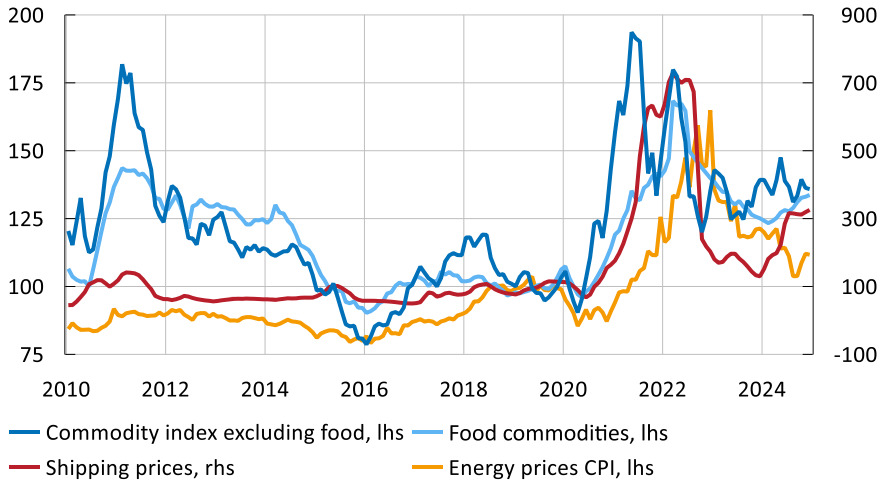
Sources: Statistics Sweden and the Riksbank.

3.2 Increases in commodity prices and labour costs

Other important factors behind the consumer price increases were rising commodity prices and labour costs. Figure 7 shows developments in prices of energy, other commodities and freight on the world market from 2010 onwards. It shows that the prices of industrial commodities began to rise sharply as early as the beginning of 2020. Towards the end of 2020 and the beginning of 2021, freight and food commodity prices also started to rise sharply. Finally, energy prices for end consumers also picked up significantly towards the end of 2021. This increase was mainly driven by a relatively strong rebound in the price of natural gas, but also by the recovery of oil prices after a sharp decline at the start of the pandemic. At the same time, electricity prices in Sweden rose due to abnormally low levels in Nordic water reservoirs and little wind. Forward pricing at the beginning of 2022 pointed clearly to falling prices for almost all energy types (see Figure 8). In other words, the market at the time judged the energy boom to be temporary.[4]

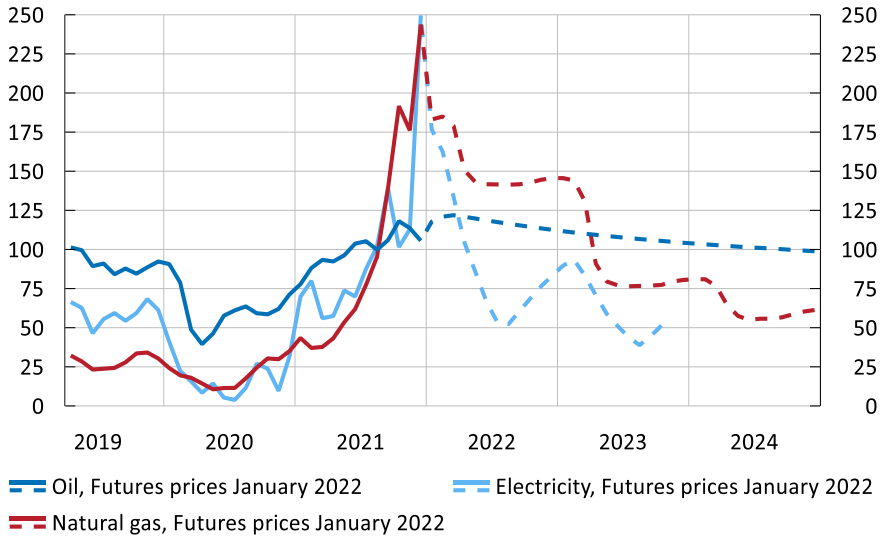
[4] For a longer discussion of how this was assumed to affect other prices, see Sveriges Riksbank (2022a).

Figure 7. Energy and commodity prices on the world market 2019 - 2024
Index 2019 =100



Sources: ICE, The Economist and Baltic dry.

Figure 8. Energy prices 2019 – 2021, forward prices as of January 2022
Index 2021=100

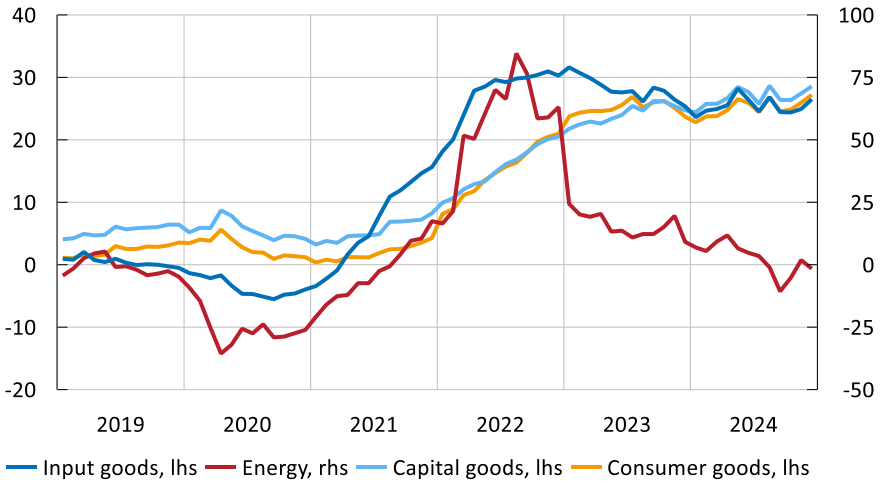


Sources: ICE and Nordpool.

Changes in commodity prices have a limited direct impact on consumer prices. The biggest impact instead comes from the fact that commodities are used as input in production. Hence, in Figure 9 we show the development of producer prices in Sweden relative to trend between 2000 and 2020. We can see that producer prices for intermediate goods started to rise significantly faster than before as early as the beginning of 2021, almost a year before the prices of consumer goods and capital goods aggregates started to rise significantly faster. Energy prices also rose in 2021, but from relatively low levels. Only towards the end of 2021 and especially in 2022 did the energy price level start to become clearly above its historical trend. Energy prices then fell back relatively quickly already in 2023, while the other sub-indices remained at the new elevated level.

Figure 9. Producer prices 2019 -2024

Deviation from historical trend in per cent



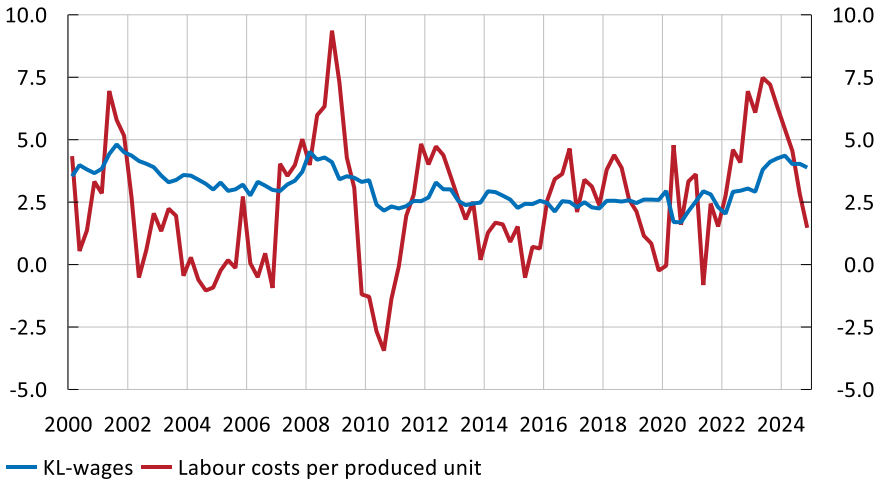
Note. The figure refers to the price index for domestic supply. The trend is estimated as an exponential trend over the period 2000–2020 and then projected at the same rate of increase for the years 2021 onwards.

Sources: Statistics Sweden and own calculations.

Figure 10 shows how wages and labour costs have developed. There, we can see that unit labour costs started to rise faster in 2022, mainly driven by a fall in productivity when output fell more than the number of hours worked. Wage growth remained subdued in 2022 before new, higher wage agreements were negotiated from 2023. Wage growth in Sweden was also lower than in many other European countries in 2022 and 2023.

Figure 10. Wages and unit labour costs 2000 - 2024

Annual percentage change



Note. Unit labour costs are intended to measure labour costs adjusted for productivity and are calculated using national accounts data as total labour costs divided by GDP.

Sources: Statistics Sweden, the Swedish National Mediation Office and the Riksbank.

Overall, we thus see that firms' costs increased broadly in 2021 and 2022, with both input and labour prices rising unusually fast.

3.3 Both supply and demand contributed to the upturn in inflation

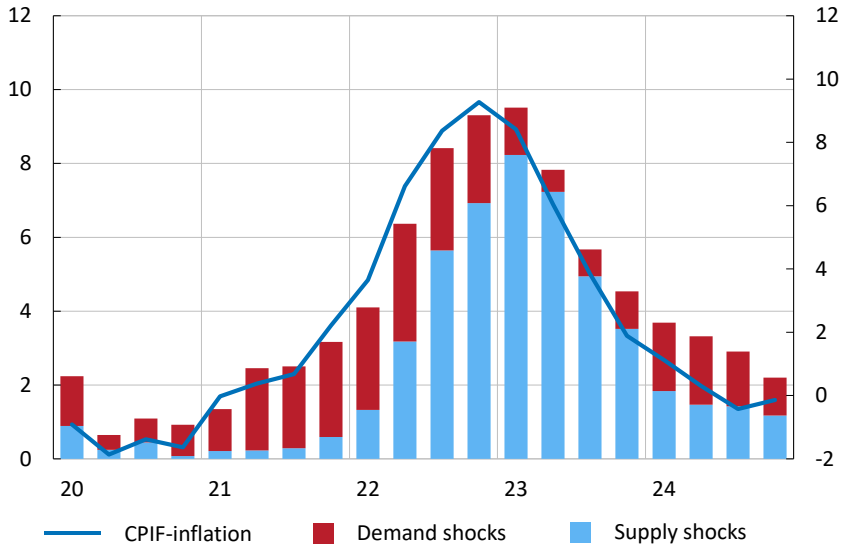
In Sweden as well as internationally, economists have discussed what primarily drove the rise in inflation: supply or demand. The reason for this is that the underlying driving forces can have a major impact on the design of monetary policy.

A number of studies have used different modelling approaches to decompose the rise in inflation into supply and demand factors. Löf and Stockhammar (2024) estimate a few different models that have been used internationally on Swedish data. In this section, we present updated results from them, supplemented with new analyses.[5]

We build on previous work by Shapiro (2024) to estimate simple VAR models for 75 different consumption sub-aggregates. Based on these estimates, we then group the price movements of the different sub-indices in each period as either demand or supply driven. In Figure 11 these estimates have been updated to include 2024. We can see that the implications from the analysis conducted by Löf and Stockhammar in 2024 are still valid suggesting that supply shocks dominated during the period when inflation was at its highest, but that demand have had a non-negligible role. As inflation fell back, this analysis suggests that it is mainly supply-side shocks that have subsided.

Figure 11. Decomposition into supply- versus demand-driven inflation, based on Shapiro (2024)

Annual percentage change



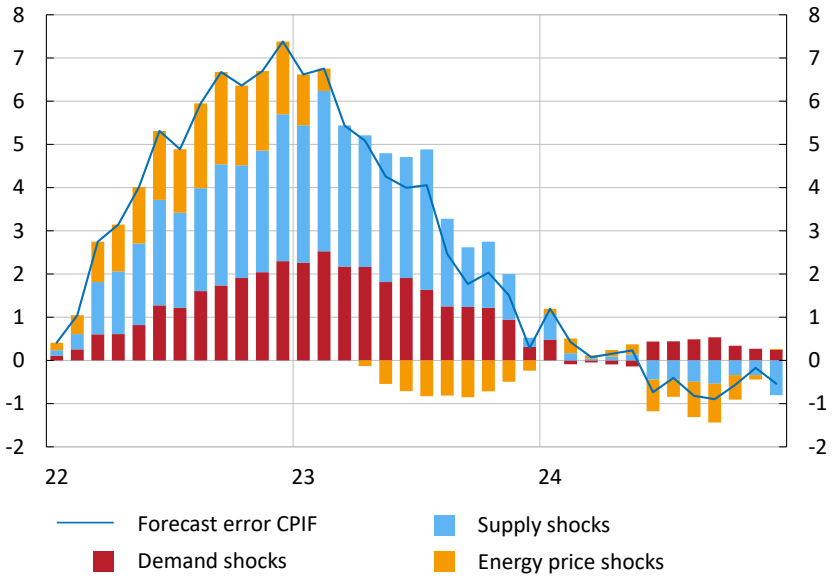
Source: The Riksbank.

[5] See the Appendix for short descriptions of the models.

The model above is very simple but can still give some indication of the inflation drivers. A slightly more developed approach is based on a model by Ascari et al. (2023), which uses a small structural VAR model with sign restrictions to identify exogenous shocks to demand, supply and energy. Based on that, it is possible to calculate how much these shocks have contributed to the development of inflation.

Figure 12 shows the results of a breakdown of the forecast errors for CPIF inflation up to 2024. In this model, too, the supply effects are greatest, but here the demand element is somewhat greater. In 2024, easing supply problems and lower energy prices contributed to CPIF inflation being slightly below 2 per cent. One disadvantage of this model is that it does not take into account the fact that Sweden is a small open economy with high external dependence.

Figure 12. Decomposition of CPIF inflation, based on Ascari et al. (2023)
Percentage points of annual percentage change



Note. Model forecast errors are used to isolate the role of supply and demand factors. The line shows the forecasting error for CPIF inflation defined as outcome minus forecast. A positive forecasting error thus implies an underestimation of the outcome and vice versa.

Source: The Riksbank.

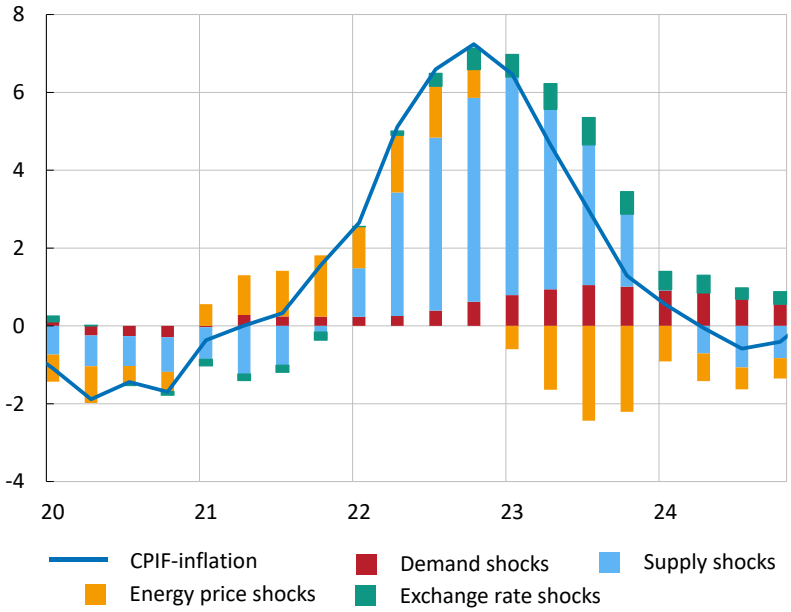
However, the Riksbank's general equilibrium model MAJA has this dimension inbuilt (see Corbo and Strid 2020). If, like Löf and Stockhammar (2024), we allow MAJA to interpret which shocks drove the rise in inflation, it indicates that it was mainly supply shocks that drove up inflation (see Figure 13).[6] In addition to productivity shocks, this group of shocks also includes price mark-ups.[7] This means that firms raised prices more than usual in relation to their costs and that this contributed to the rise in inflation. In 2022 and 2023 demand was also higher than expected, contributing to the underestimation of inflation, but this effect is much smaller than the supply shocks. In

[6] By supply shocks, we mean shocks that affect GDP and inflation in different directions.

[7] This may be more linked to corporate behaviour as discussed in the next section.

2022, higher energy prices also contributed to the upturn, an effect that faded in 2023, when the contribution was instead negative. However, this only captures the direct contribution of energy to the CPIF and not the indirect effects that may be present.

Figure 13. Decomposition of the deviation of CPIF inflation from 2 per cent in MAJA
Percentage points



Note. The CPIF is expressed as the difference against 2 per cent. Others show contributions to this difference.

Source: The Riksbank.

An important aspect of the inflation upswing that is not really captured in any of the previous models is the impact of supply chain disruptions on inflation. However, this mechanism is included in the Bernanke and Blanchard (2023) model. Here we estimate their model using Swedish data. According to our results, there were initially large contributions from increases in energy and food prices that lifted CPIF inflation (see Figure 14). When they started to fade away, they were partly replaced by relatively large contributions from a variable used to capture disturbances in global value chains.[8] These disruptions may be partly due to supply-related problems, such as the closure of factories and ports during parts of the coronavirus pandemic, but also to the occasionally very high and especially volatile demand for goods. It can also be noted that the contributions from high energy prices to inflation measured as the CPIF excluding energy are small. This model thus also indicates that the high energy prices had relatively small indirect effects on the price increases of other products.[9]

[8] Disruptions to global value chains are measured here using the 'Global supply chain pressure index' from the Federal Reserve Bank of New York.

[9] These results are relatively similar to applications to many other countries. See, for example, Bernanke and Blanchard (2024) for a comparison.

Figure 14. Decomposition based on Bernanke and Blanchard (2023)
CPIF (left), CPIFxe (right), seasonally adjusted quarterly rate annualised

Note. The bars show the overall inflation rate.

Source: The Riksbank.

To summarise, the empirical studies suggest that the results differ somewhat depending on the approach used, the way data are processed and the precise definition of supply and demand factors. But the overall picture is that it was a combination of many and large shocks to both supply and demand that caused inflation to rise as it did. However, it is difficult to measure with any great precision which explanatory factor was the most important and the results should therefore be interpreted with caution.[10]

3.4 What role has firms' behaviour played?

Another aspect that has been much discussed during the period of high inflation concerns the pricing behaviour of firms, i.e. whether, for example, they raised prices more and faster than normal in relation to their cost changes. There are studies indicating that firms pass on more of their increased costs to consumer prices when inflation and demand are high (see, for example, Borio et al. 2023, De Abreu Lourenco and Lowe 1994 and Harding et al. 2023). Thus, there appear to be non-linearities in how firms set their prices in relation to costs. If costs increase slightly and are not expected to remain at the higher level, firms tend to let some of the increase be absorbed by their margins. But if costs increase sufficiently, firms will be forced to change their prices (see discussion in Sveriges Riksbank 2024).

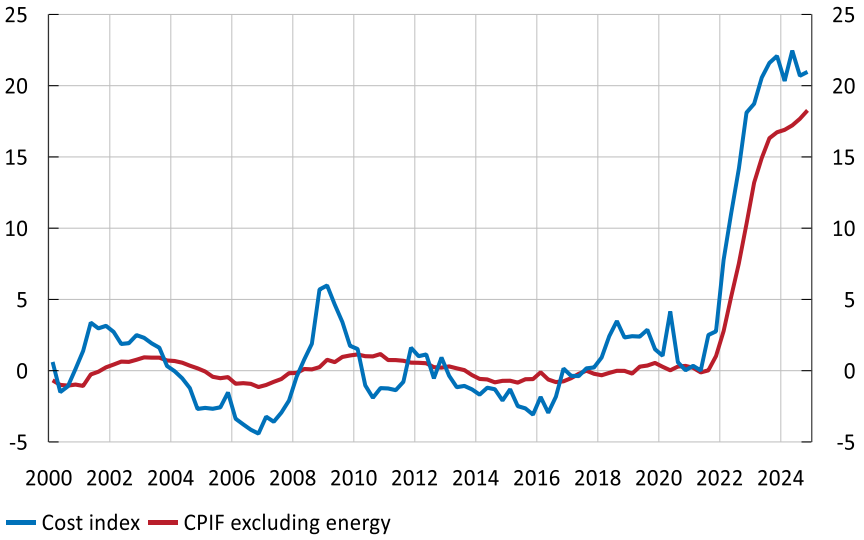
A study by the National Institute of Economic Research (2023) showed that Swedish firms, on average, raised their prices in line with how their costs rose in the period from 2019 to the second quarter of 2023. Historically firms have tended to even out price changes and allow part of their cost changes to be absorbed by profit margins,

[10] For example, there are studies on the euro area that indicate that the overall contribution of high energy prices in 2022 had a slightly larger contribution to the price increase. See, for example, Banbura et al. (2024).

but this did not occur during the period of rising inflation in 2022 and 2023.[11] This indicates that this part of companies' price-setting behaviour changed during the period of high inflation.

Figure 15. Developments in prices and firms' costs since 2000

Index development, deviation from historical trend, per cent



Note. The cost index is calculated as 0.05 * energy prices + 0.65 * unit labour costs + 0.3 * IMPI, consumer goods. The IMPI, consumer goods, is an index of import price developments, i.e. what importers are paid for their goods. The trend is estimated as an exponential trend over the period 2000–2020 and then projected at the same rate of increase for the years 2022 onwards.

Sources: Statistics Sweden and the Riksbank.

An illustration of this is shown in Figure 15. In the figure, we compare the CPIF excluding energy with a rough measure of firms' costs.[12] We then see that costs tend to vary significantly more than the CPIF excluding energy. However, in 2022 and 2023, the CPIF excluding energy increased at about the same rate as costs, in line with the conclusions of the NIER study.[13]

Two studies by Klein et al. (2024a and 2024b), from one of the Riksbank's research projects, examine how often and how much the prices of the products included in the CPI change. The results show that it is primarily the frequency of price changes that correlates with the rate of inflation – not their size.[14] This was evident in 2022 and 2023, when inflation was high. At that time, companies increased their prices much

[11] Motives for firms to smooth their price changes may be, for example, to maintain market share and/or to recognise the temporary nature of cost changes.

[12] This is a simplified measure to roughly describe the cost development of companies and does not intend to fully reflect all costs that a company has.

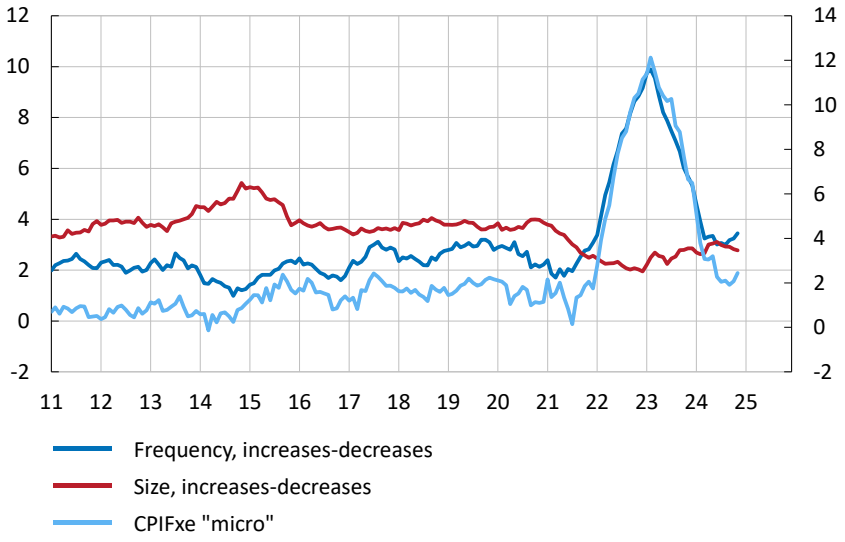
[13] The cost index is calculated as 0.05 * energy prices + 0.65 * unit labour costs + 0.3 * IMPI, consumer goods. The weights are set on the basis that about 30 per cent of private consumption consists of imports. See Table A2 in Hansson and Johansson (2007) for estimates of import content. See also the discussion in Lindskog and Lovéus (2023) and Sveriges Riksbank (2024).

[14] The same conclusion is drawn in studies by the Federal Reserve and the Bank of Canada. See Montag and Villar (2023) and Bilyk et al. (2024).

more frequently than before, while the average size of price changes did not change much (see Figure 16). It is not possible to say why from this analysis, but one contributing factor should be that companies feel they need to change their prices more frequently when their cost increases are large, and that the pass-through of costs is then both greater and faster than normal.

Figure 16. Frequency and size of price changes

Annual percentage change (CPIFxe), percentage points (others)



Note. Frequency and magnitude are expressed as the difference in the frequency of price increases and price decreases and the difference in the absolute magnitude of price increases and price decreases. In the CPIFxe 'micro', some individual components not included in the micro data have been excluded from the CPIF excluding energy.

Sources: Statistics Sweden and Klein et al. (2024a and 2024b).

As inflation has fallen, companies have also started to change their prices less frequently. This indicates that overall pricing behaviour is now more in line with what it was before the period of high inflation. The same conclusion is drawn from the Riksbank's own business surveys. Early in 2022, firms responding to the survey stated that they were adjusting prices more frequently than usual and that it was easier than usual to gain acceptance from customers for increased prices (see, for instance, Sveriges Riksbank 2022).

A related discussion to that of firms reacting more quickly to cost changes is whether the slope of the Phillips curve has changed in recent years. The Phillips curve is an analytical tool often used to describe the relationship between resource utilisation in the economy and inflation.[15] This relationship tends to be positive, i.e. high resource utilisation coincides with high inflation. In the period before inflation rose in 2021 and 2022, many economists believed that the Phillips curve was flat, i.e. that the relationship between resource utilisation and inflation was weak (see, for example, Del Negro et al. 2020, Inoue et al. 2024, From 2019, and Jonsson and Theobald 2019).

[15] The original Phillips curve, introduced by economist A.W. Phillips, described the relationship between unemployment and wages.

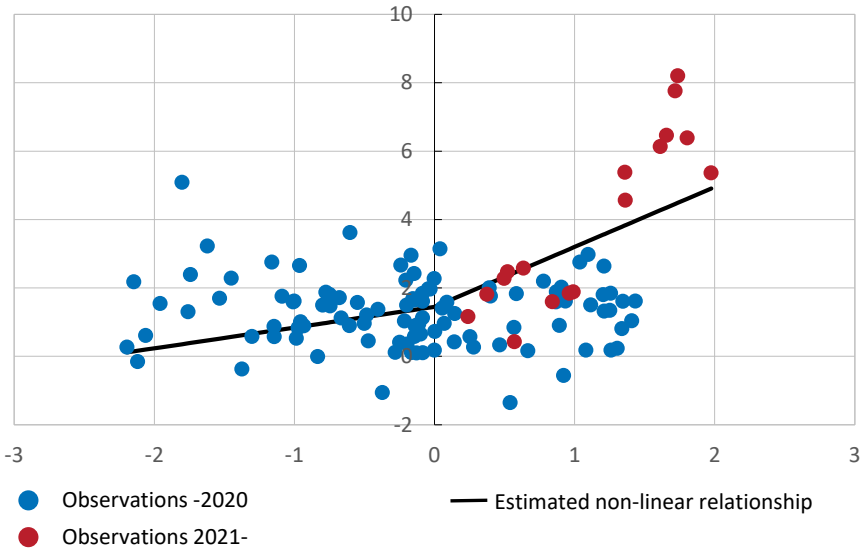
This view was based on the fact that inflation was low despite relatively strong resource utilisation (RU).

More recently, however, a number of studies have suggested that the slope of the Phillips curve has become steeper or that we have been on a steeper part of a non-linear Phillips curve during the period of high inflation (see, for example, IMF 2024, Levy 2024, Hobijn et al. 2023, Harding et al. 2023, and Benigno and Eggertsson 2023). For example, Benigno and Eggertsson (2023) point out the importance of considering non-linearities when estimating the Phillips curve, as changes in the amount of unutilised resources in the economy are likely to affect inflation differently depending on where in the business cycle one is. This can have important implications for monetary policy decisions, since a steep Phillips curve implies an easier trade-off between inflation and real economic developments.

We have estimated the model in Benigno and Eggertsson (2023) on Swedish data. This means that we start from the New Keynesian Phillips curve and use a measure of labour market tightness - the number of vacancies divided by the number of unemployed - as a proxy for the amount of slack. Figure 17 shows the combinations of outcomes for CPIF inflation excluding energy and food and the measure of labour market tightness together with the estimated non-linear relationship between them.

Figure 17. Scatterplot of labour market tightness and CPIF excluding energy 2000 - 2024

Annual percentage change of CPIFxe (vertical axis) and ratio of vacancies to unemployed (horizontal axis)



Note. The estimated relationship is based on the model from Benigno and Eggertsson (2023). The chart is drawn with data at quarterly frequency from 2000 until 2024. Red dots show the relationship from 2021 onwards and blue dots from 2000 to 2020.

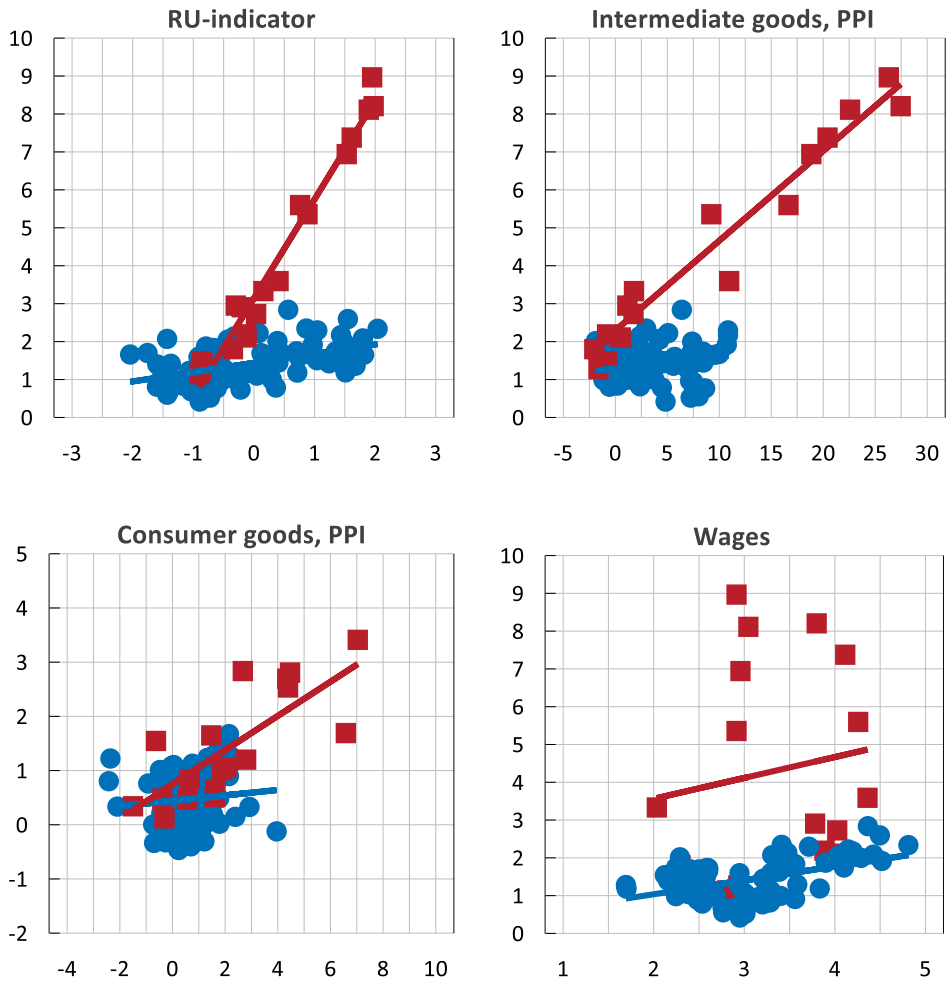
Sources: Statistics Sweden and the Riksbank.

The estimates here suggest that there is a non-linear relationship in Sweden as well, which could explain a relatively large part of the rise in inflation. However, the results are driven entirely by the observations during the high-inflation period, which may be

an indication that there is rather something specific about this period that drives the results.

Looking at the relationship between inflation and other factors that may be important for inflation, we can see that they also appear to have changed dramatically over this period (see Figure 18). In the diagram, we have plotted the relationship between the annual percentage change in the CPIF excluding energy and a number of other variables, both for the period up to 2020 and for the period from 2021 onwards. This suggests that this non-linearity is not necessarily driven primarily by the level of labour tightness. Instead, it seems to be more dependent on time or the economic situation more generally. An alternative explanatory model, which is suggested by, for instance, Karadi et al. (2024), points out that it is the fact that the economy has been subjected to such large shocks and that companies have reset their prices more often than before that explain the change in the slope of the correlation, and not a non-linear correlation in itself. One notable exception is that the relationship between wages and inflation has continued to be weak, which is also an indication that it is not via a tight labour market that inflation gained momentum in Sweden.

Figure 18. The correlation between CPIFxe and a number of determinants
RU indicator in standard deviations, others in annual percentage change



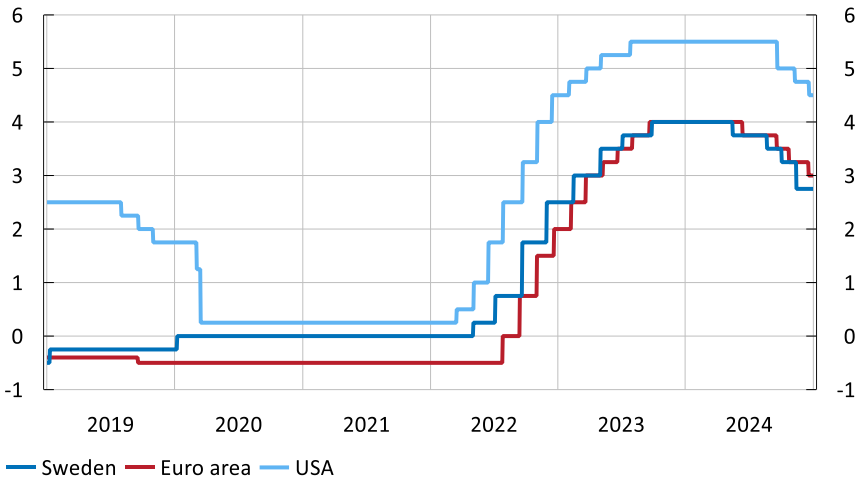
Note. Blue line and dots show the relationship between 2000 and 2020, red lines and dots show the relationship from 2021 onwards.

Sources: Statistics Sweden and The Riksbank.

3.5 The policy rate was raised, and then lowered as inflation fell back

Like many other central banks, the Riksbank started to raise the policy rate in early 2022. The first increase was followed by several more. The highest level was reached in September 2023 at 4 per cent, which was maintained until May 2024 (see Figure 19). The Riksbank then began to cut the interest rate as they saw an increasing number of signs that monetary policy was having an effect and that inflation was beginning to stabilise close to the inflation target.

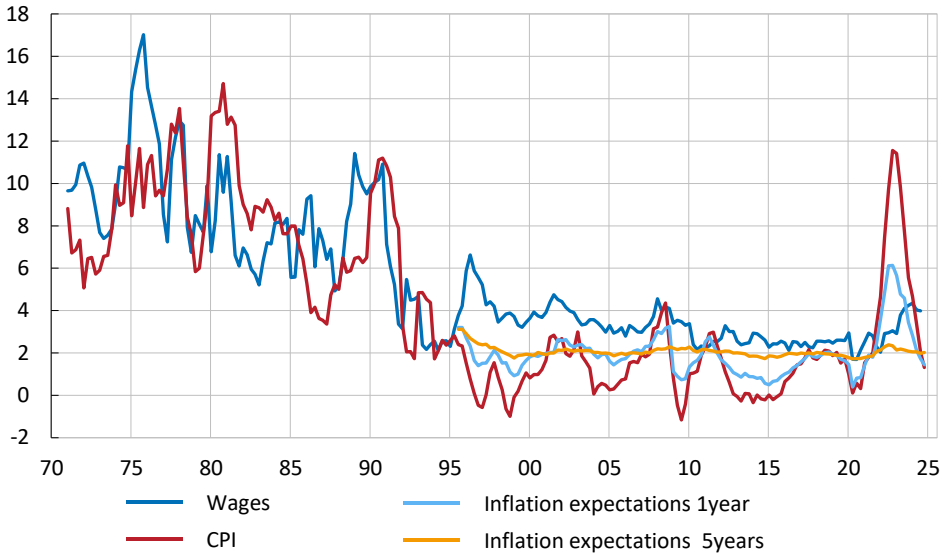
Figure 19. Policy rates in Sweden, the euro area and the United States 2019 - 2024
Per cent



Sources: The Riksbank, ECB, and Federal Reserve.

Long-term inflation expectations remained stable even during the period of high inflation, signalling that confidence in the inflation target remains high. Another sign of this is that wage agreements, negotiated at the peak of measured inflation in early 2023, were based on the inflation target and set at a level consistent with it (see Figure 20).

Figure 20. Wages, inflation and inflation expectations since 1970
Annual percentage change



Sources: Statistics Sweden, the National Mediation Office and TNS Sifo Prospera/Origo group.

Thus, tighter monetary policy and the fading of the impact of various shocks contributed to the decline in inflation.

4 Could the rise in inflation have been foreseen?

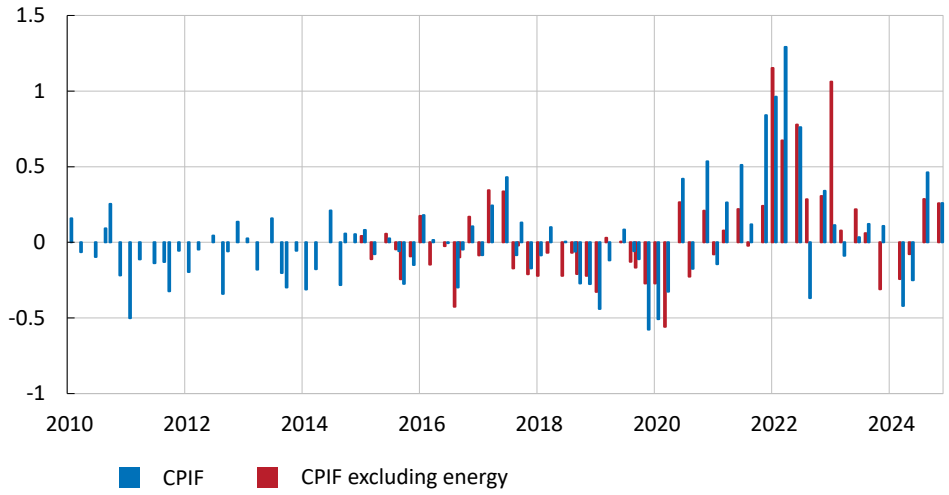
So far, we have tried to explain why inflation rose as quickly as it did based on the data we have today. Instead, in this section we try to look more closely at what information was available before inflation started to rise, and whether it could have been used to better predict what would happen next.

4.1 The Riksbank's forecasting errors

Figure 21 shows the forecasting errors in the Riksbank's published short-term forecasts since 2010. In normal times, there should be no bias in the forecasting errors and they should vary around zero over time. If there had been a systematic approach, the forecast could have been improved by subtracting or adding a constant factor. This would have been a clear indication that there was something in the inflation process that was not captured in the Riksbank's forecasting methods.

Figure 21. Average forecast errors 2010 – 2024

Percentage points



Note. The average forecasting errors refer to outcome minus forecast at the 1 to 3 month horizon and relate to published forecasts of annual percentage changes in the respective measures from Monetary Policy Reports.

Source: The Riksbank.

There was some tendency for CPIF inflation to start surprising on the upside as early as 2020. This was partly due to slightly higher-than-expected energy prices. The forecasting errors for the CPIF excluding energy varied around 0 in 2020 and 2021.

From the beginning of 2022, forecast errors became large and positive, i.e. inflation outcomes were higher than projected. The forecasting errors for the CPIF excluding energy were positive for each forecast from early 2022 to mid-2023. This suggests that the Riksbank's forecasting methods did not fully capture what happened to inflation during that period. As of the end of 2023, there no longer appears to be a systematic pattern of forecast errors.

4.2 An aggregated picture of several indicators could have given a clue

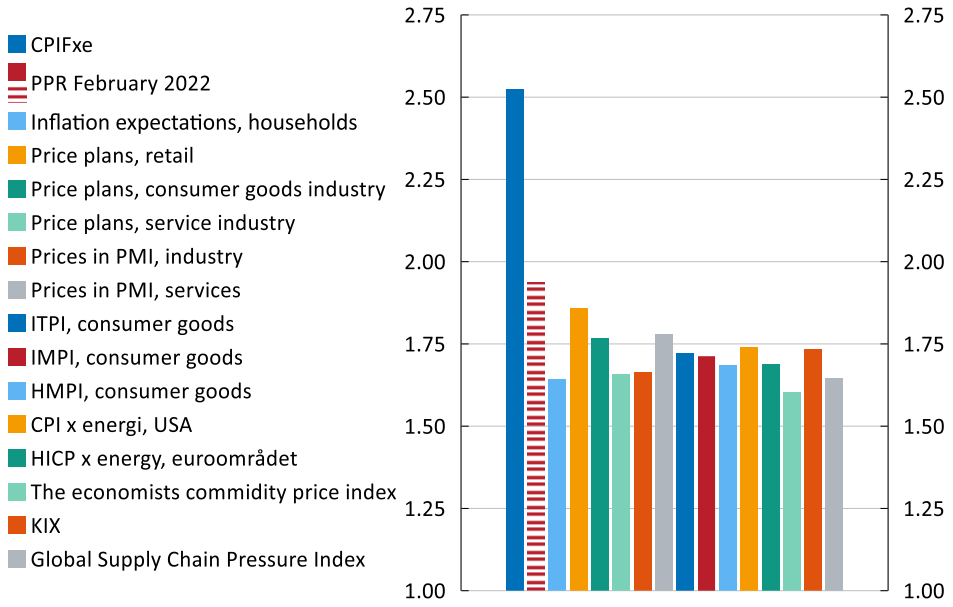
The Riksbank, like all other forecasters, thus underestimated the strength of the upturn in inflation in 2022 (see, for example, Håkanson and Laséen 2024 where a comparison is made between forecast errors made by the Riksbank and other central banks). In this section, we ask whether the rise in inflation could have been anticipated with the information available in late 2021 and early 2022.[16] In the previous section, we showed that the relationship between inflation and the cost and demand situation was different in the period of high inflation. Here we ask whether the relationship between inflation and various indicators of price developments was also different.

In Sweden, the rapid rise in inflation started in January 2022, when the rate of increase in the CPIF excluding energy rose to 2.5 per cent, from 1.7 per cent in December 2021. The rebound was largely unexpected and one of the largest forecast errors during the high-inflation period was made for the January 2022 outcome in the forecast published in the Monetary Policy Report in early February 2022. In the forecast, which was made a couple of weeks before the outcome was published, the rate of increase in the CPIF excluding energy was expected to rise to 1.9 per cent, which means that the Riksbank underestimated developments by 0.6 percentage points. Other forecasters made the same forecasting error. In the compilation of forecasts from other forecasters regularly made by Bloomberg, the average forecast the day before the outcome was also 1.9 per cent (see Figure 4 in Johansson et al. 2022).

Were the Riksbank and other forecasters looking at the wrong variables and the wrong relationships? In Figure 22, we show forecasts for January 2022 made using estimated linear relationships between the CPIF excluding energy and some common indicators. The projections are made using data available at the beginning of February 2022 and the estimated historical relationships between the CPIF excluding energy and each indicator. We then compare them with outcomes and the Riksbank's published forecast. It is clear from the figure that no single indicator model suggested that inflation would rise as fast as it did.

[16] Johansson et al. (2022) showed that the rise in inflation could not be explained by developments in the producer price index and unit labour costs, which normally together tend to explain developments in inflation quite well. In other words, the forecasting errors for inflation are due, at least in part, to the fact that firms appear to have been able to increase their margins by raising consumer prices to a greater extent than they usually do when demand was high. This is in line with the conclusions of the NIER study.

Figure 22. Outcomes and forecasts for the CPIF excluding energy for January 2022
Annual percentage change



Note. The figure shows forecasts from bivariate models together with outcomes. All models are estimated with the annual percentage change in the CPIF excluding energy as the dependent variable. The explanatory variables are a constant, the first lag of the CPIF excluding energy, and the first to fourth lags of the outcome in each indicator. Price index expressed as annual percentage change. The models are estimated from January 2000 to December 2021.

Sources: Statistics Sweden, the Riksbank and the respective institutions.

This is not particularly surprising, as the models are estimated on historical data that do not include any episode of large changes in inflation. The historically normal relationship between the indicators in Figure 22 and the inflation rate has been weak. However, if we instead look at the level of the indicators in the outcomes available in February 2022, we see that, in many cases, they were at levels two to three standard deviations higher than normal (see Figure 23). And this is roughly consistent with a rate of increase in the CPIF excluding energy of around 2.5 per cent, which would turn out to be the outcome in January 2022. Thus, if, instead of relying on historical correlations, we had looked at the level of the indicators, we could have better predicted the rise in inflation. However, this strategy has not produced good forecasts on average over longer periods, as it would have meant overreacting to changes in indicators in normal times.

Figure 23. The CPIF excluding energy in February 2022 and indicators of price developments available at the beginning of February 2022

Standardised values, standard deviations.

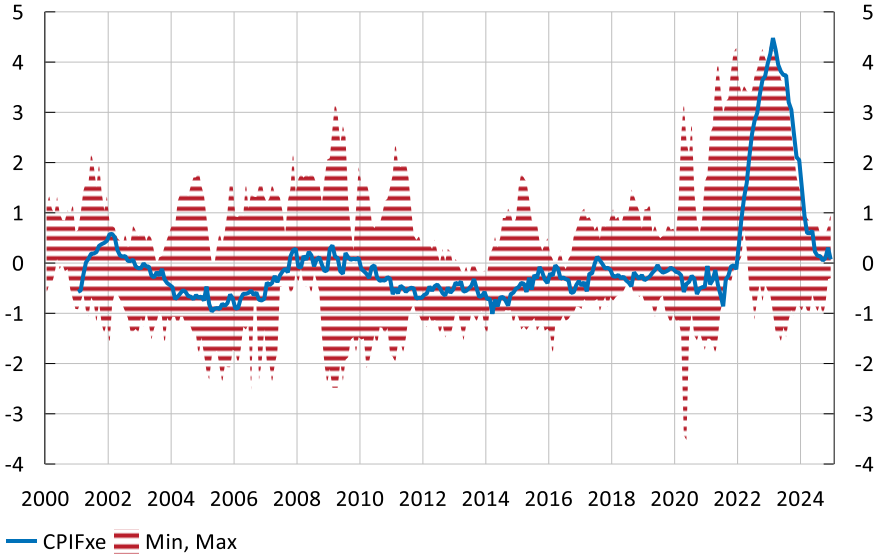
Note. The standardisation is done for the period 2000 to 2021.

Sources: National Institute of Economic Research, Swedbank, Statistics Sweden, Federal Reserve and the Riksbank.

In Figure 24, the standardised indicators have been collected in one field and plotted over time together with the CPIF excluding energy. It can then be noted that the field is usually relatively symmetrical, with some indicators slightly above their mean value and some below, while inflation measured as the CPIF excluding energy is roughly in the middle of the band. However, during 2021 it looks a little different. At that time, most indicators started to rise well above their historical averages, while there was virtually no indicator that was below. Moreover, a number of indicators were more than three standard deviations away from their historical average. Another way to look at it is to look at how many indicators are at a certain number of standard deviations from their average. We do this in Figure 25, which shows the indicators until December 2021. Even in real time, a large share of the indicators was at historically high levels. Almost 60 per cent of the indicators were more than two standard deviations above their mean and almost 50 per cent of them were as much as three standard deviations above their mean. This is markedly different from previous periods in the 2000s and indicated that something different was happening.

Figure 24. The CPIF excluding energy and indicators

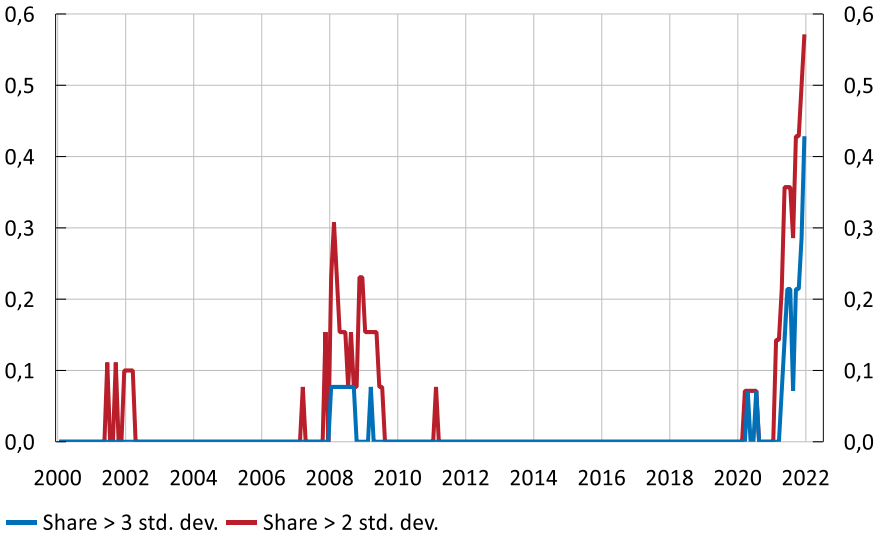
Annual percentage change, net figures and index. Standardised values



Note. Standardised values from 2000 onwards. The red band shows the highest and lowest values of the indicators listed in Figure 23. Price index expressed as annual percentage change.

Sources: The Economist, Eurostat, Federal Reserve, NIER, Statistics Sweden, Swedbank, US Bureau of Labor Statistics and the Riksbank.

Figure 25. The proportion of indicators higher than 2 or 3 standard deviations



Source: Statistics Sweden, National Institute of Economic Research, Swedbank and own calculations

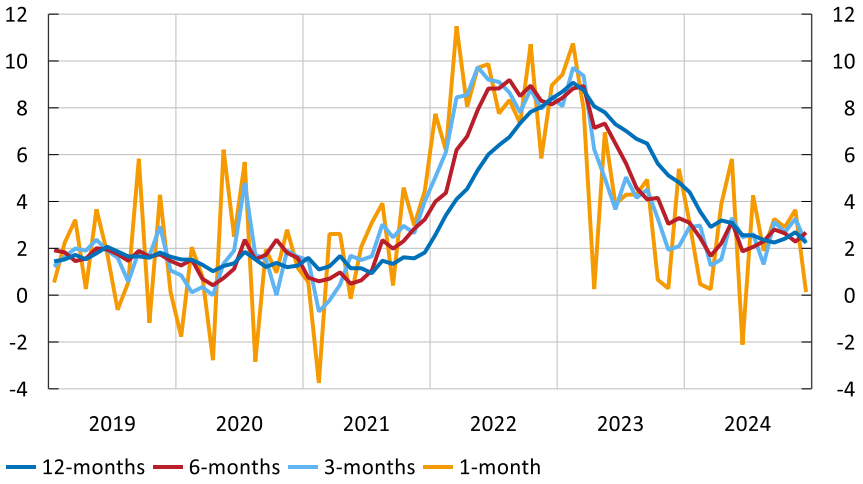
4.2.1 High-frequency measurements

In light of the rapid rise in inflation, the Riksbank has focused more on higher frequency measures of price changes than twelve-month changes, such as seasonally adjusted changes over one, three or six months. In Figure 26, it can be seen that more high-frequency measures rose relatively steeply as early as late 2021 and early 2022.

However, seasonally adjusted measures are relatively strongly influenced by data points both before and after the current observation. If we instead look at how the data looked in real time after the outcome for December 2021, as we do in Figure 26, this trend is not visible in the same way. In an earlier study by the Riksbank, the forecasting ability of these measures has been evaluated more formally, and they turn out to have relatively high information value during the period of high inflation, particularly the three-month and six-month measures (see Johansson and Tysklind 2024).

Figure 26. Price changes in the CPIF excluding energy at different frequencies 2019 - 2024

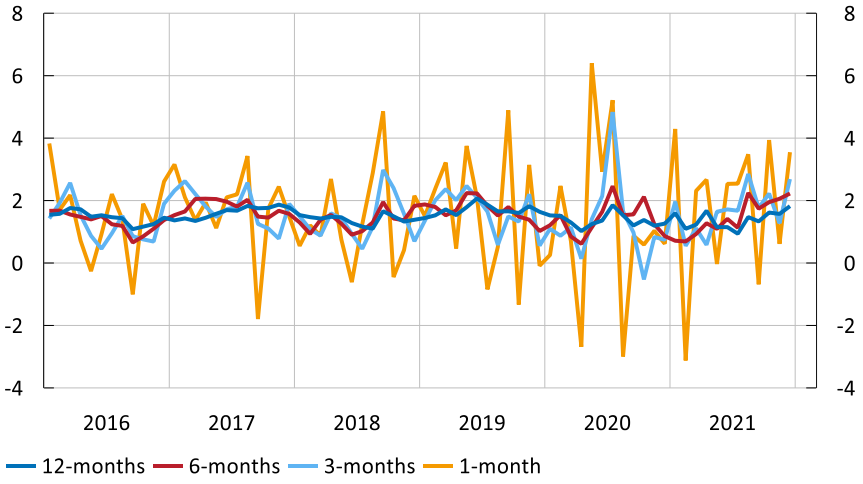
Percentage change, seasonally adjusted and annualised



Sources: Statistics Sweden and the Riksbank.

Figure 27. Price change in the CPIF excluding energy at different frequencies until end of 2021

Percentage change, seasonally adjusted and annualised



Sources: Statistics Sweden and the Riksbank.

5 Conclusions and lessons learnt

It was not possible to predict the pandemic and the economic disruptions that followed in its wake. Nor the war in Ukraine. But it is reasonable to ask whether we as forecasters could have better understood the economic impact of these shocks on inflation and the wider economy using economic models and the data available at the time.

After many years of inflation rates that tended to be slightly below the 2 per cent target, inflation in Sweden rose rapidly and unexpectedly in 2022. The upturn reflected a combination of global supply and demand shocks that created large imbalances in the economy, while firms started to pass on a larger share of their cost increases to consumer prices than before.

Average historical correlations between common indicators and explanatory variables for inflation could therefore not predict more than a small part of the rise in inflation. Many studies have documented that the relationship between inflation and both costs and demand has been different during the period of high inflation compared with what has been normal in the past. Macro models that had been estimated on historical relationships were thus unable to handle these types of very large changes.

Therefore, to predict the next rise in inflation, it is likely that a different type of analysis is needed that can take into account changes in the relationship between inflation and its explanatory variables. Changing relationships appears to be the case during periods of rapidly rising costs and high demand. The challenge will then be to recognise as early as possible that the economy is in a new state, where companies change prices more frequently and more in relation to their costs than is normal. One way forward could be to use forecasting methods based on artificial intelligence and machine learning. This type of modelling is good at capturing non-linear relationships early on and has been shown to make relatively good predictions in evaluations (see Den Reijer et al. 2025).

One lesson here has been that more continuous analyses of high-frequency measures of inflation than the twelve-month figures can provide a clearer insight into where inflation is heading (see Johansson and Tysklind 2024). Another lesson learned for future forecasting work is that it is important to spot early signs that firms are starting to adjust their prices more frequently during periods of major changes in costs and high demand. Indeed, the frequency of price changes has been shown to be more indicative of inflation than their size. One source of such information is the microdata underlying the CPI calculations, where the frequency of price-setting can be observed. These data are used for a research project at the Riksbank, and the results of that project may also be useful for the Riksbank's ongoing analyses. Another source is the Riksbank's own business surveys. For example, firms reported in early 2022 that they were changing prices more frequently than usual, and that it was easier than usual to get customers to accept price increases (see Sveriges Riksbank 2022b).

Other types of new data sources have also been shown to provide timely information. For example, the Riksbank should continue to use online prices for items such as food to detect early signs of rising consumer prices. Since spring 2023, the Riksbank has

subscribed to data from Matpriskollen, which is used as an indicator in the Riksbank's short-term models for forecasting food prices (see Tysklind 2024). It is also important to continue to monitor how companies plan to change their prices in the Economic Tendency Survey and how they view their input costs in the Purchasing Managers' Index.

Forecasters will never be able to predict exogenous shocks. It is also difficult to determine in real time if and when we will enter a different mode or regime of inflation, and this will continue to be the case in the future. Instead, the task will be to constantly improve our understanding of how these shocks propagate through the economy. In this respect, the recent period of inflation has given us a lot of new insights that help us understand inflation and its determinants.

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Appendix

This appendix provides brief descriptions of the models used in section 3.3.

Decomposition of inflation into supply and demand

In this analysis, as in Löf and Stockhammar (2024), we use data from the Swedish national accounts broken down into 75 different categories.

Step 1: We start by calculating price deflators for each consumption area, based on consumption volumes in both constant and current prices.

Step 2: Consumption at constant prices and price indices are then seasonally adjusted.

Step 3: We produce quarterly, seasonally adjusted weights for each consumption category. Then a VAR- model is estimated for each category as follows:

1. $q_t^k = \alpha_1 + \sum_{j=1}^{4} \beta_{qq,j} * q_{t-j}^k + \sum_{j=1}^{4} \beta_{qp,j} * p_{t-j}^k + v_t$
2. $p_t^k = \alpha_2 + \sum_{j=1}^{4} \beta_{pp,j} * p_{t-j}^k + \sum_{j=1}^{4} \beta_{pq,j} * q_{t-j}^k + \varphi_t$

Here q and p represent logarithmised consumption and price indices respectively for category k.

Interpretation of residuals:

- If the product of the residuals in quarter t is negative, $v_t * \varphi_t < 0$, it is interpreted to mean that a supply shock has affected developments.
- If instead the product is positive, $v_t * \varphi_t > 0$, demand factors are assumed to have been the dominant driver.

Step 4: Quarterly percentage changes in price are multiplied by the respective weight of the consumption area. This provides contributions to overall price developments. These contributions are then sorted according to whether they are classed as supply or demand-driven (as described above) and summarised into two aggregated series.

Finally, a four-quarter moving sum of these contributions is calculated, which allows them to be interpreted as contributions to the annual rate of the consumption deflator.

Model by Ascari et al. (2023)

In this section, we use the same model as in Löf and Stockhammar (2024), which in turn is based on a model developed by Ascari et al. (2023), to find out how much of the inflation can be explained by supply, demand and energy price shocks. The model used is a VAR model, estimated using Bayesian methods.

The model contains four key variables: inflation (measured as the monthly percentage change in the CPIF), industrial production (as a measure of how much is produced in

the economy each month), two-year interest rate (overnight index swap) and energy prices (measured as monthly percentage change in the CPIF energy index).

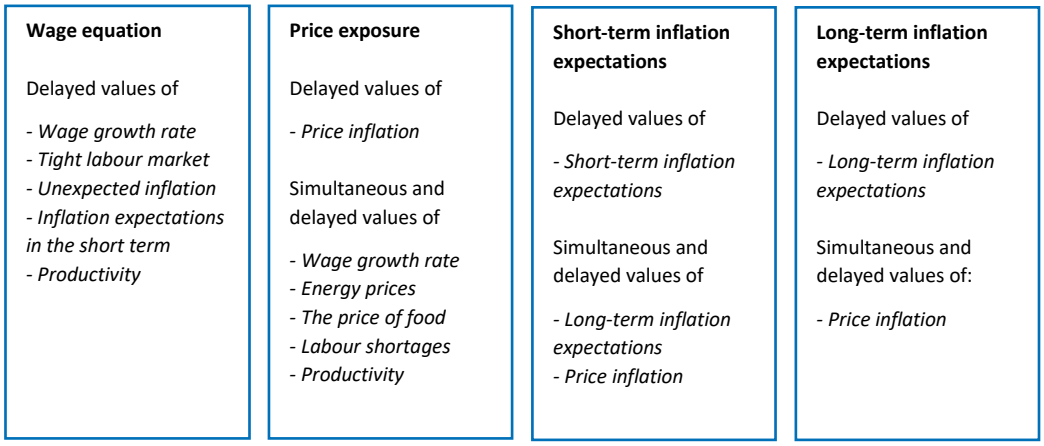
To distinguish between supply and demand shocks, sign restrictions are used where demand shocks affect inflation and output in the same direction while supply shocks affect the variables in different directions. We use data from August 2011 to October 2021 to train the model. Then we make projections for the period November 2021 to December 2024 and compare these with what actually happened. By analysing these errors and how inflation and output have moved, we can determine whether unexpected changes in inflation were caused by supply or demand.

Decomposition with MAJA

Here we have used MAJA to perform a decomposition to see which types of shocks the model reads as the most likely combination to explain the trend in the data over the period. For more details on the model, see Corbo and Strid (2020).

The Blanchard and Bernanke model

This is a dynamic model with four equations as described below. Energy and food prices are measured in relation to wages. Shortages are measured by the 'global supply chain pressure index' from the Federal Reserve Bank of New York. Labour market tightness is measured as the ratio of vacancies to unemployment. Short-term and long-term inflation expectations come from the ORIGO group survey.



Fiscal rules and debt in the 21st century: a brief overview

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Since the turn of the millennium, it has become increasingly common to attempt to improve public finances through the implementation of fiscal rules. These rules vary significantly across economies in terms of the fiscal variables they regulate, the target levels they prescribe, and their enforcement and monitoring mechanisms. However, evidence remains mixed on whether fiscal rules actually lead to better fiscal outcomes. Public debt levels have increased in most advanced economies despite the widespread introduction of fiscal rules, partly due to various crises, the relationship between interest rates and economic growth, changing demographics and political economy elements. Cross-country differences in these factors have also caused public debt levels to increasingly drift apart. In economies where the increase has been particularly sharp, concerns have even been raised regarding fiscal sustainability. Unfortunately, fiscal sustainability is difficult to evaluate because of uncertainty regarding future budgetary behaviour, interest rates and economic growth.

1 Introduction

Recent years have seen a growing amount of attention on the connection between monetary and fiscal policy, and the potential need for a greater coordination between the two.[1] At the same time, changing demographics and the need for greater public investment in defence, infrastructure and the green transition appear to be moving fiscal policy in many advanced economies in a more expansionary direction. Some economies have recently chosen to relax their fiscal rules in order to finance such investments.[2] This move towards more expansionary fiscal policy is occurring in an environment where public debt levels in many economies are already historically high, which raises concerns about fiscal sustainability in the more extreme cases.

With increasing focus on monetary-fiscal policy coordination, a shift toward more expansionary fiscal policy, and concerns about fiscal sustainability, fiscal developments are likely to play a greater role in monetary policy analysis going forward. To contribute to a better understanding of these developments, this article

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[1] See, for instance, Leeper (2018), de Brouwer et al. (2023), Sims (2016), Barro and Bianchi (2023), Blanchard (2021), Cochrane (2022) and Ascari et al. (2025).

[2] Specifically, Germany (see Shukla, 2025) and the European Union (European Commission, 2025).

aims to provide a brief overview of a few major fiscal policy themes over the past three decades. Specifically, we focus on fiscal rules, public debt developments, and fiscal sustainability, drawing on insights from previous literature and illustrating our points using data on the United States, Germany, France, Sweden, and the aggregate of the European Union (EU).

Section 2 provides an overview of fiscal rules, which have become an increasingly common tool in attempting to improve public finances since the 1990s. Between 1990 and 2021, the number of countries implementing at least one rule grew from just seven to more than a hundred. However, their design varies significantly across economies in terms of the fiscal variables they regulate, the target levels they set, and the mechanisms for enforcement and monitoring. Despite their widespread adoption, the effect of rules on fiscal outcomes remains debated. While several studies have concluded that there is a positive relationship between fiscal rules and improved fiscal performance, establishing a causal link has been challenging. Studies that account for causality concerns often find significantly weaker effects.

Section 3 focuses on public debt developments in recent decades. Despite the widespread introduction of fiscal rules, public debt has actually increased in most advanced economies in the 21st century. The increase is partly attributable to a few factors, such as the fiscal impact of the Global Financial Crisis and the Covid-19 pandemic, unfavourable dynamics between interest rates and economic growth, and a growing pressure on public finances from aging populations. These factors have not affected economies symmetrically, which can help to explain why public debt levels have also increasingly drifted apart. Beyond these factors, the literature on the deficit bias also offers political economy explanations connected to certain trends from the past few decades, including increased political polarization and greater electoral uncertainty.

Section 4 concerns fiscal sustainability, which the particularly sharp public debt increases in certain advanced economies have raised concerns about. Fiscal sustainability can broadly be defined as the government having a high probability of being solvent, meaning that it is able to meet its current and future financial obligations without having to resort to undesirable or unfeasible policies. Unfortunately, evaluating this probability is difficult, because it is dependent on future budget behaviour, interest rates and economic growth, all of which are naturally uncertain. One common approach in the literature is to estimate fiscal reaction functions, which model a country's historic budgetary behaviour, and use the results as an indicator of future behaviour. We estimate such a function for each of our example economies and find that since the introduction of fiscal rules, Sweden and Germany have systematically countered debt increases by eventually running primary budget surpluses, while France and the U.S. have not. However, other recent evaluations, which instead make forward-looking assessments partly based on qualitative factors, have deemed that the sustainability risks in all of our example economies are overall low, at least in the short term.

2 Fiscal rules

Since the start of the 1990s, it has become increasingly common to attempt to improve public finances through the implementation of *fiscal rules*. A (numerical) fiscal rule is a long-lasting numerical constraint on a budget aggregate (such as debt or expenditures) which is meant to discipline the spending behaviour of policymakers.[3] Theoretically, such rules will produce better fiscal outcomes since policymakers may be subject to a "deficit bias', which is a common explanation for the rise in public debt in the late 20th century and onwards (see for instance Calmfors, 2010).

Between 1990 and 2021, close to one hundred countries adopted at least one fiscal rule (Davoodi et al. 2022). But while these countries all had the same objective, they generally chose very different policy designs. In broad terms, fiscal rules can be categorized according to the variable they regulate: expenditures, revenues, budget balance or debt. Most countries apply some combination of these and sometimes have more than one rule for the same variable. This is often the case when countries are covered by both a national and a supranational framework, as in all European Union member states. But even when countries have similar types of rules, they can still differ in other respects, whether in technical ones such as target levels, or procedural ones such as legal status, monitoring, and enforcement mechanisms.

The variation in fiscal frameworks is illustrated in Table 1, which summarizes the fiscal rules in Sweden, the EU, the United States, Germany, and France. First, there is a clear difference between the U.S. and the European countries with regards to the number of rules that they have adopted. While the U.S. only has a single, national expenditure rule, the European countries are covered by both their own national frameworks and the EU framework.[4] This means that they have at least three rules in place (two EU rules and one national), and Sweden has as many as five. But there are also differences in policy design between the national frameworks of the European countries. For instance, Sweden is alone in having implemented its own debt anchor at a level different from the EU limit. Additionally, each country's budget balance rule differs from the others', either in terms of prescribed target level, time horizon, or variable specification (total or structural budget balance).

[3] In addition to numerical fiscal rules, there are 'procedural' rules which establish good practices for the budget process. However, we disregard these rules since they typically do not aim to produce certain fiscal outcomes (see for example Davoodi et al. 2022). Throughout this article, 'fiscal rules' refers to numerical rules.

[4] However, there are several U.S. fiscal rules imposed at the state level. Some states have enforced strict budget balance requirements that prohibit carrying deficits into the next fiscal year, while others allow for more flexibility, including escape clauses and lenient enforcement. For more information, see Leiner-Killinger and Nerlich (2019).

Table 1. Overview of numerical fiscal policy rules at the general or central level of government in selected economies[5]

	Rule type	Description	Legal status	Enforcement procedure	Monitoring	First adopted and latest revision
Sweden	Expenditure	Parliament sets an upper limit for central government nominal expenditures three years in advance. The limit is set after a proposition from the government, which may also suggest changes to the limit after it has been accepted.	Statutory	No	Yes	1997
	Budget balance	A surplus target for the budget balance of the general government, amounting to 0.33 percent on average over the course of a business cycle.[6]	Statutory	No	Yes	1997, 2019
	Debt	An anchor for the Maastricht debt at 35 per cent of GDP in the medium term, with a tolerance interval of plus/minus 5 per cent.	Statutory	No	Yes	2019
European Union[7]	Budget balance	A limit for the general government deficit at 3 per cent of GDP.	International treaty	Yes	Yes	1992, 2024
	Debt	A limit for the Maastricht debt at 60 per cent of GDP.	International treaty	Yes	Yes	1992, 2024

[5] For more details on the Swedish and European frameworks, see Calmfors (2023) and the European Parliament (2025), respectively.

[6] A parliamentary oversight of the rule recently suggested changing the target level from 0.33 per cent of GDP to balance, starting on January 1st 2027 (SOU 2024:76).

[7] The EU fiscal framework also requires member states to present a 'net expenditure path', which is meant to outline the medium-term development of government expenditures. However, we do not include the net expenditure path in the table because its explicit purpose is to ensure compliance with the debt rule and the budget balance rule. In that sense, the net expenditure path can be considered as more of an operational indicator rather than a numerical rule in its own right. For more information, see European Parliament (2025).

Table 1. Overview of numerical fiscal policy rules at the general or central level of government in selected economies[5]

United States[8]	Expenditure	Nominal limits on discretionary federal spending, not including spending for emergencies.	Statutory	Yes	Yes	1990-2002, 2011-2023
Germany	Expenditure	Central government expenditures should not grow, on average, faster than its revenues.	Political commitment	No	No	1982, 2008
	Budget balance	The structural deficit of the federal government must not exceed 0.35 per cent of GDP. Defence spending above 1 per cent of GDP is exempt.	Constitutional	Yes	No	2009, 2025
France	Budget balance	The budget balance of the general government (total or structural) must meet a medium-term objective.	Statutory	Yes	Yes	2012, 2021
	Expenditure	General government expenditures must meet a medium-term objective.	Statutory	No	Yes	1998, 2021

Note. Table 1 only includes numerical fiscal rules. For instance, the U.S. "Pay-as-you-go' rule has been excluded since it does not set numerical limits. The table also only includes rules which apply to the central or general government.

Sources: IMF Fiscal Rules Dataset 1985-2021 (2022), Government Offices of Sweden (2025), European Parliament (2025), Fiscal Responsibility Act (2023), Vie Publique (2021), Haut Conseil des Finances Publiques (2025), Programme de stabilité 2024-2027 (2024), Congressional Research Service (2022) and Bundesrat (2025).

Beyond the number of rules and their design, the frameworks in these countries also differ in terms of legal status, enforcement and monitoring. Therefore, having more rules or stricter target levels does not necessarily imply that fiscal policy is more heavily regulated. For instance, while most national fiscal rules in the European countries are legally established and monitored, few of them are enforceable by any formal procedure. In that sense, their common EU rules are stricter, in that member states may be sanctioned if they persistently fail to take effective action to return to the specified target levels when they are not met. Such sanctions may include a fine of up to 0.05 per cent of the previous year's GDP to be paid every six months

[8] The United States also has a federal debt limit. However, the limit does not restrain the spending and revenue decisions of Congress. It simply sets a limit for the amount that the Treasury is allowed to borrow to meet already existing legal obligations, such as interest payments. Congress has always raised the debt limit when necessary (Congressional Research Service, 2025; U.S. Department of the Treasury, 2025a).

(European Parliament, 2025). But this approach is arguably still less strict than the enforcement of the U.S. expenditure rule, which is known as "sequestration' – automatic, across-the-board spending cuts when expenditure limits are surpassed. However, these limits have frequently been raised through subsequent legislation to allow for more spending.[9]

Most relevant, of course, is whether the fiscal rules have been an effective tool for controlling public debt levels and budget balances and if some rules are preferable to others. In the case of the above-mentioned economies, fiscal variables have developed very differently since the introduction of fiscal rules, and the respective frameworks have generally been judged accordingly. In Sweden and Germany, where debt levels have decreased since the introduction of national rules, reviews by independent agencies have often deemed them effective. For instance, recent Article IV consultations by the IMF have recognized Sweden's fiscal framework as effective in maintaining sustainable public finances (IMF, 2024a), and stated that the German budget balance rule has served as an anchor for solid public finances (IMF, 2023a). Conversely, in the U.S. and most EU member states, debt levels have increased and the frameworks have been criticized. Critique of the U.S. framework has often focused on the coverage being too narrow and the target levels insufficient (IMF, 2012 and 2024b), while critique of the EU framework has instead focused on lack of implementation in part due to weak enforcement procedures (Arnold et al. 2022).[10]

Looking beyond the economies mentioned above, the academic literature on fiscal rules in general provides broad empirical evidence that rules tend to coincide with better fiscal performance. For instance, Debrun et al. (2008) and Badinger and Reuter (2017) provide panel estimates that show that fiscal rules are associated with more positive budget balances. The latter study also suggests that the relationship is stronger when rules are more "stringent' with regards to factors such as legal status, enforcement and monitoring. Other studies have also suggested that the type of rule matters. Budget balance rules and expenditure rules are typically shown to be most associated with sound performance, for instance in panel estimates by Nerlich and Reuter (2013), Fall et al. (2015) and Bergman et al. (2016). It has been argued that these types of rules are more effective than debt or revenue rules because they are more operational, meaning that they are more useful tools in the budgeting process (Brändle and Elsener, 2024). Finally, some studies have also suggested that the institutional setting matters. For instance, von Hagen (2006) provides empirical evidence that fiscal rules have had a greater impact on fiscal performance in economies with a strong finance minister role, long multi-annual fiscal programs, and explicit mentioning of fiscal targets in political coalition agreements.

However, while fiscal rules and fiscal performance are related, the relationship is not necessarily a causal one. It is often stressed in the literature that fiscal rules could simply be more likely to be introduced in countries where fiscal sustainability is already an important political issue. In other words, fiscal rules and fiscal discipline

[9] For a complete list of revisions of expenditure limits during 2011-2019, see Congressional Research Service (2022).

[10] For the U.S., see also U.S. Department of the Treasury (2025b) and U.S. Government Accountability Office (2024).

could both be caused by fiscally concerned electorates, rather than the former causing the latter. In addition, it is possible that the causality is reversed. Policymakers could be more likely to introduce or tighten rules when fiscal outcomes are already sound or improving and they expect to achieve the targets, such as in times of economic upturn (Brändle and Elsener, 2024; Calmfors, 2023). In a meta-study of 30 papers on fiscal rules and fiscal performance, Heinemann et al. (2018) find that the relationship between the two becomes significantly weaker the more sophisticated methods that are used to handle such potential endogeneity. A similar result is also reached in Caselli and Reynaud (2020), where the authors find that fiscal rules are associated with smaller deficits, but that the relationship disappears when endogeneity is addressed. However, the relationship continues to hold for rules that are more stringent.[11]

3 Debt developments

Global public debt has increased significantly in the 21st century, despite the widespread introduction of fiscal rules (see Figure 1). The increase has been particularly large in advanced economies, where the aggregate level has risen from 70 to 110 per cent of GDP (IMF, 2025a).[12] But public debt-to-GDP ratios have also developed very differently across these countries and now show a greater dispersion than at the start of the century.[13] In some countries (such as the United States and France), the public debt ratio has approximately doubled over the past three decades, while others (such as Germany) have seen more moderate increases of only a few percentage points. There are also a few notable examples (such as Sweden) where the public debt ratio has instead fallen.[14]

[11] For an overview of other recent studies that attempt to handle the endogeneity problem, see Calmfors (2023).

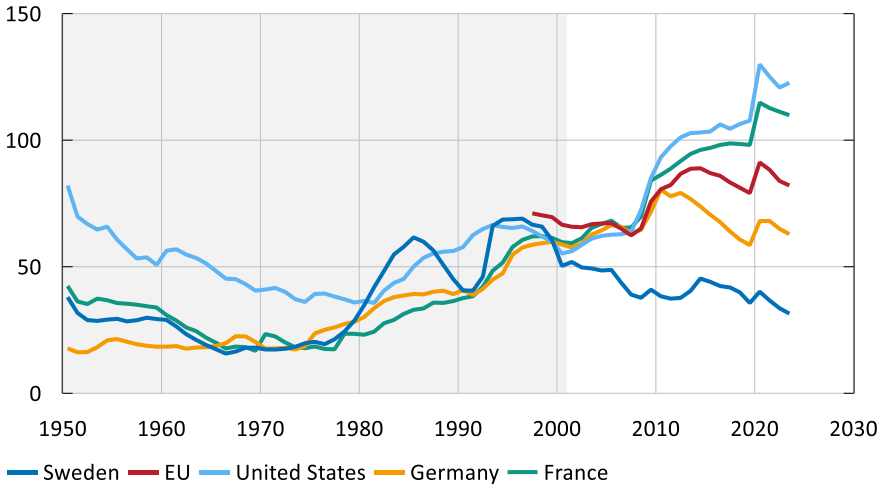
[12] In IMF (2025) the group 'advanced economies' includes Andorra, Australia, Austria, Belgium, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Macao, Malta, the Netherlands, New Zealand, Norway, Portugal, Puerto Rico, San Marino, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, United Kingdom and the United States.

[13] Between 2000 and 2024, the difference between the highest and lowest public debt-to-GDP ratios amongst advanced economies has increased from 131 to 227, and the variance has more than doubled (IMF, 2025a).

[14] The other advanced economies that have experienced a fall in the public debt ratio are Belgium, Denmark, Iceland, Israel, Malta, Puerto Rico, the Netherlands and Switzerland (IMF, 2025a).

Figure 1. Public sector debt

Per cent of GDP



Note. Nominal (face) value of total outstanding public sector debt (central government, local governments, and social security funds) at the end of the period and consolidated between the government subsectors. The EU refers to the aggregate of all member states (EU27).

Source: AMECO.

The rise in public debt ratios in advanced economies is partly a consequence of fiscal responses to various crises and recessions, most importantly the Global Financial Crisis and the Covid-19 pandemic. The large adverse effects that these two crises had on economic activity put pressure on government finances through *automatic stabilisers*, such as reduced tax revenues and increased spending on unemployment benefits. In addition, many governments engaged in substantial fiscal stimulus through discretionary measures to support growth and mitigate crisis-specific consequences, such as financial market unrest during the Global Financial Crisis and pressures on the public health system during the pandemic.[15] In many economies, the resulting primary deficits, in combination with reduced output, led to the largest single-year increases in debt ratios since the Second World War (see Figure 1). However, unlike after the Global Financial Crisis, public debt ratios partially fell back again after the initial year of the pandemic. This quick reversion was partly caused by a strong global economic recovery, and partly by the large global shock to inflation (IMF, 2023b). Unexpected increases in inflation reduce the public debt ratio because output increases in nominal terms (inflating GDP in the ratio's denominator), while the outstanding stock of debt (assumed at a fixed nominal value) is unaffected. In addition, public finances tend to improve with inflation shocks because the nominal

[15] However, discretionary fiscal stimulus was in many cases greater during the pandemic than during the Global Financial Crisis (IMF, 2020; Heimberger, 2023). For country-specific details on fiscal responses during the pandemic, see IMF (2021). For an overview of fiscal responses to the Global Financial Crisis in G20 countries, see IMF (2010). Effects on debt-to-GDP ratios in euro area countries from financial sector support during the Global Financial Crisis are reported in Semeano and Ferdinandusse (2018).

tax base instantly grows (for instance through value-added taxes when prices rise), while expenditures are usually fixed under budgetary caps.[16]

The impact of the crises on public debt ratios are illustrated for each of our example economies in Figure 2, which shows contributions to changes in their public debt ratios from a few major components: the primary balance, interest payments, GDP growth, and the stock-flow adjustment.[17] With the exception of Sweden (where public debt increased sharply in 2014 due to an unusually large stock-flow contribution[18]), the crises constitute the most severe periods of debt increase in all economies. During the initial year of each crisis, the debt ratio increase in each economy was primarily caused by a deterioration of the primary balance (reflecting automatic stabilizers and discretionary fiscal stimulus) and negative economic growth. After the initial year of the pandemic, the public debt ratios fell again, primarily as a result of large downward contributions from increased GDP growth (boosted by inflation).

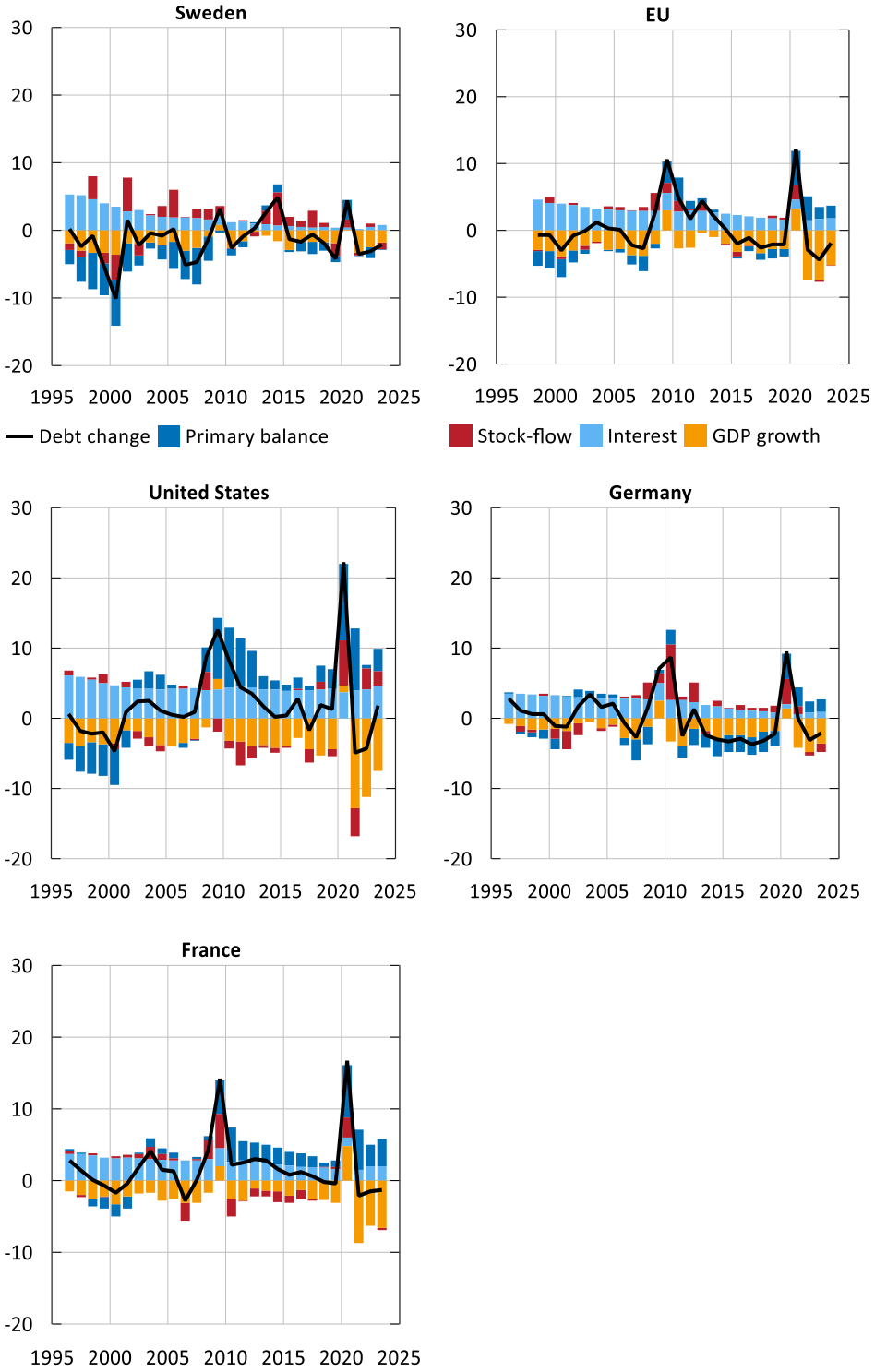
[16] Note that the effects of inflation on public finances discussed here only apply to *unexpected* increases. Increased inflation expectations are associated with a smaller increase in nominal GDP and faster increases in primary spending and interest expenditures (IMF, 2023b).

[17] The stock-flow adjustment is the difference between the change in (nominal) government debt and the nominal budget balance for a given year. Such differences may arise for several reasons. For instance, government debt issued in foreign currency can appreciate and depreciate due to exchange rate fluctuations, which are not reflected in the budget balance. For more details, see Eurostat (2019).

[18] This increase was in part caused by asset managing authorities holding 70 billion SEK in repurchasing agreements which did not mature until 2015 (Swedish National Fiscal Management Authority, 2019), as well as a significant exchange rate depreciation (IMF, 2015).

Figure 2. Change in public debt and contributions from different factors

Percent and percentage points



Note. Debt change refers to annual changes in the public debt-to-GDP ratio. Stock-flow component data is a result of own calculations (see footnote 17). Contributions are calculated as the change in debt that would have occurred if only one of the components experienced its annual change.

Sources: AMECO and own calculations.

While Figure 2 illustrates that debt was generally driven by the same factors in all economies during the crises, it also shows that the size of the increases vary widely. The same is also true of the debt decreases after the acute phase of the pandemic. Since the cross-country differences are partly attributable to primary balances, it is possible that they can be explained by a variation in the effectiveness of the economies' fiscal rules, or perhaps in their handling of rules during crises. For instance, Sweden remained in compliance with the EU budget balance rule during the Global Financial Crisis while Germany and France did not. Furthermore, Germany, unlike Sweden, suspended its national rules during the pandemic and also ran a larger primary deficit at the time. With regards to the effectiveness of rules, it can also be mentioned that the primary deficits that the U.S. ran during both crises (which were significantly greater than those of the other economies) were not in breach of national rules, but would have been under, for instance, the EU rules. In fact, U.S. fiscal policy was not even subject to a rule during the initial year of the Global Financial Crisis (see Table 1).

However, differences in fiscal responses to crises are not solely determined by ambitions regarding fiscal discipline, but also by factors such as economic conditions and national needs. As illustrated in Figure 2, debt increases during the crises partly varied because some economies were more adversely affected than others. For instance, (nominal) Swedish output was largely unchanged between 2019 and 2020, compared to a fall of almost four per cent in the EU aggregate. More adverse effects on growth cause larger increases in the debt ratio both directly (through the denominator), but also indirectly through automatic stabilisers and the need for additional fiscal support. Furthermore, crisis-specific consequences varied across countries, implying varying needs for discretionary fiscal support. For instance, countries had to devote different amounts of resources to stabilizing their financial markets during the Global Financial Crisis (Semeano and Ferdinandusse, 2018), and greater fiscal support was needed during the pandemic in countries with more pandemic incidents and an older population (Elgin et al. 2020; Chen et al. 2021). Finally, during the pandemic, some countries also chose to provide more of their fiscal support through measures that did not directly affect the debt ratio, such as loans or loan guarantees (Hudson et al. 2021).

Looking beyond the crises, other periods of debt increase have for the most part also coincided with periods of economic downturn. This is illustrated in Figure 3, which plots the primary balance, the GDP gap, and the periods of debt increase for each of our example economies.[19] With a few exceptions, each economy's debt ratio has only increased when its GDP gap has been strictly negative, in balance, or strictly negative in the following year.[20] The figure also shows that this is partly due to the primary balance, which exhibits a rather strong correlation with the GDP gap in each

[19] The GDP gap is the difference between actual GDP and potential GDP, which is an estimate of the output that would theoretically have been produced if the available production factors in the economy (capital and labour) were fully utilized. The GDP gap is a commonly used measure of the business cycle, indicating an economic boom when the gap is positive and a slump when it is negative. However, it is also an uncertain measure since potential GDP cannot be observed but has to be estimated.

[20] We define 'balance' as +/- 0.5 per cent of potential GDP. The exceptions are Germany in 1998, France in 2001, 2004 and 2005, and the U.S. in 2005 and 2018.

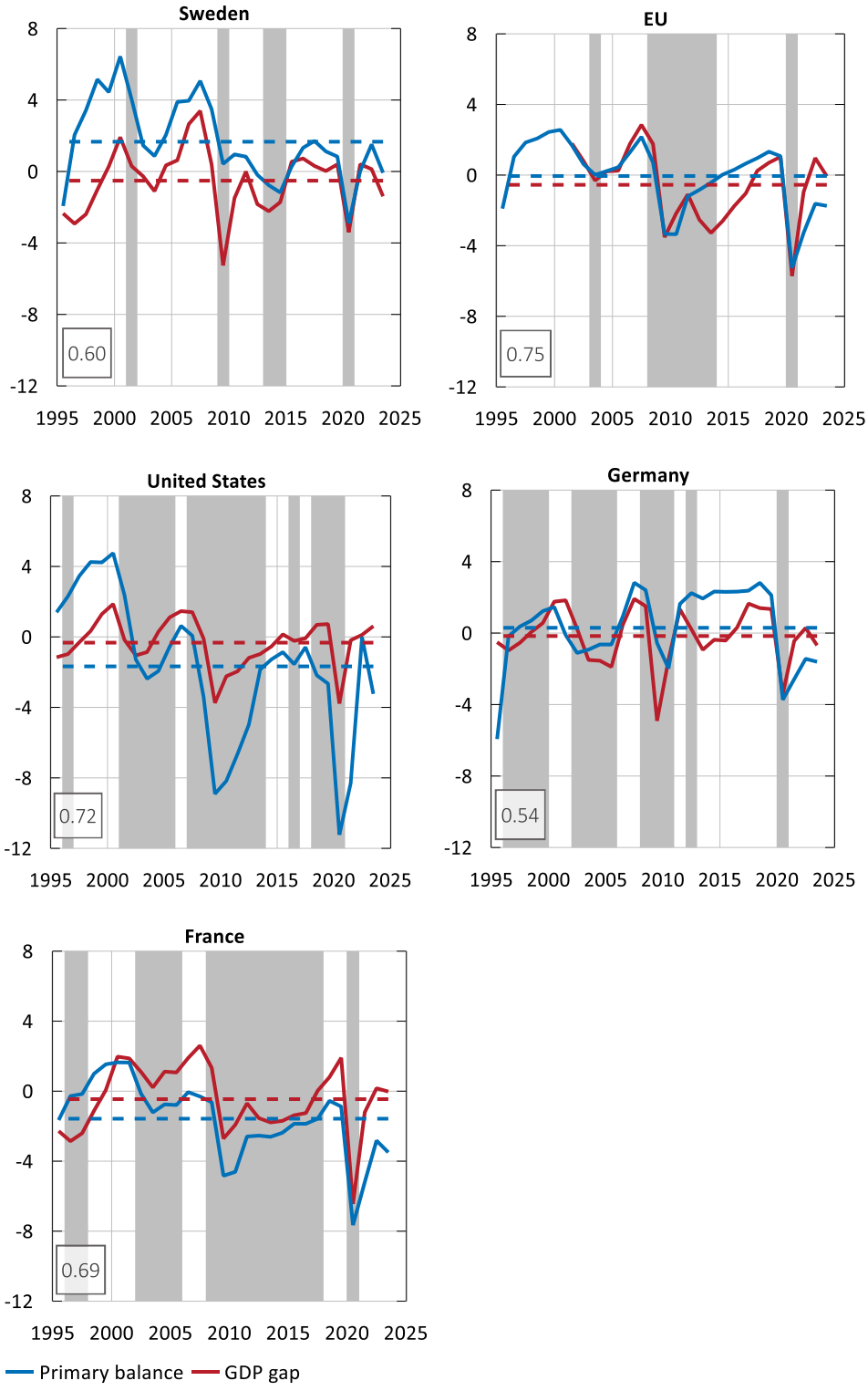
economy. Once again, this pattern is partly a natural consequence of automatic stabilizers. However, the correlation is somewhat weaker for Germany, which appears to be a result of the period in between the Global Financial Crisis and the pandemic, where the country produced consistent primary surpluses regardless of the business cycle. Interestingly, this change in behaviour coincides well with the introduction of their national budget balance rule. On the other hand, a similar medium-term rule was introduced in France three years later (see Table 1), and yet France continued to produce primary deficits in the period between the two crises.

While Figure 3 shows that the primary balance of each of our example economies tends to fluctuate with the business cycle, it also shows that business cycles have been remarkably similar among all economies, and yet that there is a strong difference in the average primary balance. For instance, Swedish primary balances have generally been in surplus, while U.S. and French balances have generally been in deficit. Once again, a possible explanation for the differences is a variation in the efficiency of rules and in attitudes towards them. There are also a few practical explanations. In the case of the U.S., the large deficits at the start of the century can partly be attributed to the war in Iraq (IMF, 2003). There is also the matter of changing demographics. The *old-age dependency ratio*, which is the population share of the elderly relative to the working age population, has increased significantly in advanced economies over the past decades (up from 22.5 to 35 per cent in the OECD countries since the start of the century, see OECD (2025)). The evolution has placed an increasing burden on public welfare systems in most economies, but particularly in those with relatively generous systems, such as France (IMF, 2019).[21] Yared (2019) shows that changes in debt ratios and changes in old age dependency ratios over the past several decades are correlated.

Looking beyond primary balances, the relationship between economic growth and the interest paid on public debt has also been an important cause of debt increases during economic downturns. Figure 2 illustrates that for most of our example economies, the largest upward contribution to changes in the debt ratio in non-crisis times has often come from interest payments. In most instances, these contributions are cancelled out by larger or equally large downside contributions from economic growth. However, when the growth rate falls in an economic downturn, the differential deteriorates and causes upward pressure on the debt ratio. In a few instances, the differential has even been large enough to cause a debt increase even in the absence of a primary deficit, such as in the U.S. in 2001 and in the EU aggregate in 2003. Since a debt increase in turn contributes to further increases in interest payments (further deteriorating the differential), the relationship between economic growth and interest payments is associated with a "snowball effect'. The effect also works in the opposite direction. For instance, Figure 2 illustrates that interest payments decreased in Sweden at the start of the period, making it easier to accomplish debt reductions, which contributes to further reductions in interest payments, et cetera.

[21] This is expected to be a great long-term challenges for fiscal policy in Europe, see Moshammer (2024).

Figure 3. General government primary balances and the business cycle (GDP gap)
Per cent of GDP (primary balance) and potential GDP (GDP gap)



Note. Grey areas indicate periods of debt increases larger than 0.5 per cent of GDP. Dashed lines indicate the mean of each variable for the period 1995-2023. The number in the lower left corner refers to the correlation between the GDP gap and primary balance.

Sources: AMECO and own calculations.

We can compare contributions to public debt increases from the various components in Table 2, which reports cumulative contributions over the period 1995-2023 for each of our example economies. In the U.S. and France, primary balance contributions have clearly exceeded contributions from the stock-flow component and the differential between interest payments and growth. In France, around 30 per cent of these primary balance contributions are attributable to the years 2009-2010 and 2020, and the share is above 50 per cent in the U.S. In the other economies, the greatest contributions are from the stock-flow component. In Germany, a large share of these contributions can be attributed to financial market support which did not affect the primary balance during the Global Financial Crisis. In Sweden, the contributions are of a more technical nature (see footnote 18).

Table 2. Contributions to the public debt between 1995 and 2023
Percentage points

	Primary balance	Stock-flow	GDP growth	Interest	Total change
Sweden	– 53.1	20.0	– 54.6	50.4	-37.3
EU	1.5	9.4	– 69.9	70.0	11.0
United States	49.1	– 3.7	– 109.5	121.3	57.4
Germany	−15.3	14.4	– 52.5	61.5	8.1
France	44.2	3.7	– 67.0	71.2	52.1

Note. Discrepancies due to rounding errors have been evenly distributed among the components. EU data is only between 1997 and 2023.

Sources: AMECO and own calculations.

Beyond more practical reasons for why debt ratios have increased, such as crises, recessions, unfavourable interest-growth dynamics or increased pressure from changing demographics, the literature on the deficit bias also offers some political economy explanations.[22] Common examples include *fiscal illusion*, that voters and policymakers overvalue the benefits of current spending relative to the cost of future taxation. There is also the *common pool* problem, under which competing interest groups lobby governments to direct resources to their cause without internalizing the cost.[23] However, these issues are always present and offer no insight as to why public debt has increased more in recent decades or in certain economies.

Yared (2019) argues that the increase in public debt in advanced economies over the past several decades can partially be explained by three political economy factors. The first is that populations are becoming increasingly older. Older voters are assumed to have weaker preferences for fiscal responsibility (which is also supported by survey data, see Parker, 2012) since future generations will bear the tax burden. The second factor is that political polarization has increased, which is supported by the fact that an increasing share of the vote has been going to far-left and far-right parties across

[22] See, for instance, Nordhaus (1975), Rogoff and Sibert (1988) and Rogoff (1990) for early literature on how fiscal policy is influenced by political factors, such as elections, government ideology and macroeconomic conditions.

[23] See Calmfors (2023) and Brändle and Elsener (2024) for overviews of more common examples.

advanced economies.[24] Theoretically, increased polarization leads to debt accumulation through a variation of the *tragedy of the commons*, where policymakers overspend because they cannot effectively coordinate and realize that all parties will share the burden of the future debt (see Velasco, 2000). That greater polarization is associated with larger deficits has also been shown empirically (see Crivelli et al. 2016). The final factor is rising electoral uncertainty, meaning that the margin of victory in political elections has been steadily declining in advanced economies. Theoretically, greater electoral uncertainty leads to a present bias for policymakers, who realize that they may not remain in power and therefore choose to increase spending now while they may still benefit and have the power to influence the fiscal choices of their successor (see for instance Alesina and Tabellini, 1990; Persson and Svensson, 1989). That political turnover is connected to debt accumulation is also supported by some empirical work (for example Alt and Lassen, 2006).

4 Fiscal sustainability

The sharp rise in public debt ratios in certain advanced economies in recent decades has led to increased concern about *fiscal sustainability.* Fiscal sustainability (or "debt sustainability') can broadly be defined as the government having a high probability of being solvent, meaning that it is able to meet its current and future financial obligations without having to resort to undesirable or unfeasible policies (Debrun et al. 2019). Unfortunately, evaluating this probability is difficult. To see why, we can start by considering the government's budget constraint:

$$G_t + r_t D_{t-1} = T_t + (D_t - D_{t-1}),$$

where G_t is the government's primary expenditures, r_t is the interest on government bonds, T_t is tax revenues, and D_t and D_{t-1} are the stock of public debt in the current and previous period, respectively. Simply put, the constraint states that the government's total expenditures in any given time period must equal the sum of its tax revenues and its debt issuance. Rearranging, the constraint becomes an expression for government debt:

$$D_t = (1 + r_t)D_{t-1} - PB_t,$$

where $PB_t = T_t - G_t$ is the primary balance. The expression states that public debt in the current period is equal to the public debt in the previous period, plus interest payments and minus the primary balance. Dividing by GDP, we get an expression for the debt ratio:

$$d_t = \left(\frac{1 + r_t}{1 + g_t}\right) d_{t-1} - pb_t,$$

where d is the debt ratio, pb is the primary-balance-to-GDP ratio, and g is the GDP growth rate. The expression states that the debt ratio is decided by the primary balance and the relationship between interest payments and economic growth, as

[24] See Figure 4 in Yared (2019), which is based on data from Funke et al. (2016).

discussed in section 3.[25] If the interest rate on government bonds is greater than the economic growth rate, then the debt ratio will grow automatically if it is not offset by a larger or equally large primary surplus. Therefore, in order for the government to be able to meet its obligations (that is, pay off the debt), the current debt level cannot be greater than the present value of all future primary balances. In other words, evaluating whether the government has a high probability of being solvent is difficult because solvency is dependent on future primary balances, interest rates, and economic growth, all of which are naturally uncertain.

Because of the inherent difficulty, there is no consensus on how to best evaluate fiscal sustainability, and many different approaches have been suggested. One common approach in the literature is to focus on historic budgetary behaviour by estimating *fiscal reaction functions*, which model government primary balances as a function of public debt developments and macroeconomic conditions. The approach was first suggested in a seminal study by Bohn (1998), which showed that a sufficient condition for government policy to satisfy the intertemporal budget constraint (in a general equilibrium model) is a positive response of the primary balance to rising debt, when controlling for temporary variations in other determinants such as output. While earlier accounts had also typically focused on historic budgetary behaviour, they often studied *unconditional* developments in public debt and the primary balance. However, Bohn argued that these can be misleading indicators of sustainability in a stochastic environment. For instance, a rising public debt level could be a natural consequence of economic crisis, war or an adverse growth shock, and is not indicative of unsustainable fiscal policy as long as the government eventually moves toward primary surpluses. A positive *conditional* response of the primary balance to public debt shows that the government has tended to do so in the past and can therefore serve as an indicator of future behaviour.

Based on this reasoning, Bohn defined a fiscal reaction function where the primary balance is determined by the debt ratio, the business cycle and temporary government expenditures, and estimated the function using ordinary least squares. Subsequent research has typically altered the model specification and estimation technique somewhat. For instance, *error-correction models* have been used to address the issue that public debt ratios and primary balances are often not stationary time series, but tend to be cointegrated. In addition, model specifications now often incorporate additional determinants of the primary balance, such as inflation and interest rates on government bonds. As discussed in section 3, inflation has a direct impact on the primary balance since it increases government revenue instantly but typically increases expenditures with a lag. Interest rates, on the other hand, are thought to have an indirect impact by affecting the government's incentive to reduce public debt. Higher interest rates are associated with greater interest payments, which the government may wish to reduce by lowering public debt through improved primary balances (see for example Mauro et al. 2015).

Below, we provide estimates of a fiscal reaction function for each of our example economies. The methodology is from Berti et al. (2016) and was previously an

[25] With the exception of the more technical 'stock-flow adjustment'.

integrated part of the European Commission's framework for evaluating fiscal sustainability. It is an error-correction model, which deals with stationarity issues and allows us to estimate a long-run, systematic relationship between the public debt and the primary balance in each economy, capturing whether the government eventually counters a debt increase by running primary surpluses. The original paper provided estimates for several European countries, including Sweden, Germany and France, over the period 1950-2013. Here, we include more recent data and estimate the function for the United States as well. We also exclude an interaction term that was used in the original model to investigate whether the long-term relationship between public debt and the primary balance in each economy had changed since the Global Financial Crisis. Instead, we estimate the model for two different time periods (1950-1990 and 1990-2023) to see whether the relationship has changed since the economies began introducing fiscal rules (see Table 1).

The model is specified as:

$$\Delta PB_t = \beta_1 + \beta_2 \cdot (PB_{t-1} - \beta_3 \cdot Debt_{t-2}) + \beta_4 \cdot \Delta Debt_{t-1} + \beta_5 \cdot \Delta Debt_{t-2} + \beta_6 \cdot GG_t + \beta_7 \cdot YG_t + \beta_8 \cdot \Delta reff_t + \beta_9 \cdot \Delta infl_t + \varepsilon_t$$

As discussed, we are primarily interested in the long-run, systematic relationship between the primary-balance-to-GDP ratio (PB_{t-1}) and the debt ratio ($Debt_{t-2}$). The issue is that these series are often found to be non-stationary, meaning that we could obtain spurious results by directly estimating their relationship using standard techniques. However, if the series are *cointegrated*, then there exists a linear combination between the two (here: $PB_{t-1} - \beta_3 \cdot Debt_{t-2}$) that is stationary. In that case, we can estimate annual changes in the primary-balance-to-GDP-ratio (ΔPB_t, also made stationary by the transformation) as a function of the linear combination and from there derive the long-term relationship (β_3). The coefficient β_2 measures how responsive the primary balance is to deviations from this relationship. Similar to Berti et al. (2016), we find (using standard stationarity tests, see Table A1 in Appendix A) that the debt ratio in each economy is non-stationary, but that the primary balance-to-GDP ratio is stationary in half the cases and ambiguously non-stationary in the other half. However, standard cointegration tests (see Table A5 in Appendix A) suggest that the series are cointegrated in each economy.

The error-correction model also accounts for short-term dynamics that cause deviations from the long-term relationship. Annual changes in the primary-balance-to-GDP ratio is in part explained by annual changes in the debt ratio ($\Delta Debt_{t-1}$ and $\Delta Debt_{t-2}$), but also by variations in the additional determinants discussed above. GG_t represents the expenditure gap, and is defined as the difference between current and trend primary government expenditures. The gap is meant to capture temporary and unexpected expenditures, such as military spending in the event of war. YG_t represents the GDP gap, and is meant to capture business cycle fluctuations. As discussed in section 3, the business cycle is intimately connected with the primary balance, in part due to automatic stabilizers. As mentioned above, a measure of the business cycle and temporary government expenditures were also included in Bohn's (1998) original fiscal reaction function, and both have remained common control variables since then. $\Delta reff_t$ represents annual changes in the real implicit interest

rate (interest payments on government debt in relation to the debt ratio) and $\Delta infl_t$ represents annual changes in the inflation rate. All these variables are found to be stationary (see tables A2-A4 in Appendix A). Further details on how the variables have been constructed, as well as plots of each time series, can be found in Appendix B.

Table 3. Estimated fiscal reaction functions

		DE	FR	SE	US
(A)	Intercept	0.207	1.814**	-1.243**	-2.312***
1950-1990		(0.536)	(0.714)	(0.508)	(0.584)
	$\Delta Debt_{t-1}$	-0.068*	0.100	-0.332**	-0.134**
		(0.047)	(0.147)	(0.142)	(0.060)
	$\Delta Debt_{t-2}$	0.139***	0.151***	0.412***	0.016
		(0.047)	(0.053)	(0.103)	(0.044)
	PB_{t-1}	-0.301*	-0.689***	-0.185	-0.924***
		(0.148)	(0.139)	(0.144)	(0.167)
	$Debt_{t-2}$	0.000	-0.055**	0.038***	0.061***
		(0.019)	(0.026)	(0.013)	(0.013)
	GG_t	0.085	-0.213***	-0.292	-0.001
		(0.165)	(0.055)	(0.180)	(0.153)
	YG_t	-0.448	0.362**	0.069	0.131
		(0.537)	(0.177)	(0.105)	(0.091)
	$\Delta infl_t$	-0.048**	0.038	-0.045	0.201***
		(0.017)	(0.029)	(0.034)	(0.052)
	$\Delta reff_t$	-0.083	0.062	-0.131	-0.490
		(0.176)	(0.291)	(0.116)	(0.500)
	Adjusted R2	0.079	0.517	0.393	0.616
(B)	Intercept	-2.591**	-0.595	-4.267***	-1.507
1990-2023		(0.082)	(0.916)	(1.387)	(1.893)
	$\Delta Debt_{t-1}$	0.163*	0.154	0.043	0.254
		(0.082)	(0.120)	(0.066)	(0.156)
	$\Delta Debt_{t-2}$	-0.054	0.146**	-0.089	0.266**
		(0.047)	(0.060)	(0.095)	(0.126)
	PB_{t-1}	-0.503*	-0.159	-0.698***	-0.202
		(0.245)	(0.274)	(0.228)	(0.264)
	$Debt_{t-2}$	0.043**	-0.006	0.118***	0.007
		(0.016)	(0.014)	(0.033)	(0.023)
	GG_t	-1.140***	-0.910***	0.030	-1.341***
		(0.080)	(0.245)	(0.133)	(0.295)
	YG_t	0.055	0.153	0.597***	-0.199
		(0.108)	(0.164)	(0.194)	(0.340)
	$\Delta infl_t$	0.076	0.270*	0.126	0.406**
		(0.156)	(0.152)	(0.099)	(0.170)
	$\Delta reff_t$	-0.195	-0.442	0.550*	-0.384
		(0.704)	(0.492)	(0.277)	(0.668)
	Adjusted R2	0.834	0.705	0.748	0.615

*** p<0.01, ** p<0.05, * p<0.1. All estimates are OLS with annual data. Robust standard errors in parentheses (Newey-West, lag window of size 3).

Long-term debt coefficient (β_3)

	DE	FR	SE	US
1950-1990	0.000	-0.080*	0.205	0.066*
1990-2023	0.085*	-0.038	0.269*	0.035

Coefficients have been derived as minus the ratio between the estimated coefficient on lagged debt and the estimated error-correction term. "*' Indicates that both these coefficients are statistically significant.

Table 3 presents the results for each country. Panel A reports the estimates for the earlier time period (1950-1990) and Panel B for the later period (1990-2023). Estimates of the long-term relationship between the debt ratio and the primary balance ratio (β_3) are reported for each country in each period at the bottom of table. These estimates suggest that in the earlier period, the U.S. (with a significantly positive β_3 of 0.066) was the only country that systematically responded to debt accumulation by eventually running primary surpluses. Bohn (1998) provides a similar result for U.S. fiscal policy in the 20th century. Conversely, the estimates for Sweden and Germany over the same period are insignificant, suggesting a lack of a systematic response, and the French estimate is even significantly negative. Berti et al. (2016) reach a similar result for France over the period 1950-2013. However, since it seems unlikely that any government would actively pursue a policy of running primary deficits in response to debt accumulation, the negative coefficient should probably be interpreted as an absence of long-term debt management rather than as active policy.

In the later period, during which fiscal rules are introduced, the estimates of the long-term relationships are significantly different. During this period, the β_3-estimates suggest that both Sweden and Germany systematically responded to debt accumulation by eventually running primary surpluses. The size of the coefficients (0.269 in Sweden and 0.085 in Germany) also suggest that these responses were relatively forceful compared to the U.S. ones in the earlier period, especially in Sweden. At the same time, the U.S. estimate is substantially smaller in the later period than in the earlier one and is statistically insignificant, suggesting a lack of a systematic response. The French coefficient remains negative, but is also smaller and insignificant. A comparison between the two time periods would therefore suggest that Swedish and German (and to some degree French) fiscal policy has increasingly moved toward debt management, while U.S. policy has moved in the opposite direction. Since these changes coincide with the introduction of rules, it is possible that these provide an explanation. In that case, the Swedish and German rules would also appear more effective than the U.S. and French ones. However, as discussed in Section 2, there are reasons to be cautious in assuming causality between rules and outcomes, even when more explicitly modelling a relationship between the two.

The apparent move towards increased debt management in Sweden and Germany is to some degree also evident in the evolution of the short-term dynamics between their debt ratios and primary balances. In the earlier period, both German and Swedish fiscal policy exhibit a somewhat erratic response to debt developments in the first two years after they have occurred (see the $\Delta Debt_{t-1}$ and $\Delta Debt_{t-2}$ rows). The estimates suggest that in both countries, the primary balance tends to deteriorate in the first year after a debt increase, only to more forcefully improve in the year after that. No such pattern is recorded in the later period. Instead, the German primary balance tends to improve immediately after a debt increase, while the Swedish balance shows no short-term response at all. However, the lack of a Swedish short-term response also illustrates that short-term dynamics are a lesser concern in terms of debt management. The primary concern is that the government *eventually* counters a debt increase with primary surpluses, which is what the long-term coefficient is meant to capture. The fact that Swedish policy in the later period shows

no short-term response but a significantly positive long-term response illustrates that such countering does not have to occur immediately.[26]

Looking at the other short-term determinants of the primary balance, it would appear that the expenditure gap (GG_t) has become a more important factor in most economies. In the earlier period, it only enters significantly in the case of France, while in the later period, it enters significantly and with large coefficients for all countries except Sweden. This is most likely illustrative of the fiscal responses to the various crises in the 21st century, as discussed in section 3. At the same time, the output gap (YG_t) appears a less important determinant, entering significantly and positively (indicating a countercyclical tendency) in the later period only for Sweden, and in the earlier period only for France.[27] This is somewhat surprising, considering the strong correlation between GDP gaps and primary balances in the later period, as illustrated in Figure 3. However, it is possible that the expenditure gap is capturing some of the effect of the output gap (or vice versa in the case of Sweden) since these series are also strongly correlated.[28] Furthermore, changes in the inflation rate ($\Delta infl_t$) appear to have the expected positive effect on the primary balance in the U.S. and France in the later period, and in the U.S. in the earlier period. Somewhat surprisingly, however, the variable enters negatively in the earlier period for Germany.[29] Finally, changes in the implicit interest rate ($\Delta reff_t$) have the expected positive effect in Sweden in the later period, but remain insignificant in all other instances.

To summarize, Swedish and German primary balance ratios over the past three decades exhibit a positive conditional response to debt increases, and thus satisfy the Bohn condition for sustainability. French and U.S. primary balance ratios do not. However, it is worth mentioning at this point that there are a few practical weaknesses with this approach to evaluating sustainability. First, a positive conditional response is a *sufficient* condition for sustainability, not a necessary one. In other words, the assessment allows for characterizing Swedish and German fiscal policy as sustainable over the period considered, but does not allow for characterizing French and U.S. policy as unsustainable (see Bohn, 1998). Second, since the assessment is based on historical behaviour, any inference regarding sustainability going forward relies on the assumption that the recorded behaviour will not change. As illustrated by our estimates for the U.S., where fiscal policy systematically responded to debt increases in the earlier period but not the later one, it is possible

[26] As mentioned, β_2 measures how responsive the primary balance is to deviations from its long-run relationship with debt, that is, how fast the relationship is restored after some short-term disturbance from another determinant. These estimates are in the range [-1, 0] (-1 being the fastest response), and are reported in the PB_{t-1}-rows. In the later period, Sweden exhibits a faster reversion than Germany. In the earlier period, the U.S. reversion appears to have been remarkably fast.

[27] That Swedish fiscal policy would have been countercyclical during this period is in line with previous evaluations, for example by Lyhagen and Shahnazarian (2023) who find that fiscal policy in Sweden has been countercyclical between 2000 and 2022, and with Calmfors et al. (2022) who also find that this is entirely due to automatic stabilizers rather than active fiscal policy.

[28] In the later period, the correlation is -0.62 in the U.S., -0.77 in France, -0.59 in Germany and -0.53 in Sweden.

[29] Berti et al. (2016) also obtain negative inflation coefficients for some countries. A possible explanation would be that expenditures are indexed by inflation, or that tax bases are somehow lagged. We are unaware of any such characteristics in German fiscal policy in the late 20th century.

that such behavioural changes can occur. Finally, the method does not acknowledge that there is a limit to the size of primary surpluses, and therefore some limit for the debt level beyond which the government cannot *credibly* commit to servicing it with surpluses. Credibility is an important part of sustainability, because a loss of credibility may result in *sovereign stress*, whereby interest rates rise sharply and further reduce the government's ability to meet its financial obligations.

Other approaches to analysing sustainability attempt to deal with these issues by making forward-looking assessments which weigh in credibility concerns. Such approaches often include making baseline projections of debt trajectories based on announced policies and forecasts for debt determinants, assessing risks to the baseline, and combining the results with assessments of qualitative factors which affect credibility, such as the country's quality of institutions. Table 4 summarizes some overall assessments, identified risks and mitigating factors from recent such evaluations by the IMF and the European Commission for each of our example economies. The conclusion is generally that sustainability and sovereign stress risks are low overall (at least in the short-term), and these assessments partly build on factors such as the countries' strong access to financing, institutional strength, and the composition of their debt.[30] However, it is worth remembering that projections are naturally uncertain, and that credibility factors are difficult to quantify and measure.

[30] Similar factors are often used in other assessments of fiscal sustainability as well, see for example Edelberg et al. (2025) and Congressional Budget Office (2025). Although the latter evaluation considers that the debt is sustainable based on these factors, it also emphasizes that a large and growing debt can have other negative consequences, such as reduced private investment and slower output growth, due to higher interest rates.

Table 4. Debt sustainability evaluations by the IMF and the European Commission as of May 2025

	IMF Debt Sustainability Analysis	EC Debt Sustainability Monitor
Sweden	**Risks:** - **Mitigating factors:** Low debt level, historical debt performance, robust fiscal framework. **Assessment:** Overall low risk of sovereign stress and explicitly states that debt is sustainable.	**Risks:** High share of short-term debt, contingent liability risks stemming from elevated private debt. **Mitigating factors:** Financial market perceptions, favourable growth and interest rate developments, unchanged aging-related expenditures, stable financing sources. **Assessment:** Low risk overall.
France	**Risks:** High debt level, debt dynamics sensitive to future paths of interest rate and growth, long-term spending pressures due to demographic changes and green transition. **Mitigating factors:** Planned consolidation measures, large institutional investor base, deep and liquid debt market. **Assessment:** Overall low risk of sovereign stress.	**Risks:** Projected debt increase, unfavourable developments in interest rates and growth, liability risks from private sector. **Mitigating factors:** Financial market perceptions, stable financing sources, lengthening of debt maturity in recent years. **Assessment:** Low risk in short-term, high in medium-term, medium in long-term.
Germany	**Risks:** Aging-related expenditures on pensions and health care. **Mitigating factors:** Strong institutions, stable investor base, relatively long average debt maturity, predominantly euro-denominated debt. **Assessment:** Overall low risk of sovereign stress and explicitly states that debt is sustainable.	**Risks:** Projected debt increase, aging-related expenditures, high share of short-term debt. **Mitigating factors:** Financial market perceptions, favourable growth and interest rate developments, stable financing sources, lengthening of debt maturity in recent years. **Assessment:** Low risk in short-term, medium in medium- and long-term.
United States	**Risks:** Debt expected to rise for several years, aging-related spending pressures on health and social security. **Mitigating factors:** Strong institutions, depth of investor pool, role of the US dollar in the international system. **Assessment:** Overall low risk of sovereign stress and explicitly states that debt is sustainable.	-

Note. Overview of risks, mitigating factors and assessments made in the IMF's and the European Commission's most recent debt sustainability evaluations. For more information, see the actual reports.

Sources: IMF (2024b, 2024c, 2024d, 2025b), European Commission (2024).

5 Concluding comments

Recent years have seen an increased attention to the relationship between monetary and fiscal policy, and the potential need for stronger coordination between the two. At the same time, recent developments are pointing towards more expansionary fiscal policy in the years to come, with announcements of substantial increases in government spending and relaxation of fiscal rules. These factors make it likely that fiscal developments will play a larger role in monetary policy analysis going forward. To better understand and analyse the potential consequences of these developments, this article has provided an overview of fiscal rules, the evolution of public debt levels in recent decades, and fiscal sustainability, with a particular focus on a few selected economies.

Since the turn of the millennium, there has been a widespread adoption of fiscal rules which are designed to improve public finances. Yet, public debt levels have continued to rise in most advanced economies and the causal effects of rules remain debated. It is possible that the type of rule and its design matter for fiscal discipline, but it is also possible that fiscal rules and fiscal discipline are simply codetermined by fiscally concerned electorates. The lack of clarity regarding the effects of rules makes it more difficult to predict the consequences of relaxing them.

Recent announcements of increased government spending on matters such as defence and infrastructure are likely to cause further increases in public debt. But economies also continue to struggle with the factors that have caused debt accumulation in previous decades. While crises, recessions and political economy dynamics are difficult to predict, aging populations and interest burdens will continue to put pressure on public finances. The fact that global interest rates have risen in recent years compounds the problem, which once again highlights the connection between fiscal and monetary policy.

Rising public debt levels continue to pose a risk to fiscal sustainability. However, sustainability remains difficult to evaluate. Our estimates of a fiscal reaction function provide evidence that Swedish and German fiscal policy has increasingly moved towards debt management since the introduction of fiscal rules, while French and U.S. fiscal policy has not. While such estimates may serve as a useful indicator of future behaviour, there is no guarantee that they will. They also do not provide any guidance on at which point the debt level is no longer sustainable. Such assessments must be based on credibility, which is difficult to measure.

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Appendix A – Stationarity and cointegration tests

Table A1. ADF test for unit root in the public debt and the primary balance, sample period 1950-2023

	PB_{t-1}		$Debt_{t-2}$		Conclusion
	H0: Random walk, no restrictions		H0: Random walk, no restrictions		
	ADF test	Phillips-Perron test	ADF test	Phillips-Perron test	
Sweden	-4.247*** (2 lagged difference)	-3.153*	-2.169 (1 lagged difference)	-2.034	• PB_{t-1} is I(0) by the ADF test, but weak significance by the Phillips-Perron test. • $Debt_{t-2}$ is I(1).
Germany	-4.669*** (0 lagged difference)	-4.652***	-3.415 ** (1 lagged difference)	-3.008	• PB_{t-1} is I(0). • $Debt_{t-2}$ is I(0) by the ADF test but not the Phillips-Perron test.
France	-2.988 (2 lagged difference)	-4.217***	-2.580 (0 lagged difference)	-2.582	• PB_{t-1} is I(1) by the ADF test, but not the Phillips-Perron test. • $Debt_{t-2}$ is I(1).
United States	-4.795*** (1 lagged difference)	-3.893**	-2.084 (0 lagged difference)	-2.062	• PB_{t-1} is I(0). • $Debt_{t-2}$ is I(1).

Note. ***p<0.01, **p<0.05, *p<0.1. Lag length for the ADF test has been selected using the AIC.

Table A2. ADF test for unit root in first-differenced public debt and primary balance, sample period 1950-2023

	$\Delta \mathrm{PB}_t$		$\Delta Debt_{t-1}$		Conclusion
	H0: Random walk, no restrictions		H0: Random walk, no restrictions		
	ADF test	Phillips-Perron test	ADF test	Phillips-Perron test	
Sweden	-5.860*** (0 lagged difference)	-5.829***	-4.983*** (0 lagged difference)	-5.010***	• $\Delta \mathrm{PB}_t$ is I(0). • $\Delta Debt_{t-1}$ is I(0).
Germany	-8.345*** (1 lagged difference)	-10.960***	-6.207 *** (0 lagged difference)	-6.160***	• $\Delta \mathrm{PB}_t$ is I(0). • $\Delta Debt_{t-1}$ is I(0).
France	-9.443*** (1 lagged difference)	-10.345***	-8.005*** (0 lagged difference)	-8.002***	• $\Delta \mathrm{PB}_t$ is I(0). • $\Delta Debt_{t-1}$ is I(0).
United States	-5.941*** (3 lagged difference)	-8.118***	-7.594*** (0 lagged difference)	-7.570***	• $\Delta \mathrm{PB}_t$ is I(0). • $\Delta Debt_{t-1}$ is I(0).

Note. ***p<0.01, **p<0.05, *p<0.1. Lag length for the ADF test has been selected using the AIC.

Table A3. ADF test for unit root in the expenditure gap and GDP gap, sample period 1950-2023

	GG_t		YG_t		Conclusion
	H0: Random walk, no restrictions		H0: Random walk, no restrictions		
	ADF test	Phillips-Perron test	ADF test	Phillips-Perron test	
Sweden	-6.179*** (3 lagged difference)	-6.513***	-4.702*** (3 lagged difference)	-5.069***	• GG_t is I(0). • YG_t is I(0).
Germany	-7.807*** (2 lagged difference)	-8.709***	-5.974 *** (3 lagged difference)	-6.667***	• GG_t is I(0). • YG_t is I(0).
France	-6.132*** (3 lagged difference)	-8.675***	-5.014*** (0 lagged difference)	-4.999***	• GG_t is I(0). • YG_t is I(0).
United States	-6.737*** (3 lagged difference)	-6.223***	-5.696*** (2 lagged difference)	-5.506***	• GG_t is I(0). • YG_t is I(0).

Note. ***p<0.01, **p<0.05, *p<0.1. Lag length for the ADF test has been selected using the AIC.

Table A4. ADF test for unit root in inflation rate and implicit interest rate, sample period 1950-2023

	$\Delta infl_t$		$\Delta reff_t$		Conclusion
	H0: Random walk, no restrictions		H0: Random walk, no restrictions		
	ADF test	Phillips-Perron test	ADF test	Phillips-Perron test	
Sweden	-6.819*** (3 lagged difference)	-11.897***	-7.688*** (0 lagged difference)	-7.703***	• $infl_t$ is I(0). • $reff_t$ is I(0).
Germany	-6.924*** (3 lagged difference)	-26.658***	-5.811*** (3 lagged difference)	-10.643***	• $infl_t$ is I(0). • $reff_t$ is I(0).
France	-6.635*** (2 lagged difference)	-12.002***	-5.619*** (3 lagged difference)	-8.041***	• $infl_t$ is I(0). • $reff_t$ is I(0).
United States	-6.697*** (3 lagged difference)	-8.465***	-5.583*** (0 lagged difference)	-5.563***	• $infl_t$ is I(0). • $reff_t$ is I(0).

Note. ***p<0.01, **p<0.05, *p<0.1. Lag length for the ADF test has been selected using the AIC.

Table A5. Tests for cointegration between PB_{t-1} and $Debt_{t-2}$, sample period 1952-2022

	Engle-Granger test		Johansen test	Conclusion
	Using ADF	Using Phillips-Perron		
Sweden	-4.203*** (2 lagged difference)	-3.176*	Rank 1, trace statistic 3.6027	Cointegrated.
Germany	-4.651*** (0 lagged difference)	-4.634***	Rank 1, trace statistic 0.0938	Cointegrated.
France	-4.786*** (1 lagged difference)	-4.881***	Rank 1, trace statistic 2.2063	Cointegrated.
United States	-4.373*** (1 lagged difference)	-3.601**	Rank 1, trace statistic 0.0341	Cointegrated.

Note. ***p<0.01, **p<0.05, *p<0.1. Lag length for the ADF test has been selected using the AIC.

Appendix B – Data

Table B1 below presents the data sources and transformations for each variable used in our fiscal reaction function. These closely follow those in Berti et al. (2016), on which much of our methodology is based.

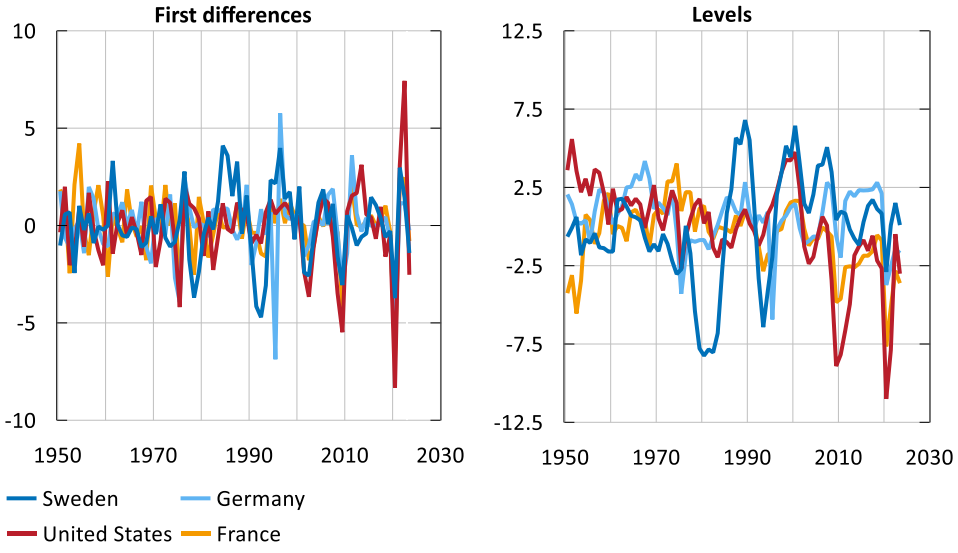
The Public Finances in Modern History (PFMH) dataset refers to the 2024 version. The choice between the 2024 and 2025 version has no implications for most variables, as most revisions concern recent years, and we do not use any PFMH data beyond 2001. The exception is the U.S. primary expenditure and primary balance series. In the 2024 version of the PFMH dataset, there is a significant jump in both government primary expenditures and revenues between 1959 and 1960 due to a change in data sources. However, because expenditures and revenues were collected consistently within each year, there is no break in the primary balance series. In contrast, the 2025 version of the PFMH dataset, significantly revises U.S. government expenditures for 1929–2000 to ensure data consistency with Federal Reserve Economic Data (FRED). This removed the jump in government primary expenditures but not in revenues, resulting in a break in the primary balance series. Since the primary balance is a key variable in our analysis, and because consistency with FRED is less of a concern for our purposes, we have chosen to use the 2024 version of the PFMH dataset.

Table B1. Data sources and transformations

	Source	Transformation
Primary balance (% of GDP)	IMF's Public Finances in Modern History (PFMH) and AMECO	For each country, the AMECO series has been extended backward from 1995 using annual changes in the PFMH series.
Public debt (% of GDP)	PFMH and AMECO	For each country, the AMECO series has been extended backward from 1995 using annual changes in the PFMH series.
Expenditure gap (GG)	PFMH and AMECO	First, a government expenditures series for each country is created by extending the AMECO series backward from 1995 using annual changes in the PFMH series. Second, we estimate a trend in the linked series using a Hodrick-Prescott filter. The final series is obtained by subtracting the trend from the actual series.
Output gap (YG)	AMECO and the 2023 Maddison Project Database	For each country, the output gap series is obtained by extending the AMECO measure of the output gap backward using annual changes in our own measure of the output gap. Our own measure is derived as follows: First, historical GDP data for each country is sourced from the Maddison Project Database. Second, we estimate a trend in the series using a Hodrick-Prescott filter. Third, the trend is subtracted from the actual series. Finally, the AMECO measure and our own measure are linked at the closest point between the two series within five years of the start of the AMECO series.
Inflation rate	AMECO and Reinhart and Rogoff (2010) dataset (available at: https://carmenreinhart.com/data/)	For each country, the AMECO series has been extended backward from 2001 using the Reinhart and Rogoff series. The inflation rate is expressed in first differences to ensure stationarity.
Implicit interest rate	AMECO, PFMH and the IMF's Global Debt Database	For each country, the implicit interest rate series is obtained by extending the AMECO series back from 1996 using annual changes in our own measure. Our own measure is derived as follows: First, we obtain historical data on public debt as percentage of GDP, as well as interest paid on public debt as percentage of GDP, from the PFMH database. We also obtain GDP data at current prices from the Global Debt Database and construct a GDP value for the year 1949 using the real GDP growth rate from the PFMH database. Second, we multiply the debt and interest paid series by the GDP series. Finally, we calculate the implicit interest rate series by dividing each interest paid value by the debt value from the previous year. The implicit interest rate is expressed in first differences to ensure stationarity.

Figure B1. Primary balance expressed in first differences and levels

Per cent of GDP

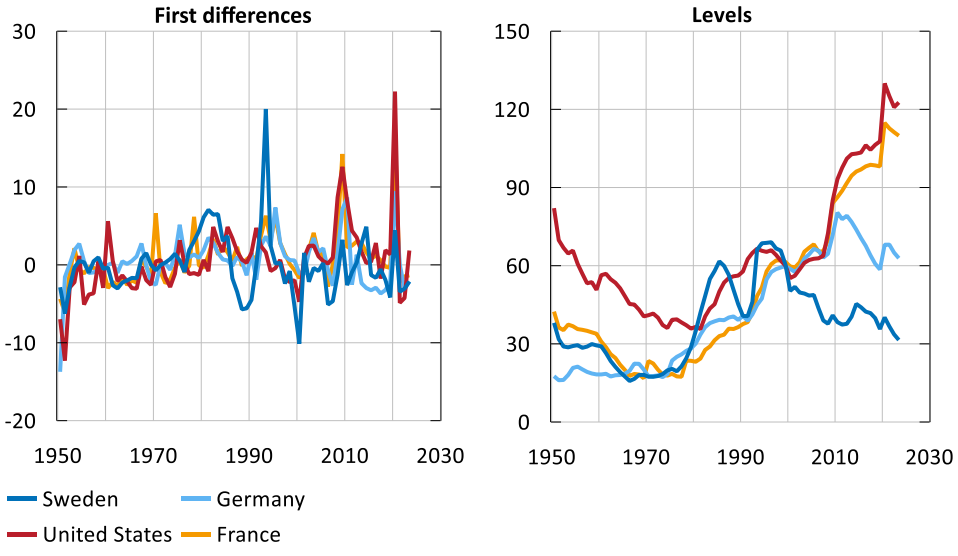


Note. See Table B1 for details on transformations.

Sources: AMECO, IMF and own calculations.

Figure B2. Public debt expressed in first differences and levels

Per cent of GDP

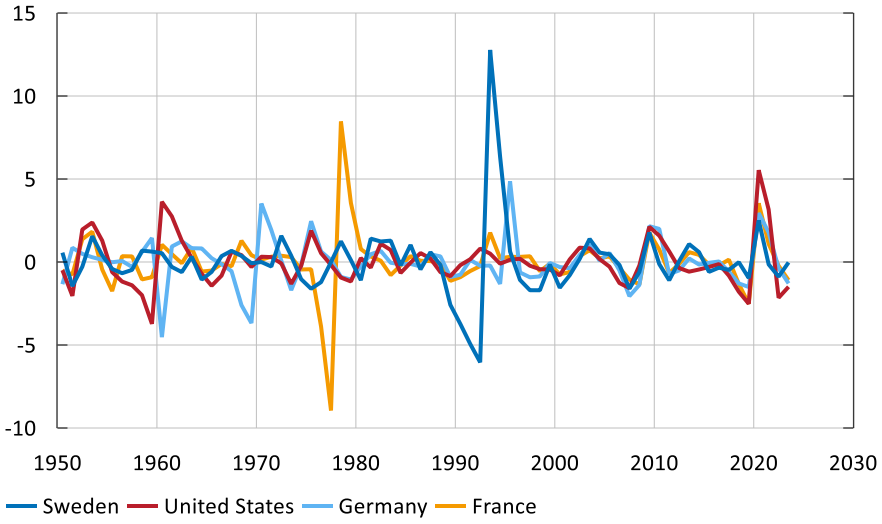


Note. See Table B1 for details on transformations.

Sources: AMECO, IMF and own calculations.

Figure B3. Expenditure gap

Per cent of GDP

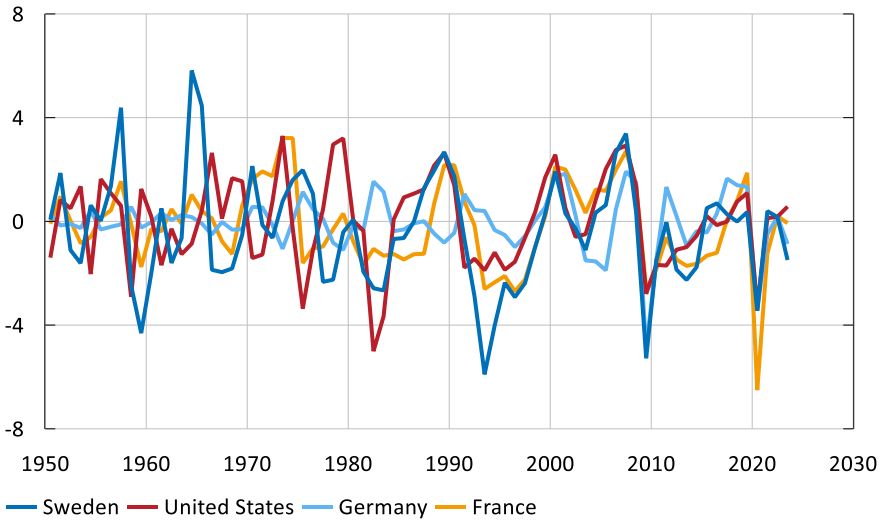


Note. See Table B1 for details on transformations.

Sources: AMECO, IMF and own calculations.

Figure B4. Output gap

Per cent of GDP

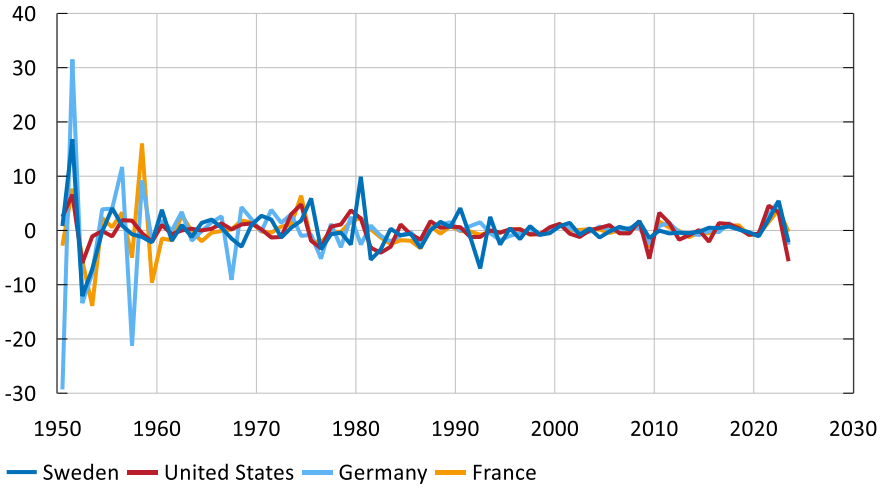


Note. See Table B1 for details on transformations.

Sources: AMECO, the 2023 Maddison Project database and own calculations.

Figure B5. Inflation rate

Annual percentage change, first difference

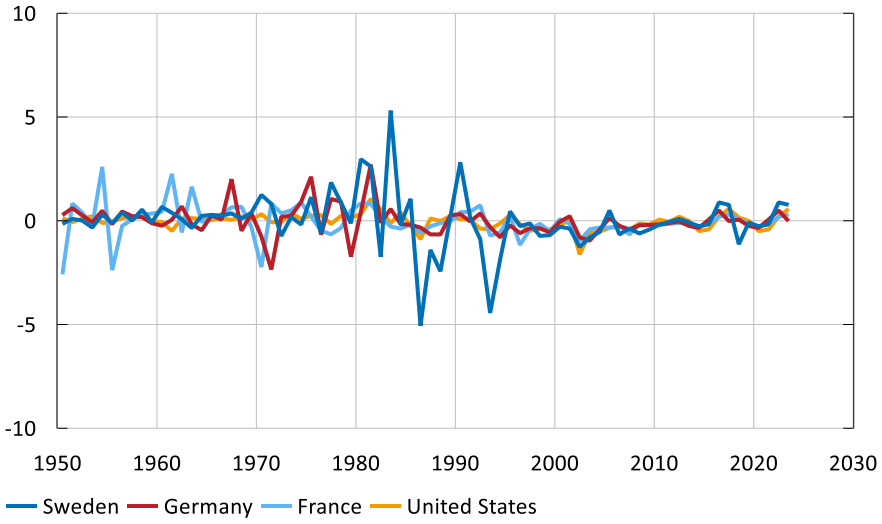


Note. See Table B1 for details on transformations.

Sources: AMECO, Reinhart and Rogoff (2010) and own calculations.

Figure B6. Implicit interest rate

Per cent, first difference



Note. See Table B1 for details on transformations.

Sources: AMECO, IMF and own calculations.

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