Economic Commentary

A surprising pattern is hidden behind the trend in long-term interest rates

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In recent decades, the persistent global decline in both nominal and real interest rates has been one of the more prominent macroeconomic trends. There is a broad consensus that this decline is largely due to changes in several structural factors that are beyond the control of monetary policy.

Hillenbrand (2023) has now made an unexpected discovery. It is namely the case that the declines in interest rates that add up over time to form the trend in the United States occur almost exclusively in connection with meetings of the US Federal Reserve (the Fed). This is despite the fact that the Fed only directly controls the short-term nominal interest rate. Hillenbrand's explanation is that investors become aware of the long-term level of interest rates in connection with these meetings.

In this Economic Commentary[1], we extend Hillenbrand's empirical analysis to include small open economies such as Canada, Sweden and Germany. We also include the most recent period with rapidly rising interest rates.

We find that around half of the trend decline in interest rates in these economies occurs outside the Fed's meeting days. We further note a change in the pattern after 2021, also with regard to the United States. The rapid rise in interest rates no longer occurs around Fed meetings to the same extent as before 2021. If it is indeed the case that the Fed's guidance is behind the pattern, this may suggest that the higher interest rates of recent years are not associated with a rising long-term trend.

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[1] Economic Commentaries are brief analyses of issues that are relevant to the Riksbank. They can be written by individual members of the Executive Board or by employees at the Riksbank. Employees' Commentaries are approved by their head of department, while Executive Board members are themselves responsible for the content of their Commentaries.

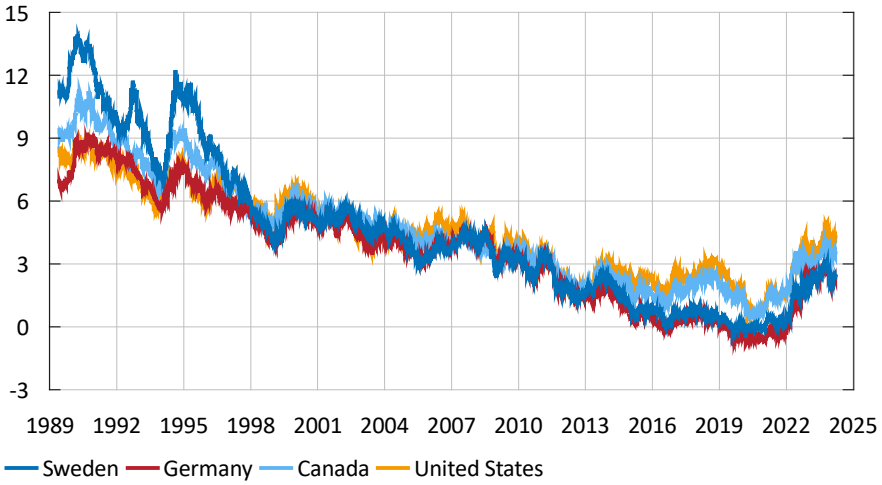
[2] Thanks to Mikael Apel, Mattias Erlandsson, Martin Flodén and Anders Vredin for their valuable comments.

Behind the trend in long-term interest rates...

One of the more prominent macroeconomic trends in recent decades has been the prolonged negative trend in nominal and real interest rates (see Figure 1).[3]

Figure 1. Yields, nominal government bonds, 10 year maturity

Per cent



Note. The figure shows the yield on a 10-year government bond in Sweden, Germany, Canada and the United States.

Sources: Federal Reserve, Bundesbank, Bank of Canada and Macrobond.

At present, the trend may seem distant, but how it develops in the future is an important question for how interest rates may develop once inflation stabilises around the inflation target again.

Although central banks have the ability to control interest rates in the short term, most economists believe that central banks have limited ability to influence nominal and real interest rates in the long term. The most common explanations for the trend decline in interest rates are the global savings surplus, the lack of investment opportunities, and the slowdown in productivity growth.[4] What these factors have in common is that they are slow-moving and probably beyond the control of monetary policy.

...there is a surprising pattern

In light of these theories, Hillenbrand (2023) has documented a surprising pattern: interest rate changes in a narrow window of time around the Federal Reserve's monetary policy meetings capture virtually the entire trend decline in interest rates over

[3] The real interest rate is approximately equal to the interest rate minus the average inflation rate over the duration of the loan.

[4] See, for example, Bauer and Rudebusch (2020), Bernanke (2005), Lundvall (2020), Summers (2014), Gordon (2016) and Flodberg (2024).

the past few decades.[5] He arrived at this conclusion by studying only the interest rate changes that occur around monetary policy meetings and comparing the sum of these changes with the interest rate changes that occur on all other days of the year.[6] In Figure 2, we replicate his results for the United States and extend the sample period to March 2024.[7]

The method of calculating these, so to speak, hypothetical interest rate changes may require some further explanation. We can start by noting that between June 1989 and March 2024 there are about 9000 working days. Thus, interest rates since 1989 change for different reasons on each of these days. Together, all changes in interest rates add up to the trend observed in Figure 1. During these 9000 days, the Fed has held about 300 meetings to decide on monetary policy in the United States.[8] Surprisingly, if one adds up the interest rate changes that occur only during these 300 days - as well as the day before and the day after - the sum is roughly equal to the sum of all 9000 days of interest rate changes (blue line versus light blue line in Figure 2). Thus, the entire trend decline in interest rates occurs in the roughly 10 per cent of days surrounding the Fed's meetings.[9] But not only that. In addition, we observe that the majority of the trend decline in interest rates after 2005 is in connection with Fed meetings which take place in the last month of each quarter, i.e. in March, June, September and December.[10] Thus, interest rate changes around all Fed meetings do not contribute equally to the decline in interest rates.

[5] The Federal Open Market Committee (FOMC) is the committee of the Federal Reserve System (Fed) responsible for implementing monetary policy. The FOMC consists of 12 voting members: the seven members of the Board of Governors, the President of the Federal Reserve Bank of New York, and four of the remaining 11 Reserve Bank presidents, who serve on a rotating schedule with one-year terms. Decisions on monetary policy are made by the FOMC based on a majority vote. Since 1981, the FOMC has typically held eight scheduled meetings per year. The majority of monetary policy decisions since 1994 have been taken at these scheduled meetings, while a few decisions have been taken at unscheduled meetings (usually in the form of teleconferences). Prior to 1994, these unscheduled meetings were more common.

[6] Greenlaw, Hamilton, Harris and West (2018) used the same approach to study the effects of the Fed's asset purchases after 2008.

[7] The results are very similar if we instead study the corresponding US Treasury Inflation-Protected Securities.

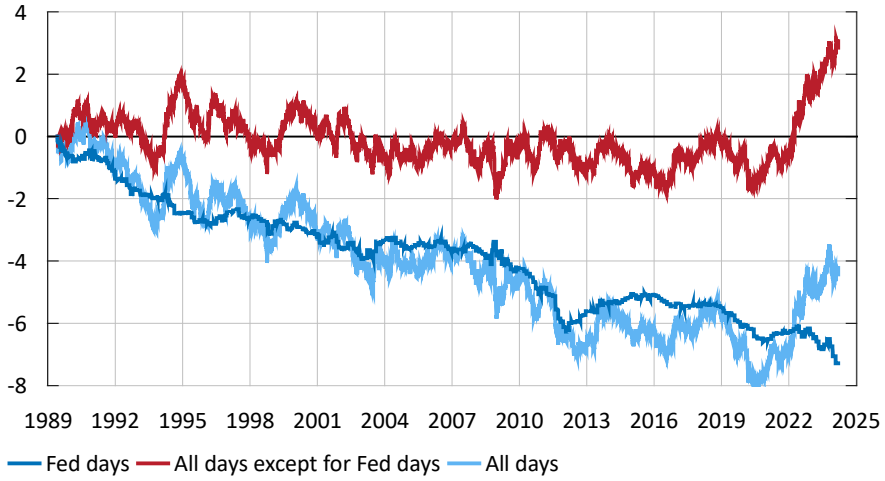
[8] 277 of these meetings were scheduled and 26 unscheduled. Figure 6 shows the distribution of daily changes in a 10-year US government bond on Fed days compared to all other days. The distributions are similar but the interest rate changes on Fed days have a slightly higher variance with a longer ‘tail’ to the left.

[9] The decline in the ten-year rate is roughly equally distributed across the three days. If we had only summarised the interest rate changes on Fed days, the total decline in interest rates is about 2.8 percentage points. The corresponding figures for the day before and the day after are -2.5 and -2 percentage points respectively.

[10] See Figure 7 in the Appendix. During these months, the Fed publishes a document called the "Summary of Economic Projections" (SEP). This summary is an overview of the FOMC members' forecasts of economic developments. It contains forecasts for growth in gross domestic product, unemployment, inflation, and interest rates over both short and long time horizons. The four months are also important in bond and derivatives markets. For example, they mark the end of financial quarters, which often leads to increased trading activity. Investors and companies make quarterly reconciliations of their portfolios and balance sheets, which may include buying or selling bonds and derivatives to balance risk or hedge profits. Moreover, many standardised derivative contracts, such as futures and options, have maturity dates that fall in these months. This increases the number of trading transactions as market participants roll their existing positions into new contracts or liquidate positions to realise gains or losses.

Figure 2. Accumulated changes, 10-year government bond yield, USA

Percentage points



Note. The figure shows that a 3-day window around Fed meetings captures the trend decline in the yield on a 10-year US Treasury bond. This 3-day window includes, for each Fed meeting, the day before the meeting, the day of the meeting and the day after the meeting. The light blue line shows the actual development of the yield on 10-year US government bonds, adding up all interest rate changes since 1 June 1989. This is the same line shown in Figure 1, except that the line shown here starts from zero. The blue line shows a hypothetical time series constructed by taking into account only the interest rate changes realised in the 3-day window around Fed meetings. Interest rate changes that occurred on all other days outside this window are set to zero. The red line shows a hypothetical time series constructed by taking into account only interest rate changes that occurred on days outside the 3-day window around Fed meetings. The analysis includes all Fed meetings (including unannounced meetings) from June 1989 to March 2024.

Source: Federal Reserve and own calculations.

The documented pattern is surprising in several ways.

First, it is surprising that the trend decline in interest rates occurs around Fed meetings. One would think that the changes in interest rates on these occasions are mostly due to the decisions the Fed takes on its monetary policy.[11] However, as mentioned above, many theories have suggested that the actual causes of the downturn are not directly linked to monetary policy. Interest rates started to fall in the 1980s when inflation was in double digits. The subsequent decline in the first part of the 1980s was probably due to a fall in long-term inflation expectations.[12] Economists have mostly seen the decline in interest rates over the following three decades as a real phenomenon. For example, estimates of the natural interest rate – the real interest rate at which monetary policy is neither expansionary nor contractionary – have declined noticeably.[13] While there is considerable uncertainty about the level of the natural rate, declines in market measures of real interest rates have presented a similar picture.

[11] See, for instance, Hanson and Stein (2015) for a discussion.

[12] See, for instance, Cieslak and Povala, (2015).

[13] See for example Laubach and Williams (2003), Bauer and Rudebusch, (2020) and Armelius, Solberger, Spånberg and Österholm (2024).

Second, it is surprising that long-term interest rates change so much and so regularly in the context of Fed meetings. From a theoretical perspective, we would not have expected it because the Fed only controls the nominal short-term interest rate (the overnight rate). Monetary policy can only affect real interest rates temporarily through price and wage rigidity. Therefore, we would expect the impact on long-term interest rates and the real interest rate to be only temporary. Moreover, the real economic effects of monetary policy do not appear to be very long-lasting.[14] Thus, it is surprising that prices of long-term bonds, especially long-term real bonds, exhibit such large and systematic movements around Fed meetings.

Third, we note a change in the pattern after 2021. The rapid rise in interest rates no longer occurs around Fed meetings to the same extent. However, as we are focusing on trends, it is difficult to say much about the long-term pattern after only a few years. In any case, it is clear that the red line in Figure 2, which is constructed by taking into account only interest rate changes that did not occur around Fed meetings, has increased in a way not seen since 1989.

What could explain the pattern?

The general view among economists, as we noted above, is that structural economic forces have driven the natural rate down over time, and the Fed has had to adjust monetary policy by following this trend. Otherwise, the Fed would have kept interest rates above the natural rate for a long time, which could have led to a deflationary spiral. According to this theory, the Fed must simply follow the trend in real interest rates.

Hillenbrand (2023) assumes that the structural drivers are fundamentally responsible for the trend in interest rates but offers an explanation as to why the trend is captured by interest rate changes around monetary policy meetings.[15] According to Hillenbrand (2023), investors learn about the trend decline in nominal and real interest rates precisely in connection with the Fed meetings. This may be because the market is learning important information about the long-term level of interest rates from the Fed. It may also be because Fed meetings play a coordinating role in financial markets and investors gather information, or trade, based on their information, especially around Fed meetings. Hillenbrand calls this hypothesis "Long-term Fed guidance", reflecting the idea that the Fed's actions and communications can provide guidance to markets on the long-term level of nominal and real interest rates.

According to Hillenbrand (2023), the Fed, through its position and resources, can provide information on the natural rate even if it is (as the Fed itself believes) outside the Fed's control.[16] To estimate its level, most models therefore rely on observing the effects of monetary policy. Thus, by closely monitoring the effect of interest rates on

[14] See, for example, Ramey (2016).

[15] See Hanson and Stein (2015), Hanson, Lucca and Wright (2021) and Hillenbrand (2023) for a discussion of alternative explanations for the sensitivity of long-term interest rates to changes in shorter-term interest rates.

[16] See, for example, Powell (2018).

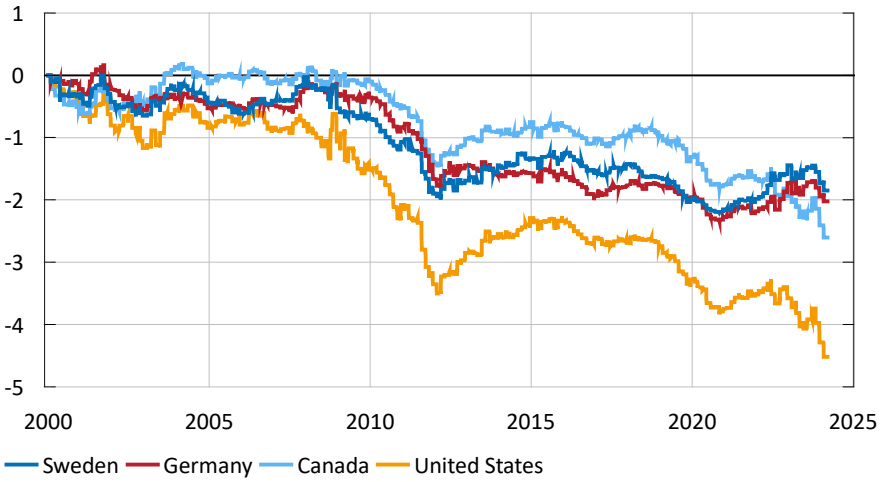
the economy, the Fed, according to this hypothesis, gets an idea of the natural interest rate. This may give the Fed an advantage over many market participants who may not have the same resources or sufficient financial incentives to analyse the impact of interest rates on the economy. Thus, the Fed cannot influence the trend itself but takes it into account when making monetary policy decisions. These decisions spill over to market participants' information on long-term interest rate levels precisely in the context of monetary policy decisions.

Is the same unexpected pattern hiding behind trends in interest rates in small open economies?

An interesting question that Hillenbrand (2023) does not analyse is whether the narrow time window around Fed monetary policy meetings also captures the trend decline in interest rates in small, or smaller, open economies such as Canada, Sweden and Germany. Given the explanation offered by Hillenbrand (2023) and the fact that small open economies do not affect the global trend, one might suspect that this should be the case. Moreover, financial agents in small open economies should have even fewer resources and opportunities to estimate the long-term level of interest rates and thus more incentives to take into account the information around Fed meetings. Armelius, Solberger and Spånberg (2018) have also shown that the decline in Swedish interest rates over the past couple of decades can largely be explained by the decline in natural interest rates abroad, with the greatest influence coming from interest rates in the United States.

Figure 3. Accumulated changes, 10-year government bond yields, Sweden, Germany, Canada and USA around Fed meetings

Percentage points



Note. The lines show hypothetical time series constructed by only taking into account the interest rate changes realised in the 3-day window around Fed meetings between 1 January 2000 and 14 March 2024. Interest rate changes that occurred on all other days outside this window are set to zero. The yellow line is the same as the hypothetical time series (blue line) shown in Figure 2. The difference is that the hypothetical series is calculated from 1 January 2000 in this figure but from 1 June 1989 in Figure 2. See also the note to Figure 2.

Sources: Federal Reserve, Bundesbank, Bank of Canada and Macrobond.

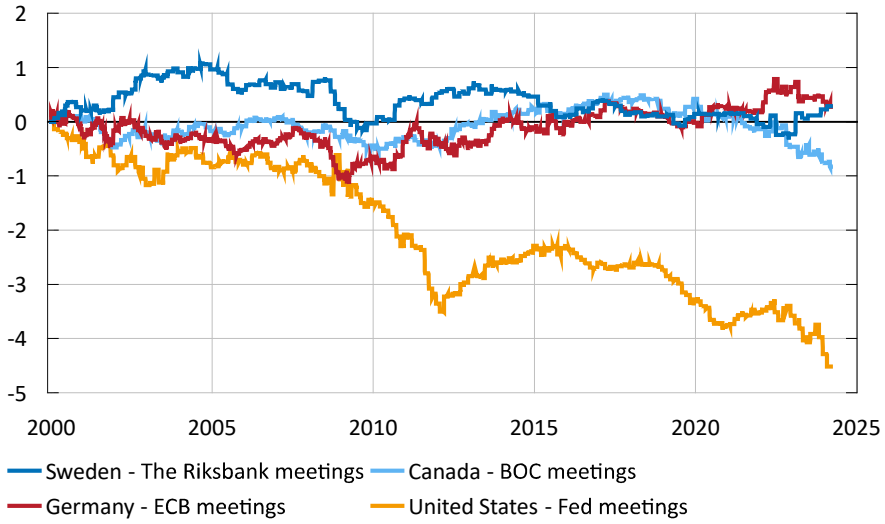
Figure 3 shows the total changes in interest rates on 10-year government bonds in Sweden, Germany, Canada and the United States around Fed meetings. The yellow line shows the hypothetical time series for the United States and is the same as shown in Figure 2 (blue line). The difference is that the hypothetical series is calculated from 1 January 2000 in Figure 3 but from 1 June 1989 in Figure 2.

It is clear that long-term interest rates in the three open economies develop in a similar way to US interest rates around Fed meetings. We note that in the shorter term, i.e. meeting by meeting, the covariance between the United States and Canada appears higher than that of Germany and Sweden, but the trends are similar.[17]

[17] Figures 8 and 9 in the appendix show that similar conclusions also apply to Denmark, Finland, France, the UK and Norway. The trend in Norway is the most similar to that in the United States.

Figure 4. Accumulated changes, 10-year government bond yields, Sweden, Germany, Canada and USA around the respective central bank's monetary policy meeting

Percentage points



Note. The lines show hypothetical time series constructed by only taking into account the interest rate changes realised in the 3-day window around the respective central bank's monetary policy meetings between 1 January 2000 and 14 March 2024, which do not overlap with the Fed's 3-day window. Interest rate changes that occurred on all other days outside this window are set to zero. See also the note to Figure 2.

Sources: European Central Bank, Bundesbank, Bank of Canada, Federal Reserve and Macrobond.

It is also clear that the trend decline in interest rates in the three open economies also occurs on days other than around Fed meetings. The overall decline in interest rates in the three economies around the Fed's meetings is only half as large as the decline in US interest rates. It is also difficult to say why investors in the three open economies do not fully incorporate knowledge of the trend decline in nominal interest rates precisely in the context of Fed meetings as investors in the US seem to do, according to Hillenbrand's (2023) theory.

Overall, the trends in interest rates in small open economies conceal, at least in part, the same unexpected pattern as the one in the United States. The fact that about half of the trend occurs on other days brings us to the next question, namely whether the remainder of the trend arises in connection with announcements of monetary policy decisions by the central banks of the three open economies.

Figure 4 shows that this has not been the case. It shows how yields on 10-year government bonds in Sweden, Germany, Canada and the United States have changed in conjunction with each central bank's monetary policy meetings.[18] The changes at

[18] The time window for the monetary policy meetings of the Riksbank, the Bank of Canada and the ECB overlaps with the time window for the Fed's meetings in 12%, 4% and 8% of the cases respectively. The interest rate changes that occurred during these days are set to zero. The overall results and conclusions are not affected by including all meetings instead.

these meetings in the three open economies show no clear direction over the whole period since 1 January 2000.

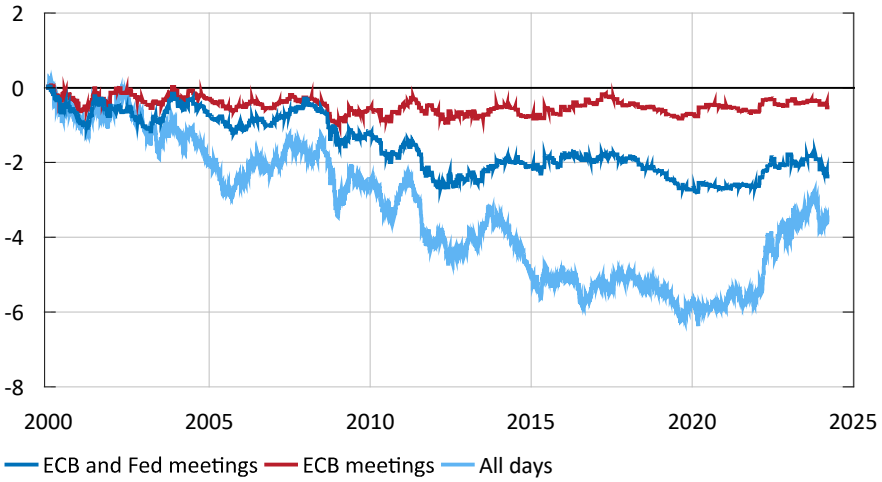
Since the trend does not appear to arise on days when the Riksbank announces monetary policy decisions, one can ask how Swedish long-term interest rates change on days when the European Central Bank announces monetary policy decisions. Figure 5 shows precisely this. Interest rate changes around the ECB's monetary policy decisions add up to just under one percentage point and together with interest rate changes on Fed days they add up to between two and three percentage points. A significant part of the trend in Swedish government bond yields thus arises in connection with the announcement of monetary policy decisions by major central banks.

Given that the trends in long-term interest rates are so similar and that previous studies have shown that the decline in Swedish interest rates over the past couple of decades can largely be explained by the decline in international interest rates, one might have expected a larger part of the trend to arise when the Fed and the ECB announce monetary policy decisions. The fact that this is not the case may be related to systematic differences in the timing of other important, possibly country-specific, news. If positive country-specific news tended to occur at the same time as Fed meetings, it could result in the trend occurring not only on Fed days but also on other days. Figure 11 in the Appendix shows that there may be something to this hypothesis. The figure shows summarised changes around Fed meetings in an index that measures surprises in economic data in relation to market expectations. As can be seen, the news published on Fed days exceeds analysts' expectations in Sweden and Canada but not in the United States over the whole time period.

What does it mean that interest rates increase rapidly after 2021 but no longer in connection with Fed meetings? If the Fed's guidance is the reason for this pattern before 2021, the broken relationship after 2021 could possibly imply a continued low trend going forward. If the rate increase was caused by a rising trend that was also captured by the Fed, the pattern would likely have continued beyond 2021. In other words, as the pattern is broken, it could suggest that the rate increases since 2021 were not necessarily caused by a general rising trend in interest rates. Alternatively, investors are no longer guided by the Fed after 2021.

Figure 5. Accumulated changes, 10-year government bond yield, Sweden at time of ECB and Fed meetings

Percentage points



Note. The lines show time series constructed by only taking into account the index changes realised in the 3-day window around the only the ECB's and the ECB's plus the Fed's monetary policy meetings between 1 January 2000 and 14 March 2024. Interest rate changes that occurred on all other days outside this window are set to zero. The light blue line shows the actual development of the yield on 10-year Swedish government bond, in one totals all interest rate changes since 1 June 2000. This is the same line shown in Figure 1, except that the line shown here starts from zero on 1 January 2000.

Sources: Federal Reserve, the European Central Bank, Macrobond and the Riksbank.

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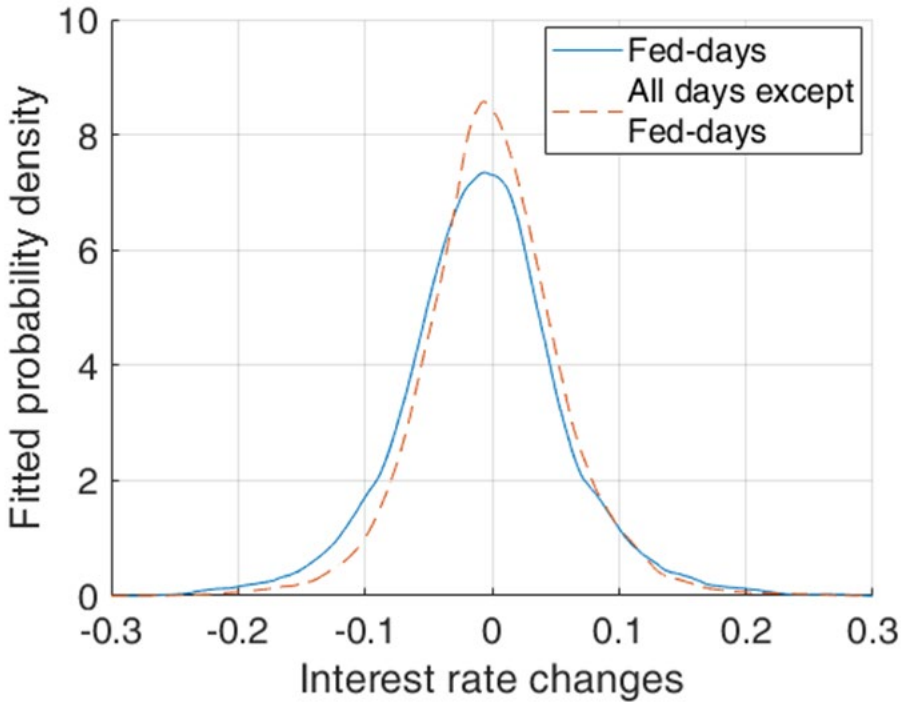
APPENDIX - Additional figures

Figure 6. Distribution of interest rate changes, 10-year government bond, USA

Percentage points

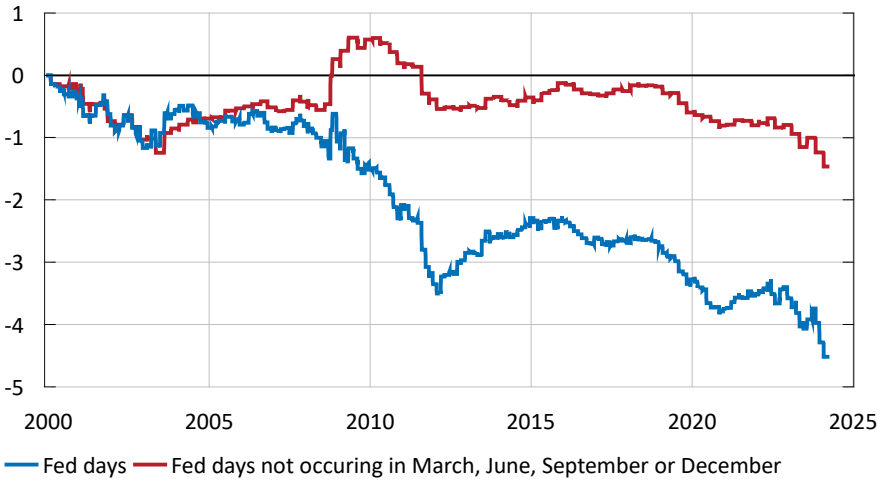


Note. The figure shows two non-parametric estimates of a probability distribution based on daily changes in interest rates between 1 June 1989 and 14 March 2024 on Fed meeting days and on all other days.

Sources: Federal Reserve and own calculations.

Figure 7. Accumulated changes, 10-year government bond yield, USA around Fed meetings not occurring in March, June, September and December

Percentage points

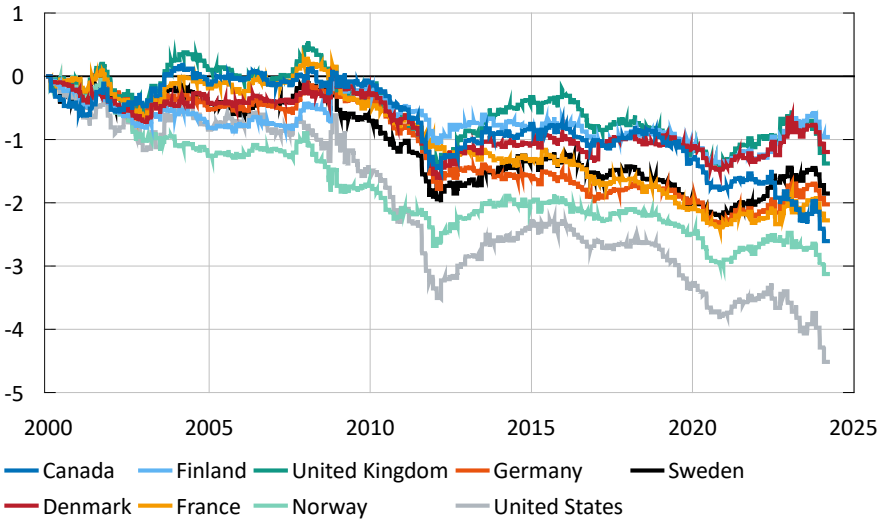


Note. The lines show hypothetical time series constructed by only taking into consideration the interest rate changes realised in the 3-day window around Fed meetings between 1 January 2000 and 14 March 2024 (blue line) and the interest rate changes realised in the 3-day window around Fed meetings in all months except March, June, September and December (red line). Interest rate changes that occurred on all other days outside this window are set to zero. See, for example, Crump and Lucca (2012) for an analysis and discussion of seasonal patterns in Fed rate setting between 1987 and 2008. They show that during this period the Fed had a greater tendency to cut interest rates in the first month of each quarter. While some of this seasonal pattern can be explained by the timing of meetings, a significant part of the seasonal variation is unexplained.

Sources: Federal Reserve and Macrobond.

Figure 8. Accumulated changes, 10-year government bond yields, around Fed meetings

Percentage points

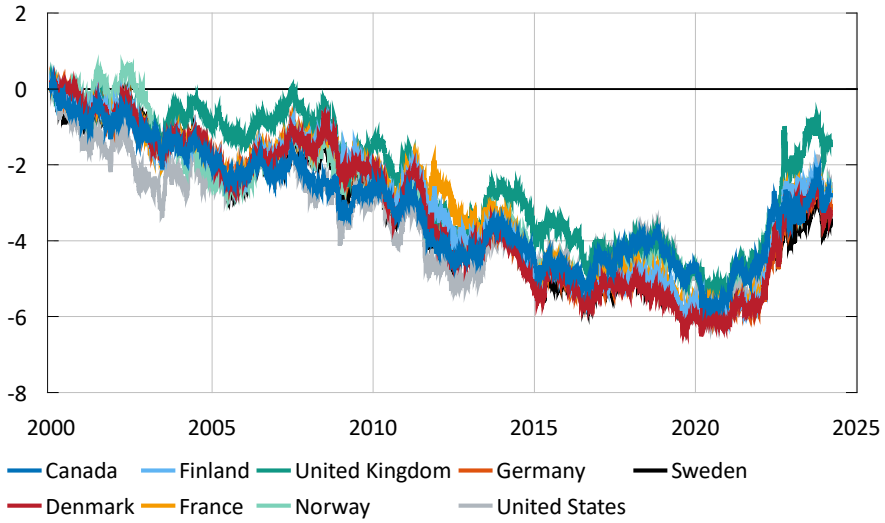


Note. The figure shows the cumulative change in the yield on a 10-year government bond in Canada, Denmark, Finland, France, Germany, Norway, Sweden, the United Kingdom and the United States. The lines show hypothetical time series constructed by only taking into account the interest rate changes realised in the 3-day window around Fed meetings between 1 January 2000 and 14 March 2024. Interest rate changes that occurred on all other days outside this window are set to zero. The grey line is the same as the hypothetical time series (blue line) shown in Figure 2. The difference is that the hypothetical series is calculated from 1 January 2000 in this chart but from 1 June 1989 in Figure 2.

Sources: Federal Reserve and Macrobond.

Figure 9. Accumulated changes in nominal government bond yields, 10-year maturity since 1 January 2000

Percentage points



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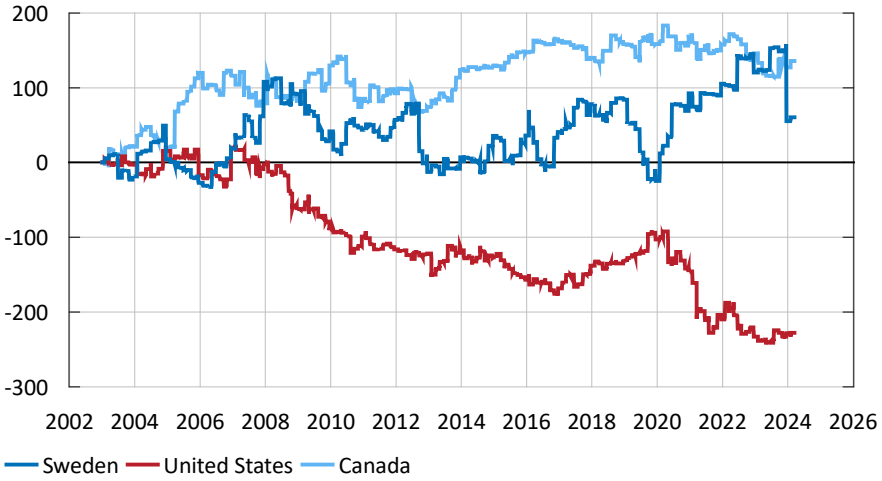
Note. The figure shows the accumulated change in the yield on a 10-year government bond in Canada, Denmark, Finland, France, the United Kingdom, Norway, Germany, the United States and Sweden since 1 January 2000.

Source: Macrobond.

Figure 10. Accumulated changes, Citi, Economic Surprise Index, Sweden, Canada and USA at Fed meetings

Index units



Note. The lines show time series constructed by only taking into account the index changes realised in the 3-day window around the Fed's monetary policy meetings between 1 January 2000 and 14 March 2024. Index changes that occurred on all other days outside this window are set to zero. The Citigroup Economic Surprise Index represents the sum of the difference between economic outcomes and forecasts. With a sum above 0, outcomes are more positive than market expectations. With a sum below 0, outcomes are generally worse than expected.

Sources: Macrobond and own calculations.

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