



Riksbank Study

The Riksbank's asset purchases 2015–2022

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Riksbank Studies

Riksbank Studies contain articles with advanced analysis and examination of relevant questions. Their aim is to contribute knowledge and understanding of issues relevant to the Riksbank. Riksbank studies are staff publications. Publication is approved by the appropriate Head of Department. The opinions expressed in each of the articles are those of the authors and are not to be seen as the Riksbank's standpoint.

Foreword

In February 2015, the Riksbank began buying Swedish government bonds in an uncertain situation when inflation and inflation expectations were low. The European Central Bank, ECB, had also announced extensive purchases of government bonds for at least a year, which risked contributing to a strengthening of the Swedish krona and thus prolonging the period of below-target inflation. Such a development would have made it much more difficult for the Riksbank to safeguard the role of the inflation target as an anchor for price and wage setting. Additional monetary policy stimulus was therefore necessary, but only lowering the interest rate to slightly below zero was insufficient and cutting the rate far below zero was not considered a reasonable option. Central banks in a similar situation also chose to buy domestic securities rather than cut policy rates far below zero.

The Riksbank continued to buy securities in the following years and increased its purchases when the outbreak of the pandemic in the spring of 2020 caused parts of society to close down. For the Riksbank, it was a matter of maintaining the supply of credit to prevent the historically rapid and sharp economic downturn from becoming a financial crisis. The asset purchases, combined with other measures, were a tool to achieve this while keeping interest rates low.

Now that monetary policy has entered a new phase, it is appropriate to summarise the experience of the Riksbank's asset purchases, something that has also been requested by the Parliamentary Committee on Finance. This study by economists in the Riksbank's Monetary Policy Department contains, in addition to a description of the Riksbank's asset purchases from 2015 to 2022, a summary of international experience of the effects of asset purchases and an inventory of the state of knowledge about the effects of the Riksbank's purchases. When the Riksbank started buying securities in 2015, there was some foreign experience of quantitative easing, as large-scale asset-purchasing programmes are often called. There was also a growing theoretical and empirical literature about asset purchases. Since then, central banks and academia have devoted considerable resources to increasing knowledge about the effects of asset purchases. From mostly studying the effects on long-term government bond yields, the focus has shifted increasingly to trying to better understand the mechanisms through which asset purchases operate and the ultimate effects on economic activity and inflation.

As can be seen from this Riksbank Study, there are now some analyses of the effects of the Riksbank's asset purchases over different periods. They show that the Riksbank's purchases have contributed to more expansionary financial conditions, for example by lowering bond yields and weakening the exchange rate. Studies also indicate that the more expansionary financial conditions have contributed to higher resource utilisation and higher inflation. However, the studies are few and necessarily based on simplifying assumptions about how purchases work through the economy. At the same time, as discussed in more detail in the Riksbank Study, these studies take little account of confidence-building effects and effects associated with the fact that the purchases prevented far worse economic developments. Such motives were central for much of the period when the Riksbank made its asset purchases.

It is also important to better understand in which situations asset purchases are most effective. In crisis situations, asset purchases have been crucial in remedying and preventing major problems – a clear example of this is the crisis management during the pandemic, when the Riksbank's purchases helped to limit the damage to the economy and Sweden was able to avoid a financial crisis. In more normal times, purchases contribute to a more expansionary monetary policy. The international literature on quantitative easing currently is ambiguous about which channels the purchases mainly operate through and in which situations the various channels are most important for the economy. Thus, there is room for different views on how the purchases work and what their effects have been.

When the role of the inflation target as a nominal anchor was threatened, it was of the utmost importance that the Riksbank acted to safeguard confidence. Not to act would have been inconsistent with the Riksbank's statutory mandate for price stability. During the pandemic, it was also important for the Riksbank to act to ensure that the pandemic did not cause more lasting damage to the Swedish economy and ultimately jeopardise price stability. However, the monetary policy measures taken by the Riksbank are always a trade-off between the effects it wishes to achieve and other effects that may arise.

Asset purchases have contributed to an increase in the Riksbank's and other central banks' financial risks. With interest rates now rising rapidly, this means that many central banks are making losses on their asset holdings. However, these losses do not reflect the economic outcome of the asset purchases. The losses should be balanced against lower public financing costs and higher economic activity with higher tax revenues, but above all against the broader value of a credible inflation target as a guarantor of well-functioning price and wage setting.

Even if the Riksbank completely terminates all of its asset purchases at the end of 2022, including reinvestments of maturing bonds, the bond portfolio will remain part of monetary-policy considerations. One question is to what extent asset purchases will have a prominent role among central banks' monetary policy tools in the future. It is quite possible that policy rates in many countries will return to low levels and periodically approach their lower bound. New crises will also arise. The experience of past purchases will be valuable when considering possible purchases in the future. At the same time, developments over the next few years, when the holdings of many central banks are likely to decline, may teach us more about asset purchases as a monetary policy tool.

Executive Board of the Riksbank, December 2022

Summary

The authors work in the Monetary Policy Department of the Riksbank.¹

Purchases of government bonds 2015–2017 to support the rise in inflation and safeguard the inflation target

At the beginning of 2015, the Riksbank cut the policy rate below zero per cent and started buying Swedish government bonds to make monetary policy more expansionary. Inflation had then been well below the inflation target of 2 per cent for some time. This had begun to have an impact on long-term inflation expectations, which had fallen in line with the trend and were below 2 per cent. The Riksbank considered that there were factors that increased the risk of inflation, and thus inflation expectations, not rising to the target quickly enough. One such factor was that the European Central Bank, ECB, had announced a programme of large purchases of government bonds. These purchases were likely to contribute to a strengthening of the Swedish krona against the euro, which would hold down import prices and further dampen inflationary pressures in Sweden.

In 2015 and the following two years, monetary policy was characterised by a low tolerance for risks that could prolong the period of below-target inflation, as this risked further dampening inflation expectations. In addition to lowering the policy rate further below zero and gradually adjusting down the forecast for the policy rate, the Riksbank increased its holdings of government bonds. The aim of the expansionary monetary policy was to support the economy in an uncertain environment and to ensure that inflation rose towards the 2 per cent target sufficiently quickly. During the period 2015–2017, the Riksbank decided to purchase nominal and real government bonds for a total of SEK 290 billion.

Purchases of securities in 2020–2021 as part of the management of the coronavirus crisis and to support the economy during the recovery

In the spring of 2020, the coronavirus pandemic broke out. The pandemic caused great human suffering around the world, while the economy deteriorated rapidly and significantly for households and companies in all countries. In a short period of time, companies' revenues largely disappeared, while fixed costs remained, and many companies found it difficult to cover these costs. Turmoil escalated in financial markets internationally and in Sweden, and investors quickly reduced their demand for risky assets in favour of safer ones. Risk premiums on various securities and credit instru-

¹ Thanks to Emma Bylund, Paul Elger, Heidi Elmér, Henrik Erikson, Mattias Erlandsson, Jesper Hansson, Iida Häkkinen Skans, Jens Iversen, Caroline Jungner, Stefan Laséen, Marianne Nessén, Åsa Olli Segendorf, Marianne Sterner, Ingvar Strid, Ulf Söderström, Tommy von Brömsen and Anders Vredin for their wise comments and help with this study. Special thanks to Bul Ekici for help with the section comparing the Riksbank's asset purchases with those of other central banks. We would also like to thank Elizabeth Nilsson and Gary Watson for helping us translate this Riksbank study into English.

ments rose sharply and, in parallel, banks found it more difficult to secure their funding. At the most turbulent stage, there was a risk of the situation becoming a financial crisis.

The government, the Riksbank and other authorities took swift action in the spring of 2020, as did other policymakers around the world. The Riksbank's measures were aimed at providing money to the financial system so that a lack of liquidity would not affect lending to households and companies. The Riksbank also needed to ensure that interest rates were kept low. The strategy was to act quickly, broadly and on a large scale, and the majority of the measures were implemented in a short period during March and April 2020. As part of its crisis management, the Riksbank decided on an asset-purchasing programme with an envelope of up to SEK 300 billion until the end of 2020. The aim of the purchases was to keep interest rates low, provide broad support to the supply of credit and bolster the Swedish economy during a period of substantial uncertainty.

The Riksbank increased the envelope by SEK 200 billion on two occasions and at the same time extended the programme so that it covered purchases of up to SEK 700 billion in total until the end of 2021. The aim of expanding purchases was to continue to keep general interest rates low and to contribute to a functioning credit supply to support the recovery and bring inflation up towards the target. The programme, which expired at the end of December 2021, came to include purchases of Swedish government and municipal bonds, covered bonds (mortgage bonds), treasury bills, and corporate bonds and commercial paper. At the end of 2021, the size of the Riksbank's securities holdings in nominal terms was just over SEK 900 billion as a result of the 2015–2021 purchases. Holdings then declined slightly in 2022.² Compared with other central banks, which undertook similar asset-purchasing programmes both before 2020 and as part of crisis management during the pandemic, the Riksbank's holdings relative to GDP were in line with central banks in other small, open economies. However, the holdings were significantly smaller in comparison with those of large central banks.

Asset purchases can affect the real economy and inflation through various channels

Monetary policy transmission describes how monetary policy spreads through the economy to ultimately affect the real economy and inflation. Transmission consists of several so-called channels through which monetary policy operates. When the Riksbank buys securities, it can affect activity in the economy, the exchange rate and the expectations of households and companies in much the same way as when the Riksbank lowers its policy rate, although the channels then work in a slightly different way. The purchases can, for instance, lower expectations of the future policy-rate level and reduce the premiums and hence the yields on the securities purchased by the central bank, but also the yields on other securities. The purchases also increase liquidity in the banking system, which may help to stimulate lending in the economy.

² The market value of the holdings fell significantly more in 2022 as interest rates rose rapidly during the year.

Much of the literature on the transmission of asset purchases is based on conditions in large economies. There are factors that suggest, at least a priori, that the picture may be somewhat different in small, open economies such as Sweden, for example that the effect of purchases on the exchange rate may be relatively more important for transmission. Other factors may also be particularly important for the Riksbank's purchases, although it is difficult to determine to what extent, such as the fact that the Swedish financial system is highly integrated with that of the rest of the world, that Swedish government debt is small compared to that of many other countries and that Swedish households are comparatively more sensitive to changes in variable mortgage rates.

International experience shows that asset purchases have lowered market interest rates and increased economic activity

By now, several central banks have implemented asset-purchasing programmes. Although the size, design and implementation of these programmes have differed across countries, the research on asset purchases has drawn a number of broad conclusions based on common experiences. One is that asset purchases have been a particularly effective tool for restoring market functioning during periods of financial stress and for dampening elevated premiums on risky assets. Another conclusion is that large-scale purchases of government bonds and mortgage bonds have lowered market interest rates and contributed to more expansionary financial conditions and more expansionary monetary policy when policy rates have been at or near their lower bound.

International experience provides strong evidence that asset purchases contribute to more expansionary financial conditions, including through lower yields on safe assets, reduced yield spreads between safe and risky assets and a weaker exchange rate. While there is compelling evidence of this, the effects on economic activity and inflation have been more difficult to estimate. Studies based on different methodologies and data from a number of large economies show that purchases increased economic activity and, to a lesser extent, inflation, but there is a wide dispersion of the estimated effects. The majority of studies concern large economies such as the United States and the euro area. There are fewer analyses of purchases in small, open economies. Such economies may be relatively influenced by asset purchases in large economies and the exchange rate may be an important channel through which purchases by the country's own central bank affect the economy.

The Riksbank's purchases contributed to lower government bond yields and more expansionary financial conditions in Sweden

The studies that focus on what happened when the Riksbank announced its purchases of government bonds in 2015–2017 indicate that the purchases helped to lower the yields on longer-term government bonds. Announcements equivalent to 1 per cent of GDP lowered the yield on a 10-year government bond by just under 0.05 percentage points on average. Up to the end of 2017, the Riksbank purchased SEK 290 billion worth of government bonds, equivalent to around 6.5 per cent of GDP, which means a total effect of around 0.3 percentage point lower yields. There are also indications

that the effects of the purchases on government bond yields spread to yields on riskier assets and helped to weaken the krona.

Overall, the studies thus suggest that the Riksbank's purchases of government bonds contributed to more expansionary financial conditions in the years before the pandemic. According to one study, the Riksbank's purchases in 2015–2017 corresponded to an approximate 0.9 percentage point lower policy rate.³

The results of a so-called event study of the Riksbank's asset purchases during the 2020–2021 pandemic suggest that these purchases also contributed to more expansionary financial conditions. As might be expected from the focus of those purchases, the effects were greatest on covered bond and municipal bond yields. However, as market participants have increasingly come to expect that asset purchases are part of central banks' monetary policy, it has become more difficult to identify the effects in this type of study because the purchases have largely been anticipated.

The results of the studies of the effects of Swedish asset purchases are generally well in line with the results of international studies during and shortly after the global financial crisis.⁴ Compilations of studies done for the United States, United Kingdom and the euro area show that the median estimated impact of government bond purchases on 10-year government bond yields is around 0.05 percentage points for a purchase equivalent to 1 per cent of GDP. At the same time, the results are highly uncertain and the dispersion of the estimated effects is large across different studies.

Swedish studies suggest positive effects on the real economy and inflation

There are some studies showing the effects of asset purchases on financial prices but fewer studies analysing their effects on the later stages of the monetary policy transmission mechanism. During the period 2015–2017, lending rates to households and companies track the policy rate well, suggesting that government bond purchases had no significant positive effect on bank lending. The Riksbank's purchases during the 2020–2021 pandemic were explicitly aimed at safeguarding the supply of credit and preventing the interest rates faced by households and businesses from rising. However, the small movements in lending rates during the pandemic do not necessarily mean that the asset purchases had no effect. For a fair assessment, actual interest rate developments need to be compared with a counterfactual scenario based on how interest rates would have evolved if no asset purchases had been announced.

The preventive purpose of the Riksbank's purchases during the pandemic also makes it difficult to analyse developments in credit volumes. As far as we know, there are no studies analysing the causal relationship between the Riksbank's asset purchases and changes in credit volumes. There are also few Swedish studies with more direct anal-

³ De Rezende and Ristinieni (2018) find that an unexpected announcement of government bond purchases for SEK 10 billion corresponds to a 0.03 percentage point lower policy rate.

⁴ See, for example, Gagnon (2016).

yses of the effects of the Riksbank's asset purchases on economic activity and inflation. Those that do exist paint an overall picture of some positive but uncertain effects on GDP and inflation.

For a small, open economy like Sweden, the effects of asset purchases on the exchange rate could play a particularly important role in transmission. However, there are few studies on this and the effects of purchases on the exchange rate are uncertain. Studies indicate that the krona weakened when the Riksbank announced purchases of government bonds. However, during the period 2015–2017, the interest rate cuts seem to have had a greater impact on the weakening of the krona than the government bond purchases. Foreign investors sold a significant portion of the government bonds purchased by the Riksbank before the pandemic, but at the same time bought private Swedish securities, suggesting that the purchases had only small capital flow effects on the exchange rate. In analysing the effects of the asset purchases on the krona, it is also important to bear in mind that the Swedish purchases were to some extent announced in response to expansionary measures abroad. It may have been the case that the Swedish krona would have strengthened had the Riksbank not neutralised it by announcing its purchases.

Several reasons to be cautious when interpreting the estimated effects

Although the studies of the Riksbank's asset purchases suggest that they have had the intended expansionary effect on the economy and inflation, we need to better understand how the effects occur. This is particularly true in small, open economies, where the interaction with foreign asset purchases and the impact on the exchange rate become important elements. Studies of the effects in such economies are generally scarce.

It is not easy to study the effects of asset purchases. Asset purchases do not appear very often in economic models. Moreover, in Sweden, experience with large-scale asset purchases is limited, which makes it more difficult to build empirically reliable models. It is also difficult to identify the effects of purchases, especially when other measures with similar effects are implemented at the same time. During the period 2015–2019, the Riksbank announced government bond purchases at the same time as it cut interest rates on several occasions, and during the pandemic, the Riksbank announced purchases of various securities at the same time as other crisis measures that likely also affected financial markets and economic activity.

A central motive for the Riksbank's asset purchases has been to prevent unfavourable scenarios, and this has characterised the design and scope of the purchases, particularly during the pandemic. This makes it difficult to estimate the effects of the purchases, as we do not know what would have happened if the Riksbank had not announced any purchases. During the period 2015–2017, the concern was that inflation expectations would be too low and erode the credibility of the inflation target. During the pandemic, the more immediate concern was to prevent a financial crisis, which in the long run would have significantly hampered the Riksbank's efforts to stabilise inflation close to the inflation target on a lasting basis.

Riksbank's purchases of private securities important during the pandemic but hardly the main explanation for today's high inflation

Monetary policy decisions always entails a trade-off between the effects one wishes to attain and other effects that can arise. Since purchases may have effects in areas that are outside the central bank's mandate or that other policy areas are better able to influence, it is important for the central bank to pay attention to such effects. However, the purpose of purchases and how they relate to the central bank's mandate must also be clearly communicated. These effects include a potentially lasting impact on the functioning of the markets in which the Riksbank has purchased securities, increased risk to the Riksbank's financial independence, a build-up of financial imbalances and changes in the distribution of household income and wealth.

The fact that the Riksbank bought a large proportion of private securities during the pandemic years raises questions about so-called moral hazard and whether the Riksbank has undesirably influenced the distribution of credit in the economy. The purchases of corporate bonds were primarily about supporting monetary-policy transmission in a market that was important for the hard-hit corporate sector and ensuring the Riksbank's readiness to scale up the measure further if necessary.

The purchase of covered bonds was initially aimed at ensuring that transmission would continue to function well in this market, in which banks finance a large part of their lending to households. The purchase of these types of securities, together with other measures, helped to ensure that interest rates for households and companies remained low and that banks did not clearly tighten their lending. A deeper recession was thus avoided and the conditions were created for recovery from the more acute phase of the pandemic. The fact that announced purchases were made despite the fact that rates in these markets were close to or lower than pre-pandemic levels can be seen primarily as a sign of the uncertainty about how the pandemic would unfold and what impact it would have on financial markets. It was also a way for the Riksbank to safeguard credibility in its ability to ensure the smooth transmission of monetary policy in the future.

The extensive asset purchases during the pandemic cannot explain the sharp rise in inflation in the second half of 2021 and 2022. Inflation has been rising rapidly across much of the world and the rise is more a consequence of pandemic-related disruptions and Russia's invasion of Ukraine.

1 Asset purchases as a monetary policy tool in Sweden

At the beginning of 2015, the Riksbank started to buy government bonds to make monetary policy more expansionary. The aim was to bring inflation up to 2 per cent, break the trend of falling long-term inflation expectations and safeguard the inflation target. The Riksbank made monetary policy increasingly expansionary in the coming years, for example by continuing to buy government bonds.

When the coronavirus pandemic broke out in spring 2020, the Riksbank implemented several measures in a short period to avoid a financial crisis and to ensure that the expansionary monetary policy had the intended impact on the economy. Among other things, the Riksbank decided to create an asset-purchasing programme. In addition to government securities, the programme included municipal bonds, covered bonds and commercial paper. This was then expanded and extended to provide continued and long-term support to the supply of credit and the economic recovery. The programme expired at the end of December 2021, at which point the Riksbank's asset holdings amounted to more than SEK 900 billion. As a share of GDP, this was in line with the holdings of central banks in other small, open economies, but considerably smaller than those of the major central banks. Compared with other central banks, the Riksbank bought fewer government bonds and more covered bonds during the pandemic.

“The Executive Board of the Riksbank has decided to establish a securities portfolio to a value of SEK 10 billion. This decision should be seen in the light of the experience gained during the financial crisis. By establishing a securities portfolio, the Riksbank will ensure that the required systems, agreements and knowledge are in place if it becomes necessary to rapidly take extraordinary measures in the future.” This is how the Riksbank began a press release in May 2012, announcing its intention to build up a portfolio of SEK 10 billion of government bonds for contingency purposes.⁵

Just over ten years earlier, the Riksbank had liquidated an asset portfolio on the grounds that it was no longer needed for monetary policy reasons.⁶ However, after the global financial crisis 2008–2009, the Riksbank concluded that it was important to be able to buy securities quickly in order, for example, to ensure that monetary policy had the intended effect in a crisis, or to make monetary policy more expansionary in a

⁵ Sveriges Riksbank (2012a). See also Sveriges Riksbank (2012b) for the basis for the decision.

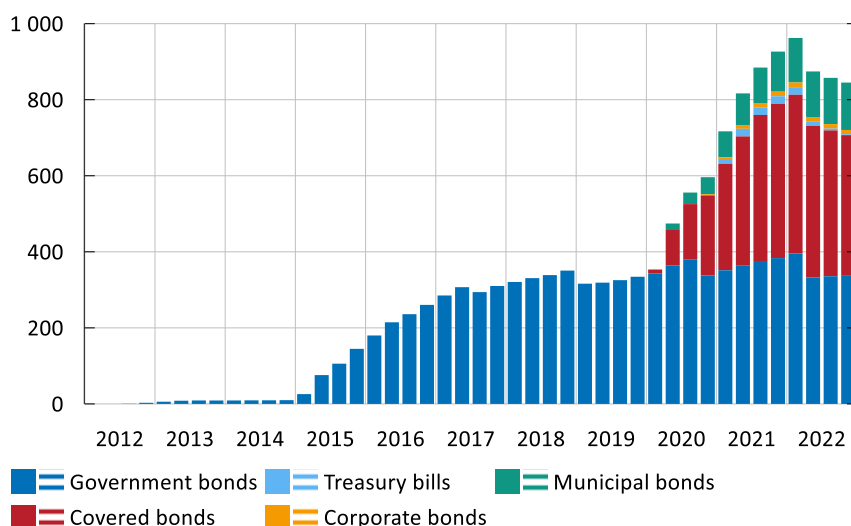
⁶ See Sellin (2018) and Sveriges Riksbank (1998).

situation where the policy rate could not be lowered much further.⁷ By having a portfolio of government bonds that could be scaled up quickly if necessary, the Riksbank acquired a tool for doing this.

The Riksbank thus acquired a portfolio of government bonds in 2012 as a contingency measure. At that time, the financial markets were functioning well, the policy rate was 1.50 per cent and the Riksbank saw no monetary policy need to purchase securities, other than as a contingency measure. But just three years later, the situation changed and the Riksbank started buying government bonds to make monetary policy more expansionary. From 2015 onwards, the Riksbank then expanded its portfolio, first with an ever larger holding of government bonds and, during the pandemic, also with other types of securities (see Figure 1). From a portfolio of SEK 10 billion, the Riksbank’s holdings grew to more than SEK 900 billion at the end of 2021. This was not unique for the Riksbank. Other central banks also purchased securities on a large scale during this period.

Figure 1. Riksbank’s asset holdings

Nominal amounts, SEK billion



Source: The Riksbank.

In this chapter, we describe this development of the Riksbank’s portfolio and the reasons for the purchases. To gain perspective, we also compare the Riksbank’s asset holdings with corresponding developments at other central banks.

1.1 Asset purchases and quantitative easing

The objective of monetary policy is low and stable inflation. To attain this objective, the central bank needs an operational framework with tools to implement monetary

⁷ The Riksbank implemented a series of measures during the global financial crisis of 2008–2009 but did not buy securities, unlike some other central banks. However, this was an option discussed by the Executive Board.

policy in practice. It is common for the operational framework to be focused on controlling the interest rate on very short-term loans, for example the interest rate on loans between commercial banks from today to tomorrow. Changes in this overnight rate then spread to interest rates on longer-term loans, including interest rates faced by households and companies, affecting activity in the economy and inflation.⁸

The most common tool used by central banks to influence short-term interest rates is a policy rate. Asset purchases are often described as an extraordinary or unconventional monetary policy tool that central banks have added recently to complement the policy rate. In some ways this is true, but the picture needs to be nuanced. The buying and selling of securities has long been one of the **operational** tools of central banks, i.e. part of the operational framework to influence the amount of central bank reserves in the banking system and thus the overnight interest rate. Purchases can then be made directly in the market via open market operations by the central bank.

However, large-scale asset purchases by central banks to achieve *quantitative easing* (QE) is a relatively new phenomenon.⁹ In principle, it involves large-scale asset purchases to depress interest rates and increase credit at a time when it is judged that the policy rate cannot be cut much further, or at a time when major turmoil in the financial markets is pushing up yields on certain securities. The Bank of Japan implemented quantitative easing in 2001 as a way to stimulate the economy when the policy rate had already been cut to close to zero without overcoming the deflation that prevailed at the time. Central banks in the United States and the United Kingdom launched asset-purchasing programmes during the global financial crisis of 2008–2009, and the European Central Bank, ECB, followed suit in 2014, expanding its programme in 2015. In the same year, the Riksbank began its purchases.

1.2 The Riksbank's purchases of government bonds 2015–2019¹⁰

Background: long-term low inflation and falling inflation expectations

In 2014, the economic situation in Sweden improved, but inflation, which had been below the inflation target for several years, fell even lower (see Figure 2). At the same time, long-term inflation expectations continued to trend downward and were below 2 per cent. To reverse the trend, the Riksbank cut the policy rate (then called the repo rate) in two steps down to zero per cent in October 2014. In connection with the

⁸ More details on operational frameworks in general and the Riksbank's framework in particular can be found in Sveriges Riksbank (2014), Sellin (2018) and Sveriges Riksbank (2022a).

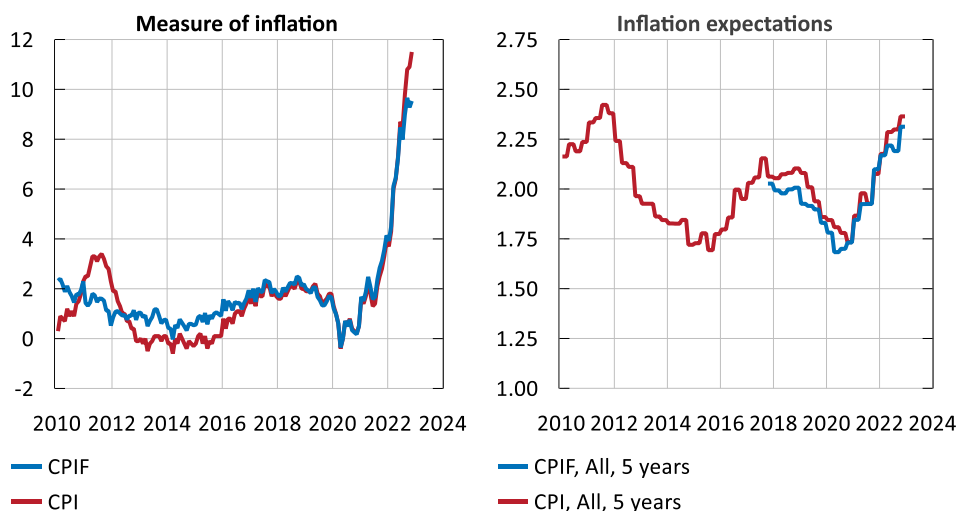
⁹ D'Amico et al (2012) discuss the Federal Reserve's experience of buying and selling treasury bonds before the global financial crisis and Ferguson et al (2015) study central banks' balance sheets since 1900 and describe episodes when balance sheet holdings increased and decreased significantly.

¹⁰ For more on the background and motives for monetary policy, please refer to the press releases, the Monetary Policy Reports and the report Account of Monetary Policy during these years. Details of the purchases can be found in the annexes to the minutes of each monetary policy meeting. The Riksbank's asset purchases for contingency purposes before 2015 are not the focus of this study.

monetary policy decision in December, the Riksbank announced that it was preparing further measures to make monetary policy even more expansionary if necessary.

Figure 2. Inflation and long-term inflation expectations

Annual percentage change and per cent.



Sources: Kantar Prospera and Statistics Sweden.

At the monetary policy meeting in February 2015, the Riksbank noted that economic developments abroad had become more uncertain and that economic activity, and thus monetary policy, was out of step in the major currency areas. In the United States, the central bank was about to make monetary policy less expansionary, while the European Central Bank, ECB, on the contrary increased its monetary policy stimulus. The ECB started a programme of private asset purchases in 2014 and had announced in January 2015 that it would expand this programme with government bond purchases in 2015. The ECB planned to buy a total of EUR 60 billion of securities every month until at least September 2016.

The Riksbank assessed that there were signs that inflation was on its way up in Sweden. However, there were factors that increased the risk that inflation and inflation expectations would rise more slowly than in the Riksbank’s forecast. For example, the krona could become stronger than in the Riksbank’s forecast, which would dampen import prices (see Figure 3). It could thus take even longer for inflation to return to target. The inflation forecast did assume that the krona would strengthen. However, uncertainty about external developments and the impact of the ECB’s planned asset purchases created uncertainty about the size and speed of the strengthening.

Figure 3. Nominal exchange rate, KIX

Index, 18 November 1992=100



Note. The KIX (krona index) is a weighted average of the currencies in 32 countries that are important for Sweden's international trade. Since 28 March 2022, the index has been calculated against 31 countries since the Russian rouble was excluded from it. A higher value indicates a weaker exchange rate.

Source: The Riksbank.

The Executive Board of the Riksbank considered that monetary policy needed to become more expansionary to support the upturn in inflation and to ensure that long-term inflation expectations were consistent with the inflation target. The Executive Board therefore decided to lower the policy rate to -0.10 per cent.¹¹ At the same time, the Executive Board decided that the Riksbank would purchase nominal government bonds to the tune of SEK 10 billion to make monetary policy more expansionary. With these measures and a clear message that it was prepared to rapidly make monetary policy even more expansionary to ensure that inflation rose towards the target, the Executive Board wanted to emphasise that the Riksbank was safeguarding the role of the inflation target as a nominal anchor for price and wage setting.

Low tolerance for risks of continued low inflation

In 2015, the Riksbank continued to make monetary policy more expansionary by lowering the policy rate further, adjusting the forecast for the policy rate downwards and buying more government bonds (see Table A.1 in the Appendix). Up to the end of October, the Riksbank had decided to buy nominal government bonds for a total of SEK 190–200 billion until mid-2016. This would correspond to just over 30 per cent of the outstanding stock of nominal government bonds in Swedish kronor. Monetary policy was characterised by a low tolerance for risks that could prolong the period of below-target inflation, as this could further dampen inflation expectations. The purpose of lowering the policy rate, buying government bonds and adjusting the interest rate

¹¹ With this, the Riksbank became one of the first central banks to cut the policy rate below zero per cent, which has long been seen as its lower bound. Shortly before this, negative policy rates had been introduced in the euro area, Denmark and Switzerland. The Riksbank's experience of negative policy rates is described in Sveriges Riksbank (2020a).

path downwards was to support the economy in an uncertain environment and to ensure that inflation rose towards the target of 2 per cent sufficiently quickly.¹²

More expansionary monetary policy and continued purchases in 2016 and 2017

Swedish economic activity strengthened and inflation continued to rise, but remained below 2 per cent (see Figure 2). At the beginning of 2016, the Riksbank's assessment was that the upturn was not yet assured and that inflation in 2016 was likely to be lower than in the Riksbank's previous forecast. The Executive Board emphasised that there were arguments both for maintaining the stance of monetary policy and for making it more expansionary. The majority felt that the arguments in favour of making it more expansionary outweighed the arguments against it, and the policy rate was therefore lowered to -0.50 per cent. To maintain the expansionary effect of the government bond holdings, the Executive Board also decided that the Riksbank would until further notice reinvest the coupon payments and repayments when the government bonds matured. Without reinvestments, the holdings would have gradually decreased in relation to the purchases decided.

Many of the same trade-offs were relevant during the rest of 2016 and in 2017. The outlook for economic activity in the rest of the world and in Sweden gradually improved, inflation rose and was close to the target from the beginning of 2017 and long-term inflation expectations were around 2 per cent (see Figure 2). At the same time, uncertainty remained about developments abroad – partly due to the United Kingdom's decision to leave the EU. Risks related to the krona exchange rate and the monetary policies of other central banks, notably the ECB, also persisted. There were arguments both in favour of maintaining monetary policy and in favour of making it more expansionary, and for different members of the Executive Board the arguments carried different weight.

In April 2016, a majority of the Executive Board decided that the Riksbank would increase its holdings of government bonds with additional purchases equivalent to SEK 45 billion. The purchases were to take place during the second half of 2016 and would include both nominal and real government bonds to have a broad impact on different interest rates (see Table A.1). In December 2016, it was decided to extend the purchases by a further SEK 30 billion during the first half of 2017.¹³ In April 2017, a majority of the Executive Board then decided to also extend the purchases by a total of SEK 15 billion during the second half of 2017. Together with the previous decisions, this meant that the Riksbank's purchases of government bonds at the end of 2017

¹² At times during the spring of 2015, the krona strengthened against the euro and other currencies faster than in the Riksbank's forecast, and uncertainty about economic activity abroad increased. During the year, the risk outlook was characterised by concerns about the Greek and euro area economies and a slowdown in the Chinese economy, among other things. The humanitarian catastrophe of the wars in the Middle East and the large flows of refugees to Europe and Sweden added to the uncertainty.

¹³ At the same time, the Executive Board decided not to wait to reinvest an amount of approximately SEK 30 billion that the Riksbank was to receive in August 2017, mainly consisting of repayments on maturing government bonds. To achieve a more even volume of purchases at each purchase date in 2017, it was decided that the reinvestment of these funds would start immediately at the beginning of 2017 and continue throughout the year.

amounted to SEK 290 billion (SEK 252.5 billion nominal and SEK 37.5 billion real government bonds) (see Figure 1). This corresponded to around 39 per cent of the outstanding volume of nominal government bonds and around 20 per cent of the outstanding volume of real government bonds in Swedish kronor.

Exit strategy: reduce the portfolio when the policy rate is raised to an appropriate level

At the end of 2017, the Riksbank noted that the economic and monetary policy situation had improved. Economic activity continued to improve abroad, activity in the Swedish economy was high and inflation had been close to the 2 per cent target for some time. However, there was still uncertainty about monetary policy abroad and the risk that the krona's exchange rate would strengthen too much and too quickly. Monetary policy therefore still needed to be expansionary. But the time for making monetary policy less expansionary was now approaching.

To provide guidance on how the Riksbank would change its holdings of government bonds in the long term, the Executive Board published a strategy in December 2017.¹⁴ In brief, the strategy was that the Riksbank, having stopped expanding its portfolio, would keep its holding of government bonds at the same level, i.e. continue to reinvest maturities and coupon payments. When the time came to make monetary policy less expansionary, the policy rate would be raised first. Once it had been raised to an appropriate level, reinvestments would then be tapered or terminated altogether so that the portfolio would be reduced as the bonds matured. The strategy was similar to that adopted by other central banks.

There were no changes in the Riksbank's holdings of government bonds between the beginning of 2018 and mid-2019. A decision to bring forward reinvestments did mean that the holdings of government bonds temporarily exceeded the decided nominal amount of SEK 290 billion in 2018 and 2019.¹⁵ In principle, however, the Riksbank kept the holdings constant during the period while the policy rate was raised to -0.25 per cent in December 2018. In April 2019, the Riksbank changed the form of its decisions on the government bond portfolio. Instead of distinguishing between decisions to increase holdings and decisions on reinvestments, the Riksbank now began to decide on total purchases over a certain period. A majority of the Executive Board decided that the Riksbank would purchase government bonds for a nominal amount of SEK 45 billion over the period July 2019 to December 2020. This corresponded to about half of the payments from maturities and coupons that the Riksbank would receive during that period.

¹⁴ Sveriges Riksbank (2017).

¹⁵ During the first half of 2019, bonds worth more than SEK 50 billion would mature and the Riksbank would receive coupon payments totalling around SEK 15 billion from the beginning of 2018 to mid-2019. To maintain the Riksbank's presence in the market and to achieve a relatively even purchase rate, a majority of the Executive Board decided to start reinvesting these maturities and coupon payments as early as January 2018.

1.3 The Riksbank's asset purchases 2020–2021¹⁶

By the end of February 2020, it was clear that the coronavirus had spread widely, affecting several countries in Europe and the United States, and on 11 March the World Health Organisation (WHO) declared Covid-19 a pandemic. The rapid spread of the virus caused widespread human suffering worldwide and led to a rapid and significant deterioration in the finances of households and companies in all countries. Governments imposed various types of restrictions on travel and social contacts. The restrictions and changes in household behaviour affected economic developments in several ways. Demand fell sharply as travel and visits to hotels and restaurants virtually ceased.

World trade also declined, which greatly affected small, open economies such as Sweden. Shortages of production input goods and high sickness absence also hit companies. In particular, companies with close links to the hospitality industry were badly affected. Small and medium-sized companies were particularly vulnerable, as they were less able to cope with low demand. In a short space of time, companies' revenues largely disappeared, while fixed costs remained. For those companies that were unable to cover costs with their own resources, new bank loans or market financing, the situation quickly became critical.

Considerable turmoil in financial markets

When it became clear that the spread of the coronavirus could not be prevented, turmoil escalated in the financial markets both internationally and in Sweden. How the situation changed in Sweden can be illustrated by the Riksbank's index of financial conditions, which shows that conditions quickly shifted from expansionary in February to markedly tight in March (see Figure 4). Investors quickly sought refuge in safer assets, which caused stock markets to fall sharply. The vulnerable situation for companies and the reluctance of investors to hold risky assets pushed up risk premiums on various securities and credit instruments sharply. This was reflected in widening spreads between yields on riskier bonds and government bonds (see Figure 12 in Chapter 4).

Companies found it more difficult to fund themselves by issuing commercial paper and corporate bonds, while banks found it more difficult to secure their funding. In Sweden, for example, investor demand for the banks' longer-term debt securities, which are largely made up of covered bonds, i.e. bonds backed by mortgages, declined.¹⁷ The substantial pressure to sell risky assets, especially corporate bonds but also covered bonds, became difficult for markets to handle. There was a widening gap

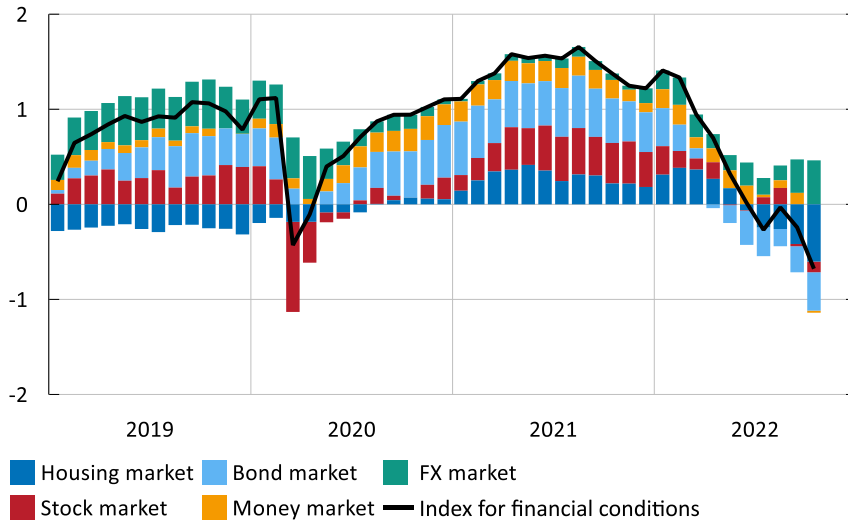
¹⁶ Details of asset purchases during the period can be found in the annexes to the minutes of the monetary policy decisions. A summary of the purchases during the pandemic and the Riksbank's experience can be found in Hansson and Birging (2021), Gustafsson (2022) and Sveriges Riksbank (2022b). Descriptions of all the measures implemented by the Riksbank during the pandemic can be found in Gustafsson and von Brömsen (2021) and in Chapter 2 of Sveriges Riksbank (2021a), among others.

¹⁷ Mortgage bonds are the general term for mortgage-backed securities. However, the design may differ between countries. Swedish mortgage bonds are structured as covered bonds where the investor has a preferential right in a collateral pool consisting of assets, mainly mortgages. For further details on how Swedish covered bonds work, see Hellström et al (2019).

between the price at which investors were willing to buy and the price at which corporate bond issuers were willing to sell (see Figure 5).

Figure 4. Index for financial conditions in Sweden

Standard deviations. A higher value indicates more expansionary financial conditions

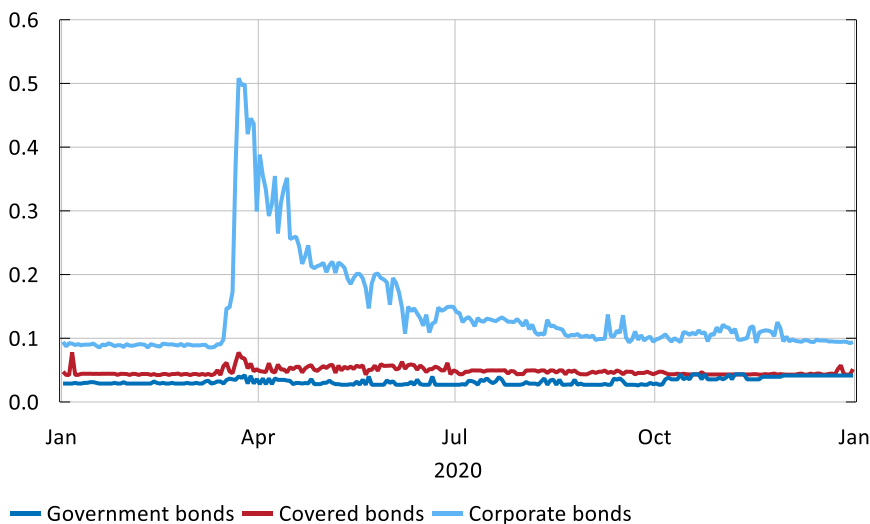


Note. The coloured bars show the contribution of the different submarkets. The index is a modified version of the index described by Alsterlind et al. (2013).

Source: The Riksbank.

Figure 5. Bid-ask spread on bonds

Percentage points



Note. Average listed yields based on all available nominal government bonds, a selection of covered bonds issued by Stadshypotek and SBAB, and more than 50 corporate bonds with varying maturities and credit ratings equivalent to Investment Grade.

Sources: Refinitiv and the Riksbank.

Comprehensive action by governments and central banks

The Government and the Riksbank took swift action in the spring of 2020, as did other governments and central banks around the world.¹⁸ At the most turbulent stage, there was a risk of the situation becoming a financial crisis. Banks could then be forced to tighten their lending to households and companies so much that the recession would become even deeper and more lasting, with even higher unemployment and inflation well below target. The Riksbank therefore focused its measures on injecting money into the financial system so that lending to households and companies would not be affected by a lack of liquidity. In addition, the Riksbank needed to ensure the effectiveness of monetary policy, i.e. to ensure that the interest rates faced by households and businesses were not driven by uncertainty and risk premiums that meant that the policy did not have the intended effect on activity in the economy and on inflation.

On 12 March 2020, the Riksbank held an extraordinary monetary policy meeting and decided on the first crisis measure: a programme of lending to companies via the banks. During the rest of 2020, the Riksbank then took further monetary policy decisions on measures on around 20 occasions, the majority of which were launched in a short space of time during March and April 2020. The strategy was to act quickly, broadly and on a large scale for precautionary reasons.

The Riksbank's asset-purchasing programme was part of its crisis management

The Riksbank's Executive Board decided on an asset-purchasing programme in response to the pandemic on 16 March to facilitate the supply of credit and mitigate the economic downturn (Tables A.2 to A.8 in the Appendix show all decisions on asset purchases during the period).¹⁹ The decision provided an envelope for purchases totalling up to SEK 300 billion until December 2020, and the Executive Board specified that the Riksbank would purchase government and municipal bonds as well as covered bonds if necessary.²⁰ The aim of the purchases was to keep interest rates low, provide broad support to the supply of credit and bolster the Swedish economy during a period of substantial uncertainty. In a supplementary decision a few days later, the Executive Board announced that purchases of commercial paper and corporate bonds would also be included in the purchasing programme to provide further support for the credit supply to Swedish companies.

Purchases of nominal government bonds began immediately in mid-March. Purchases of covered bonds and commercial paper started one to two weeks later and purchases of municipal bonds started at the end of April (see Tables A.5, A.6 and A.8). With the exception of the first purchases, the decisions concerned the purchase of a

¹⁸ In their evaluation of monetary policy 2015–2020, Flug and Honohan (2021) argue that decisive and speedy action was needed in that situation and that the Riksbank displayed a good degree of crisis preparedness and decisiveness in quickly arriving at monetary policy solutions.

¹⁹ The policy rate was left unchanged at zero percent during the pandemic.

²⁰ The envelope for the pandemic programme and the purchases of government bonds that took place under the programme were in addition to the purchases in 2020 that the Riksbank had decided on prior to the pandemic, see section 1.2.

specific security for a specific amount over a specific period – often one quarter at a time – within the overall amount of the programme.

Expansion and extension of the programme to keep interest rates low and support lending

Financial conditions began to stabilise in April 2020 (see Figure 4). At the end of June, the Riksbank noted that the turmoil in the financial markets had gradually eased – interest rates had come down and the markets were functioning better. However, the Riksbank assessed that the situation was still fragile and dependent on the Riksbank and other central banks continuing to support liquidity provision. Uncertainty about the ability of households and companies to obtain credit persisted and risked exacerbating the severe economic downturn and leading to longer-lasting negative consequences for output and employment. At the same time, it would make it more difficult to achieve the inflation target.

The Executive Board considered that monetary policy needed to continue to keep general interest rates low and to contribute to a functioning credit supply by continuing to purchase securities in the coming year. The programme was therefore extended until 30 June 2021 and increased by SEK 200 billion so that the Riksbank could purchase securities under the programme up to an amount of SEK 500 billion. In June, the Executive Board also decided on the purchases of government bonds, which now included real government bonds, municipal bonds, covered bonds and commercial paper for the fourth quarter of 2020 (see Tables A.2 to A.8).

Corporate bond purchases started in September 2020

In June, the Executive Board also decided to start buying corporate bonds in September and that the Riksbank would buy corporate bonds for a total of SEK 10 billion by mid-2021. The market had indeed recovered and corporate bond yields were only slightly above pre-pandemic levels (see Figure 12 in Chapter 4).²¹ However, the Executive Board judged that the economic situation could quickly deteriorate further and that the Riksbank therefore needed to ensure that it was well prepared to provide additional support to the credit supply for Swedish companies quickly and to counteract disruptions in the impact of monetary policy. The Executive Board also considered it important to actually implement the purchases that it had previously announced. It was reasonable to believe that the Riksbank had helped to calm the markets with its announcement in March that it would start buying corporate bonds. Failure to carry out the purchases could increase market uncertainty again and mean that future signals to buy securities risked having less impact.²²

²¹ Wollert (2020) reports on events in the corporate bond market from March 2020 onwards and discusses the reasons why the market was hit so hard.

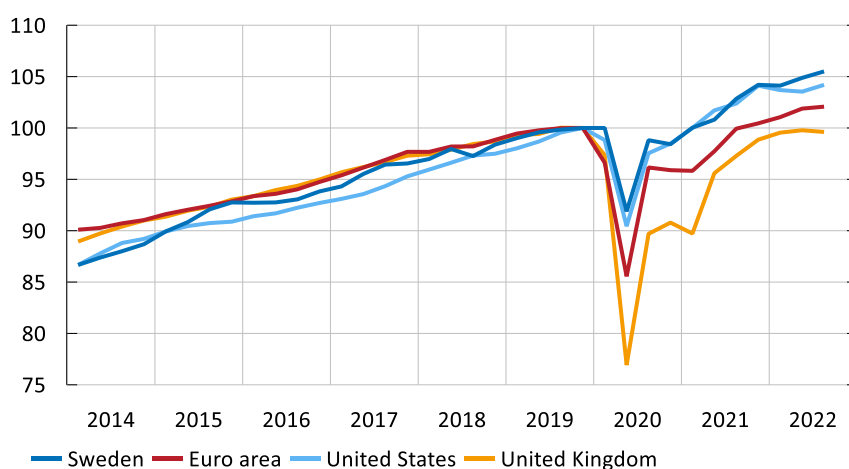
²² In the June decision, the Executive Board noted that the Riksbank could take sustainability into account in its choice of corporate bonds. The details of this were worked out in the autumn when the Executive Board decided on the conditions for the purchases. This resulted in the Riksbank applying a so-called norm-based negative screening when selecting corporate bonds from 1 January 2021, see Andersson and Stenström (2021).

Further expansion and extension of the programme until the end of 2021

After the dramatic fall in economic activity in spring 2020, the economies of Sweden and many other countries began to recover in the summer (see Figure 6). The spread of the disease then decreased while restrictions on social contacts eased somewhat. Widespread economic policy support also contributed to the recovery. However, during the autumn, the spread of the disease picked up in Sweden and in countries important for Swedish trade, and restrictions and general guidelines on social contacts were tightened again.

Figure 6. GDP in Sweden and abroad

Index, 2019 Q4=100, seasonally adjusted data



Sources: Eurostat, Office for National Statistics, Statistics Sweden, U.S. Bureau of Economic Analysis.

In November, the Riksbank assessed that the growth and inflation outlooks had deteriorated both abroad and in Sweden and that uncertainty about the economic recovery had increased. The Executive Board therefore judged that monetary policy must continue to contribute to a low interest rate level and a well-functioning supply of credit in order to support the recovery and help inflation to rise towards the target. However, there were different views in the Executive Board on how best to design asset purchases in 2021 to contribute to this. A majority decided to expand and extend the asset-purchasing programme from SEK 500 billion up to SEK 700 billion until the end of December 2021 to ensure that the economy would receive sustained and sufficient support. Treasury bills and green government and municipal bonds were now also included in the programme so that the purchases would have the broadest possible impact on market interest rates. Moreover, the Executive Board increased the size of asset purchases in the first quarter of 2021, citing heightened uncertainty and the risk of setbacks to the economic recovery.

The asset-purchasing programme expired on the last day of December 2021

In 2021, the economic outlook brightened. Vaccinations against COVID-19 accelerated and it became clear that the second large wave of infection and tighter restrictions were not having the same effects on the Swedish and international economies as the first wave did in the spring of 2020. The Riksbank, like many other central banks, judged that monetary policy needed to be sustained to facilitate the recovery and help inflation to rise towards the target. The risk was that if the Riksbank phased out the emergency measures too early and reduced the support from monetary policy, or if expectations were created that this would happen, it could stall the economic recovery.²³

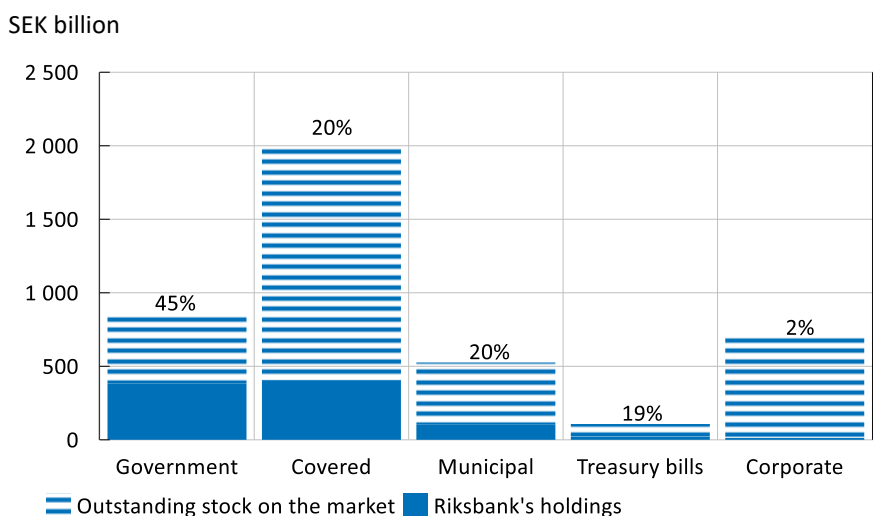
In February 2021, the Riksbank signalled that the entire envelope for the asset-purchasing programme would probably be fully utilised, up to SEK 700 billion. Decisions in the first half of 2021 concerned how the remaining space would be allocated to different securities in the last three quarters of the year, with the Executive Board choosing to gradually reduce the size of the purchases. The programme expired at the end of December 2021, at which point the Riksbank's asset holdings consisted of SEK 383 billion in government bonds, SEK 20 billion in treasury bills, SEK 406 billion in covered bonds and SEK 105 billion and SEK 12 billion in municipal and corporate bonds respectively (see Figure 1).²⁴ In relation to the amount of each security issued in Swedish kronor that was outstanding on the market, the Riksbank then owned around 45 per cent of government bonds, around 20 per cent of municipal bonds, covered bonds and treasury bills, and just under 2 per cent of corporate bonds (see Figure 7).

In 2021, the Executive Board signalled that the Riksbank was likely to maintain its asset holdings during 2022, and at the beginning of 2022, the Riksbank focused its purchases on compensating for asset maturities. As the economic recovery continued, the question of when central banks would begin to phase out their expansionary monetary policy became increasingly topical in Sweden and abroad. The dramatic rise in inflation in the spring of 2022 and the rapid increases in central bank policy rates shifted the focus to the question of how "quantitative tightening", QT, would be designed and what the effects of such a move would be. In June 2022, the Riksbank's Executive Board decided to design purchases in the second half of the year so that the Riksbank's asset holdings would decline during the year, and in November the Executive Board signalled that asset holdings would decline as they matured after the end of the year.

²³ However, a number of emergency measures that were put in place at the acute start of the crisis were phased out in 2021. In October, the Riksbank terminated, among other things, loan facilities for which there had been low demand and restored the collateral requirements that banks must provide for loans from the Riksbank.

²⁴ Holdings of government bonds also included bonds purchased prior to the pandemic. At the end of December 2021, the Riksbank did not hold any commercial paper.

Figure 7. Riksbank's asset holdings compared with the outstanding stock on the market



Note. The figure shows the Riksbank's holdings in government bonds, covered bonds, municipal bonds, treasury bills (SSVX) and corporate bonds compared with the total outstanding stock for each type of security in the Swedish market. The figures are shown in billions of Swedish kronor as of 31 December 2021. The holdings as a share of the outstanding stock have been rounded to the nearest percentage point.

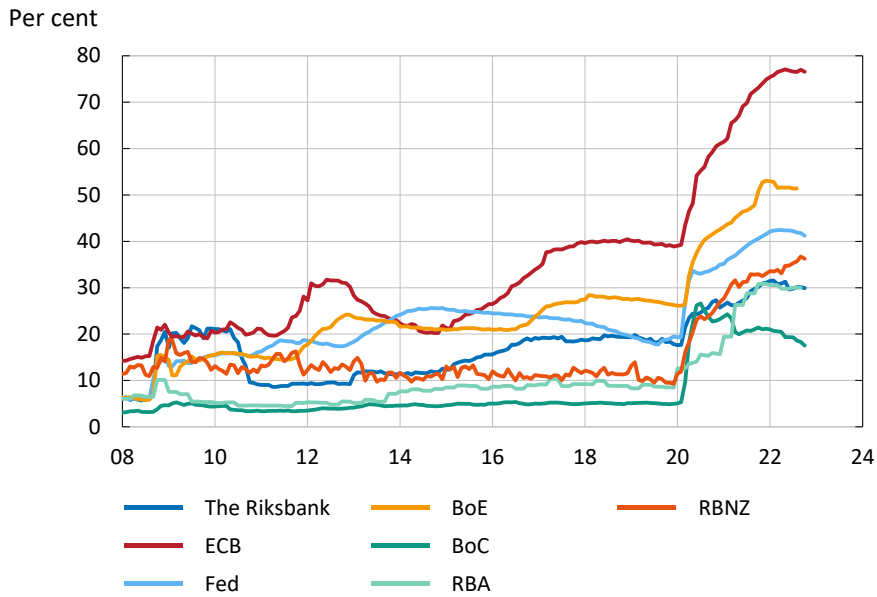
Sources: Statistics Sweden and the Riksbank.

1.4 The Riksbank's asset purchases compared with those of other central banks

Central bank balance sheets have increased significantly since the financial crisis

The financial crisis that erupted in 2008, the subsequent period of low inflation and low policy rates, and the 2020–2021 pandemic led several central banks to take various measures that contributed to a sharp increase in the size of their balance sheets (see Figure 8). These measures included various lending facilities to improve funding conditions and the liquidity situation in the banking system, the functioning of various markets and the supply of credit to households and companies. Large-scale asset purchases were also one of the measures that caused balance sheets to expand (see Figure 9). Some central banks, such as the US Federal Reserve, already held a small portfolio of domestic government bonds before the financial crisis. The Federal Reserve and other central banks such as the Bank of England and the ECB bought securities during the global financial crisis to address problems in financial markets and to support the economy with a more expansionary monetary policy.

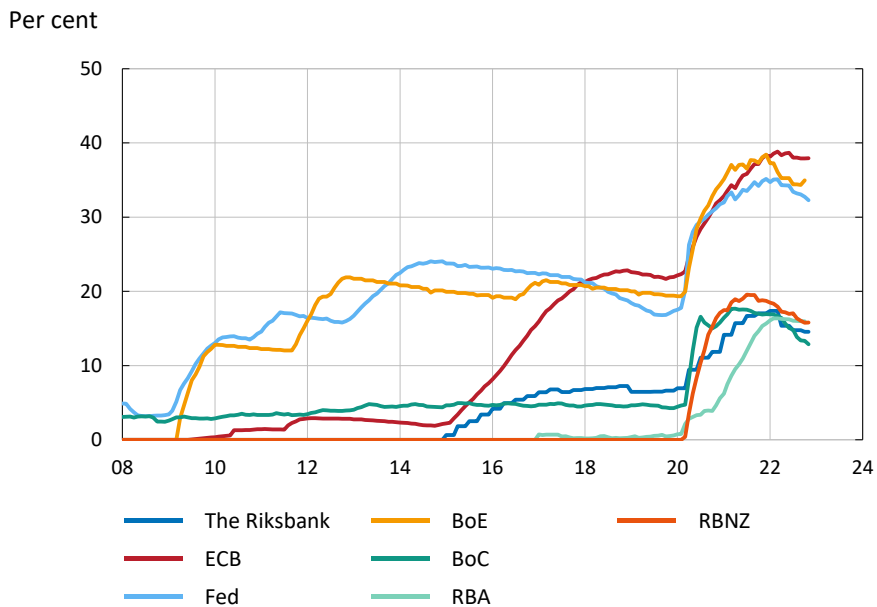
Figure 8. Central banks' balance sheet totals as a share of annual GDP



Note. GDP is calculated as the sum of the present quarter and the three previous quarters. For those quarters for which GDP has not yet been published, the latest published GDP statistics are used. The central banks included in the figure are the Riksbank, the Federal Reserve (Fed), the Bank of England (BoE), the European Central Bank (ECB), the Bank of Canada (BoC), the Reserve Bank of Australia (RBA) and the Reserve Bank of New Zealand (RBNZ).

Sources: National sources.

Figure 9. Central banks' asset holdings issued in national currency as a share of annual GDP



Note. See note under Figure 8.

Sources: National sources.

A few years after the financial crisis, the ECB, the Bank of England and the Federal Reserve, among others, launched new asset-purchasing programmes at different times, one of the main objectives being to make monetary policy more expansionary in a situation where inflation remained low despite policy rates being at or close to the limit of how low central banks could cut them. Some of the purchases were also aimed at shoring up poorly functioning markets.

When the Riksbank started buying government bonds in 2015, the US, UK and European central banks already had several different asset-purchasing programmes under way. There were some differences between their asset portfolios during this period. The Riksbank bought only government bonds, which was also the focus of the Bank of England, although it also included commercial paper. The Federal Reserve's various so-called LSAP programmes included both government and covered bonds. The ECB's asset-purchasing programme, APP, started with purchases of private securities in 2014 and was extended to purchases of government bonds in 2015. Some of the programmes during this period had a fixed envelope and a fixed end date. Others were more flexible, with the pace of purchases in some cases linked to the outlook for the economy and inflation.²⁵

Large asset purchases during the pandemic

Central banks that already had asset-purchasing programmes in place expanded and extended them during the 2020–2021 pandemic. In addition, a number of other central banks launched purchasing programmes, including central banks in small, open economies, such as the Bank of Canada, the Reserve Bank of Australia and the Reserve Bank of New Zealand. The aim of the purchases was to reduce turmoil in financial markets and continue to stimulate the economy.

Compared to the pre-pandemic period, purchases were much larger and were made in a shorter period of time. All central banks made substantial purchases of government bonds and bonds issued by regions. Some of them also bought debt securities issued by the private sector. The ECB predominantly purchased government bonds both under APP and under the purchasing programme launched during the pandemic, PEPP. In the case of the Federal Reserve, government bonds accounted for about two-thirds of its asset holdings. The Riksbank differed from other central banks in that its purchases consisted to a lesser extent of government bonds and to a greater extent of covered bonds. Most of the central banks had completed their net asset purchases by mid-2022, by which time the large central banks had asset holdings equivalent to 35–40 per cent of their respective countries' GDP, while the Riksbank's and the central banks of other small, open economies' portfolios were 15–20 per cent of GDP (see Figure 9).

Several central banks had holdings of, for example, government bonds amounting to more than 40–50 per cent of the outstanding stock, including the Riksbank, while the corresponding figure for the Federal Reserve was closer to 30 per cent. The average maturity also varies across countries, depending in part on the profile of government

²⁵ For details of central bank asset purchases during the financial crisis and the following years up to 2017, see Bank for International Settlements (2019).

borrowing chosen by each country (see Table 1). A rough comparison of the remaining maturity of government bond holdings when the purchases were concluded shows that the Riksbank had the shortest average maturity of the central banks we are comparing here: just over five years. The remaining maturity of the Riksbank's total asset holdings at the end of 2021 was just under four years.

The details of how purchases have been structured differ somewhat between countries, as do the institutional arrangements depending on the formal relationship central banks have with the governments and treasuries of the countries. For example, in some countries, including Canada and the United Kingdom, there are agreements in place between central banks and ministries of finance that are designed to compensate and protect central banks in various ways from losses associated with the asset-purchasing programmes.

Table 1. Central banks' purchases of various securities

	Bonds issued by state/region		Mortgage bonds		Other private securities		Maturity, government bonds
	Before 2020	After 2020	Before 2020	After 2020	Before 2020	After 2020	Average
RB	x	x	-	x	-	x	5.2
ECB	x	x	X	x	x	x	7.4
Fed	x	x	X	x	x	x	7.6
BoE	x	x	X	-	x	x	13.0
BoC	-	x	-	x	-	x	6.2
RBA:	-	x	-	-	-	-	5.9
RBNZ	-	x	-	-	-	-	8.1

Note. Maturity refers to the approximate maturity (in years) at the time the purchases were made. See note under Figure 8. For Sweden, mortgage bonds refer to covered bonds.

Sources: National sources.

2 How do asset purchases work?

How monetary policy works through the economy to ultimately affect inflation is called the monetary policy transmission mechanism. The transmission mechanism consists of several elements and is usually described as monetary policy affecting inflation through different channels. In practice, there are strong links between the channels and it is not clear how to divide them. The research into asset purchases has identified several channels through which purchases can contribute to a weaker exchange rate, lower interest rates and more lending. In this way, the purchases can contribute to higher economic activity and higher inflation. They can also lower expectations of future policy rates and reduce the premiums and hence the yields on the securities the central bank buys, as well as on other securities. The purchases also increase liquidity in the banking system, which may help to stimulate lending in the economy.

For a small, open economy like Sweden, the effects of purchases on the exchange rate can be particularly important for the transmission of monetary policy. Another important factor that may have a relatively large impact on transmission in Sweden is that households are sensitive to changes in mortgage rates due to the high indebtedness and short interest rate fixation periods of their mortgages.

When central banks launched large-scale asset-purchasing programmes to make monetary policy more expansionary in the context of the 2008–2009 global financial crisis, there was little practical experience of such programmes. There were limited empirical studies and also limited guidance in the modern theoretical economics literature. In it, monetary policy was mostly equated with changing the central bank's policy rate. Some theoretical results even indicated that asset purchases were no substitute for cuts in the policy rate, as the purchases would have no effect on the economy. However, these results are based on simplified assumptions about how the economy and financial markets work.²⁶

Following the global financial crisis, research has naturally become increasingly interested in quantitative easing and asset purchases as a monetary policy tool. Academic research has identified a number of ways in which central banks can influence the economy and inflation by purchasing securities instead of, or in addition to, lowering

²⁶ See, for example, Deutsche Bundesbank (2016). This is the background to an oft-repeated quote by Ben Bernanke, former head of the US Federal Reserve. A number of years after the global financial crisis, he was asked how confident he had been that the theory behind the central bank's actions would work during the crisis. Referring to these simplistic models, Bernanke jokingly replied "well, the problem with QE is it works in practice, but it doesn't work in theory" (Brookings, 2014).

the policy rate. In this chapter, we describe these different ways. In the following chapters, we discuss their likely impact in practice.

2.1 The monetary policy transmission mechanism

The aim of monetary policy is to keep inflation low and stable. In concrete terms, the Riksbank, like many other central banks, aims for inflation to be around 2 per cent. Central banks have various monetary policy tools to control inflation, the most common of which is the policy rate. The way in which the changes made via these tools are transmitted to changes in inflation is usually referred to as **the monetary policy transmission** or transmission mechanism. This mechanism consists of several parts and is often described as monetary policy affecting inflation through different **channels**.

It is important to remember that the division into different channels is an attempt to describe a complex process in which different mechanisms engage and interact. To simplify, one often describes the channels in a way that allows them to be perceived as independent. But in practice there are strong links between the channels and it is therefore not clear how to draw the boundaries between them

Although monetary policy operates through all channels simultaneously, the time it takes to affect inflation through different channels can vary. Through some channels, inflation is affected fairly immediately, while through others it takes longer. Moreover, the importance of different channels may differ across countries, as the structure of financial markets and the broader economy differs.

Before describing the transmission of asset purchases, it may be useful to first have a picture of how monetary policy affects inflation "in the usual case", i.e. when monetary policy is conducted via the policy rate.

2.2 Transmission through changes in the policy rate

What inflation will be in the short to medium term, say one to two years ahead, will depend largely on how economic activity and the exchange rate develop and on households and companies' inflation expectations. If inflation is lower than the target, the central bank can help it to rise by pursuing a more expansionary monetary policy, which for a time raises activity in the economy and helps to weaken the exchange rate. The most common way to do this is by cutting the policy rate. Similarly, the central bank raises the policy rate if inflation needs to be brought down.

How do changes in the policy rate affect economic activity? Let's take a cut in the policy rate as an example. To begin with, it affects the short-term interest rate that the central bank is trying to control. In the case of the Riksbank, this is the overnight rate, which is the interest rate on loans between banks overnight. Longer-term market rates are influenced by expectations of what short-term rates will be in the future. This means that a cut in the overnight rate transmits to longer rates, pushing them down.

Since the effect is largely via expectations, longer rates may fall even **before** the Riksbank cuts the policy rate if market participants expect a cut. As long as the Riksbank then does exactly as market participants had expected, the effect on other interest rates may be small or non-existent once the Riksbank cuts the policy rate. The impulse from a more expansionary monetary policy via lower interest rates has then already begun to propagate through the economy.

For households, saving becomes less attractive when interest rates are lower. In addition, households need to use a smaller proportion of their income for interest payments on loans. Both of these factors contribute to households consuming more goods and services and also increase their demand for housing, which puts upward pressure on housing prices. For companies, lower interest rates mean that it is cheaper to finance investment and they therefore invest more in machinery and property. Lower interest rates also increase demand for higher-yielding financial assets. This pushes up the price of shares, for example. It also contributes to higher consumption, as it makes households that own such assets more willing to spend. Banks, which use the assets as collateral, may also be more willing to lend to households and companies.²⁷

So lower interest rates stimulate demand in the economy. Since households' and companies' consumption and investment today are influenced by what they think about the economy in the future, demand can also be stimulated if they **expect** lower interest rates. The central bank's cutting the policy rate and its communication about the future level of the policy rate, for example when the Riksbank adjusts its forecast for the policy rate downwards, can therefore have a stimulating effect on the economy by changing expectations.²⁸

In addition to domestic demand, demand for export goods also increases. When domestic interest rates fall compared to interest rates abroad, for example when Swedish interest rates fall compared to interest rates abroad, foreign operators become less interested in investing in Sweden and there is less demand for kronor. This contributes to a weaker krona exchange rate, which makes Swedish goods cheaper for foreign households and companies. At the same time, the prices of imported goods become more expensive in kronor terms, which helps to push up inflation.²⁹

Overall, consumption, investment and exports thus increase. Companies produce goods and services at a faster pace and demand more labour, and as more people get jobs and it becomes harder to find staff, wages rise faster. Companies also raise their prices more to compensate for higher wage costs and higher input prices, which pushes up inflation.

²⁷ This section briefly describes mechanisms often referred to as an interest rate channel, an asset price channel and a credit channel in the monetary policy transmission.

²⁸ This is sometimes described as monetary policy also operating through an expectations channel, in addition to the channels mentioned earlier.

²⁹ The so-called exchange rate channel.

2.3 Transmission when purchasing assets

The previous section described the transmission of a more expansionary monetary policy when the central bank lowers the policy rate. What does transmission look like when the central bank buys securities? The models used to analyse the impact of monetary policy on the economy were built primarily with the policy rate in mind, not asset purchases. However, new theoretical approaches and a new generation of models have been developed to capture mechanisms that are relevant for studying the impact of asset purchases on financial prices and the macroeconomy. Although the models need further development, there have been achievements that have deepened the understanding of the transmission of asset purchases.³⁰

As with central bank rate cuts, there are channels that contribute to a weaker exchange rate and higher activity in the economy via lower market interest rates, expectations of lower interest rates and more lending. However, market rates are affected in a partly different way. In addition, there are channels that do not necessarily have an effect only through interest rates, but can also affect the economy through the extra volume of money that the central bank creates when it pays for the securities.

Below we describe the channels that are often highlighted as important for the transmission of asset purchases.³¹ As with the transmission of the policy rate, it is not clear how to divide up these channels and their importance may vary across countries. In addition, the importance of certain channels varies depending on the state of the economy, in particular whether or not there are disruptions in financial markets.

Signals about monetary policy going forward may lower expectations of the policy rate

The market rate on a security with a longer maturity, such as a ten-year government bond, reflects, among other things, what investors think a short-term market rate will be on average over those ten years. This is natural as an alternative to holding the government bond may be repeated investment in a short-term security. There is thus a link between expectations of short-term interest rates and long-term market rates. When the central bank buys securities, it can stimulate the economy through a channel whereby the purchases send signals of a low policy rate in the future, leading market participants to expect lower short-term interest rates. Longer-term rates then fall in a similar way to when the central bank lowers the policy rate and communicates about monetary policy going forward.

³⁰ Krishnamurthy (2022) provides an overview of recent theoretical developments in the field.

³¹ The channels we describe below through which asset purchases operate often assume the existence of financial frictions that imply that the purchases affect financial prices and the macroeconomy. These include investor preferences for specific maturities or assets, constraints on investors' ability to arbitrage between assets and markets, and costs associated with adjusting portfolio composition. Vayanos and Vila (2021) present a model with the first two frictions and the study by Kabaca (2016) provides examples of the latter. For more on the transmission of asset purchases, see for example Krishnamurthy and Vissing-Jorgensen (2011), Alsterlind et al. (2015), De Graeve and Lindé (2015) and Busetto et al. (2022).

The extent to which interest rates are affected via this signalling channel depends on the expectations of market participants. The effect also depends on the extent to which market participants interpret purchases as a signal of the central bank's commitment to keeping policy rates low. One possible mechanism for this could be that market participants interpret the purchases as a commitment by the central bank to keep policy rates low, since rising interest rates affect the central bank's financial results and may lead to losses on its asset holdings.³² Bernanke (2020) argues that in practice the signalling effect appears to be through expectations about the sequencing of central bank actions. A common perception among market participants, one that central banks may encourage, is that the policy rate is unlikely to be raised until the asset purchases have been completed. With this view, market participants' expectations of the policy rate may be influenced by the start of purchases, the announcement of continued purchases by the central bank or a change in the size of purchases.

Channels also go via the premiums on longer rates

The signalling channel we have described above is a broad channel in that it affects interest rates on several assets simultaneously. There are also narrower channels that start with an effect on the interest rate of the specific asset or assets that the central bank buys. These have mostly been government bonds of various maturities but also include mortgage bonds and corporate bonds. The purchases then act mainly through the **premiums** on the market rates of the assets.

The premiums mean that longer-term rates do not simply reflect expectations of future short-term rates.³³ One reason for the premium is that short-term rates may move in a different way than expected. For example, to invest in a bond with a fixed coupon rate and long maturity, investors may want to be compensated for that uncertainty in the form of a premium. A premium may also compensate for the fact that an asset is more difficult to convert quickly into cash. In addition, premiums may reflect the risk that the issuer of the bond will have problems paying what it owes the bondholder. This is less relevant for bonds issued by governments, but can periodically be a relatively large part of the premium for a corporate bond, for example.

The size of a premium can also be influenced by whether an asset has a particular characteristic that benefits market participants. The most obvious example is government bonds. As comparatively safe assets, they have additional uses that market participants may wish to include in their portfolios. For example, banks can use them as collateral in interbank transactions and transactions with the Riksbank. Insurance companies may also require government bonds to comply with regulations requiring

³² In 2022, however, the Riksbank and many other central banks have raised their policy rates sharply, despite the consequences for financial results. See also Chapter 4.4.

³³ In practice, it is not clear how much of a longer rate is due to expected short rates and how much is a premium. Since this cannot be observed directly, breakdowns are made via statistical calculations.

them to hold assets with a certain maturity and risk profile. In addition, lending government bonds via repo transactions in the secondary bond market is a common way for market participants to obtain liquidity at short notice.³⁴

Purchases can affect interest rates through the composition of different assets in investors' portfolios

Thus, some market participants may wish to hold government bonds and other specific assets with specific maturities in their portfolios for reasons other than the return on the assets. They are then reluctant to switch between different types of assets and maturities. For example, when the central bank buys a particular government bond, the volume of that bond available to market participants is reduced. This increases competition for the remaining bonds, especially if they have a feature that is difficult to substitute, and this increases the price of the bond. At the same time, the premium for holding the bond decreases and the market interest rate on the bond is lower. The more agents who want to hold this particular bond, and the greater the volume that the central bank buys, the greater should be the effect on the premium and hence on the interest rate.

How does this affect economic activity? A fall in the market rate on a specific bond can have some impact on the interest rates faced by households and companies by reducing the cost of funding for banks, mortgage institutions and companies. It is also possible that the interest rates on some bonds have a greater impact on the exchange rate than other rates. In general, the impact on activity and inflation should be greater the broader the impact is on market interest rates. The central bank can contribute to a broader pass-through by buying government bonds with different maturities and other types of bonds. But there are also channels through which the purchase of a government bond with a long maturity may not only lower the interest rate on that particular bond – it may also have spillover effects and contribute to a fall in other market interest rates.

Thus, for example, when the central bank buys a large volume of a particular government bond with a long maturity, there is greater competition for the remaining volume, as we have described above. At the same time, competition for assets with a similar characteristic should also increase, such as government bonds with similar maturities. This could result in prices for these assets also rising and interest rates falling.³⁵ Moreover, the effect could be even broader, affecting prices and interest rates on other types of securities, such as mortgage bonds and corporate bonds. Overall,

³⁴ A repo or repurchase agreement is a contract in which one party agrees to sell an asset to another party in exchange for liquid funds. At the same time, the parties also agree that the same asset will be repurchased at a predetermined price at a certain time in the future. The repo agreement therefore functions essentially as a collateralised loan, with the interest rate being the difference between the price at the time of sale and the price at the time of purchase.

³⁵ When the central bank buys long-term government bonds from market participants, it assumes a large part of the risk associated with government bonds, i.e. the risk that short-term interest rates may change in an unexpected way during the term. For market participants, this risk is therefore reduced overall. As a result, premiums – and hence interest rates – may fall on government bonds across all maturities, not just on the bonds with the closest maturities. See, for example, D'Amico et al (2012).

purchases affect interest rates in different ways depending on how willing participants are to switch between different types of assets and maturities, and what those who sell government bonds to the central bank do after the sale – whether they choose to invest in other assets instead and, if so, which ones they choose. The less inclined market participants are to rebalance their portfolios, the greater the impact on the rates of the assets purchased by the central bank.

Asset purchases can have greater impact when financial markets are in turmoil

The starting point for the channels described in the previous section is that central bank asset purchases can reduce the premium component of market interest rates. The size of the premiums varies according to the type of security and its maturity, but they also vary with the state of the economy. Premiums can be pushed up if market participants perceive an increasingly high risk that an asset may be difficult to sell and if many people want to sell at the same time. If it goes too far, there may be such a wide gap between the price that sellers and buyers are willing to accept that the market will have trouble functioning. By buying the asset, the central bank can reduce the risk by making it clear that there is an operator to sell to, which lowers the premium, and helps to keep the necessary trading going. The willingness and ability of market participants to rebalance their portfolios may also be less in times of uncertainty and the impact on interest rates may be greater.

In extreme situations of high turmoil, central bank purchases can have a greater impact on financial markets. The purchases can then depress premiums that have risen but also prevent problems in one market from spilling over into other markets. In this way, they can prevent a general problem arising for agents in accessing credit, including households and companies. Market rates would then risk being pushed up across the board, which would mean that the central bank's expansionary monetary policy via a low policy rate would have less of an impact on the interest rates faced by households and companies. By buying assets, the central bank could then help to maintain the transmission of the policy rate. In times of great turmoil in financial markets, when market participants are even less inclined to rebalance their portfolios, central bank purchases can thus have a major impact on interest rate setting. The central bank's action may also have a general stabilising effect by clearly demonstrating that the central bank will reduce the risk of a very negative development. It helps to ensure that companies and households do not cut back on investment and consumption as much as they would otherwise have done.

Increased liquidity in the banking system can stimulate lending

So far, the description of the different channels has focused mostly on the assets that the central bank takes over from market participants and the effect this has on market interest rates. Little has been said about how the central bank pays for the assets. Another way of saying the same thing is that the focus has been mostly on the asset side of the central bank's balance sheet and less on the liability side. But even the change on the liabilities side can affect activity in the economy. It does so through a partially different channel than those going via signals about short-term interest rates

or premiums on longer-term interest rates, namely precisely via the way the central bank pays for the assets. Usually it is by increasing the volume of central bank reserves.³⁶

When a commercial bank sells assets to the Riksbank, on its own behalf or on behalf of a customer, the payment is made by the Riksbank increasing the balance on the account held by the commercial bank with the Riksbank. This increases the total volume of central bank reserves, sometimes also referred to as central bank money. When liquidity in the banking system increases in this way, it can make banks more willing to lend to households and companies. This is partly because when banks' holdings of reserves increase, the risk and return on their assets decrease. Increased lending to households and companies is then one way to increase returns.³⁷ When the liquidity of the banking system increases, the risk of an individual bank running too large a deficit with the other banks at the end of the day also decreases. As a result, banks may be prepared to increase lending to households and companies somewhat. It is reasonable to believe that this channel is much more important if banks have liquidity problems.³⁸

Channels go via both the asset holdings and the purchases themselves

An important question is whether it is the central bank's asset **holdings** that ultimately contribute to raising activity and inflation or whether it is the **purchases** themselves, i.e. the change in holdings. In other words: are the effects via the stock or the flow of assets? It can be concluded that the different channels described above support both possibilities.

The channel whereby market participants rebalance their portfolios when the central bank buys assets assumes that it is primarily the central bank's holdings relative to the outstanding stock of assets that matter. The larger the share of assets held by the central bank, the greater should be the impact on interest rates and hence on activity, exchange rates and inflation, all else equal. As for the channel through which purchases send signals about the future policy rate, this is less clear, as the effect depends largely on the expectations of market participants and their interpretation of the central bank's actions. It is possible that both the size of the holdings, or announcements of plans for them, and the purchases themselves and changes in their size may affect the expectations of market participants and hence interest rate setting. This applies in

³⁶ See Kjellberg and Vestin (2019) for details of how the Riksbank's balance sheet is structured and Armelius et al. (2020) for a description of what happens on the Riksbank's balance sheet when various transactions are made, including when the Riksbank buys assets.

³⁷ As reserves increase, this can reinforce the channel described earlier where market participants rebalance their portfolios. The increase in reserves results in a shorter average maturity of the overall asset portfolio held by commercial banks. To compensate for this, banks want to increase their holdings of longer-term assets. This causes interest rates on these assets to fall. This effect can occur regardless of whether the central bank itself buys longer-term assets, see Christensen and Krogstrup (2018).

³⁸ Central bank reserves can play a particularly important role if government bond yields start to rise due to concerns about the long-term sustainability of government finances. In this situation the scope for using government bonds as collateral reduces, which would weaken the financial position of banks and reduce their lending to households and companies. If the central bank then buys government bonds, it takes over risk from commercial banks and increases the volume of a safe asset, i.e. reserves, in the banking system. See Reis (2017).

particular in times of financial market turmoil. In such cases, both communication of the central bank's plans to buy assets and actual purchases can help to calm the situation.

An important difference between the effects of the holdings and the effects of the actual purchases, is that the effects of the holdings probably have an impact over a longer time – in principle as long as the central bank owns the assets. But the effect may diminish over time, for example if the central bank's share of a particular bond also declines as new issues are made and the volume available to market participants increases again. Even if the central bank buys new bonds to maintain its holdings, the downward pressure on market rates may decline compared with the effect when the central bank made the first purchases, if the financial markets were in a more stressed situation at the time.

2.4 Potentially important factors for the transmission of monetary policy in Sweden

In the introduction to this chapter, we noted that the transmission of monetary policy may generally differ across countries and that the importance of different channels may vary. This applies both to how well monetary policy affects market interest rates and the exchange rate, which is the first stage of transmission, as well as the second stage where changes in market interest rates affect the decisions of households and companies and thus economic activity and inflation.

The effect on interest rates of market participants rebalancing portfolios may be smaller in a small, open economy...

The fact that Sweden is a small, open economy is an important factor that affects the transmission of Swedish monetary policy in several dimensions. Our financial system is highly integrated with that of the rest of the world, and Swedish banks and companies operate to a large extent in international financial markets. What happens internationally is therefore of great importance for Swedish financial markets. This means, among other things, that measures taken by the ECB and the Federal Reserve that affect interest rates internationally also have an effect on Swedish market rates.

One aspect of the strong link to international financial markets is that market participants have a wider range of assets that can meet a specific need and that they can therefore consider as equivalent. The volume of Swedish government bonds, for example, is a small proportion of the total volume of low-risk bonds on the international market. The Riksbank cannot influence this total volume in the same way as the major central banks can when they buy assets. This would suggest that the channel through which market participants rebalance their portfolios may be weaker in Sweden and

other small, open economies than in large economies.³⁹ But the extent to which market participants choose to replace Swedish government bonds with other Swedish assets or with other countries' assets also matters for the interest-rate effect.

... but the effects on the exchange rate may be greater

Another aspect of how dependent Sweden is on other countries is that a large share of what Swedish companies produce is sold abroad, at the same time as a large share of companies' input goods and the goods consumed by Swedish households, is imported. This means that exchange rate developments are an important channel for the transmission of monetary policy in general. It also means that asset purchases, via a weakening of the exchange rate, can have a comparatively greater impact on activity and inflation in Sweden than in large economies. If market participants replace Swedish assets that the Riksbank buys with foreign assets, it will contribute to the Swedish krona weakening, and the effect can be reinforced through this channel. It could in this case counteract the smaller effect via interest rates in Sweden, as we described earlier.

High indebtedness and short interest-fixation periods make households more sensitive to changes in mortgage rates

An important factor affecting the transmission of monetary policy in Sweden is that Swedish household consumption is particularly sensitive to changes in mortgage rates. This sensitivity to interest rates has increased as households have borrowed more and more for their home purchases. In addition, households have, to a large extent, short mortgage interest rate fixation periods. As a result, the proportion of households' disposable income spent on housing is affected relatively quickly and relatively substantially if the mortgage rate changes. Moreover, households with large loans tend to be more responsive to changes in income and to adjust their consumption to a greater extent than less indebted households. A more expansionary monetary policy can therefore contribute to a relatively high increase in consumption, provided that the mortgage rates fall. Similarly, a more restrictive monetary policy can dampen consumption quite considerably.⁴⁰

The impact on consumption may also be amplified by the effect of monetary policy on housing prices, as the valuation of housing affects households' ability to consume by taking out loans using their home as collateral. This effect will be greater if those with home loans have a high level of debt in relation to the value of their home.

³⁹ See Johnson et al (2020) who discuss the transmission of a central bank's asset purchases in small, open economies.

⁴⁰ This is usually referred to as a cash flow channel for monetary policy. The link between monetary policy and household indebtedness, interest rate fixation periods and cash flows is described in Gustafsson et al. (2017) and Flodén et al. (2020). Di Casola and Iversen (2019) show in a general equilibrium model how monetary policy becomes more potent when household indebtedness is higher.

Swedish public debt is relatively small compared to other countries

Two additional factors specific to Sweden that may affect the transmission of the Riksbank's asset purchases are the relatively small outstanding volume of Swedish government bonds in relation to Swedish GDP and the Swedish National Debt Office's market-supporting facilities. The comparatively small volume of government bonds is due to the low borrowing needs of the Swedish government. Compared to the US and the euro area, where the outstanding stock of government bonds is close to 100 per cent of GDP, the volume of Swedish government bonds is fairly modest, amounting to just under 20 per cent of Swedish GDP.⁴¹ If market participants cannot easily replace Swedish government bonds with other riskier assets or investments in other countries, relatively small government bond purchases by the Riksbank in SEK terms can therefore have a large interest rate effect – contrary to the mechanism that suggested a smaller effect in small, open economies of market participants balancing their portfolios as we described above.

At the same time, the small outstanding volume of Swedish government bonds may be a constraint. At the end of 2019, the Riksbank owned 45 per cent of the outstanding Swedish government bonds issued by the Swedish National Debt Office in Swedish kronor.⁴² This affected the scope for the Riksbank to purchase government bonds when monetary policy needed to be made more expansionary during the pandemic.⁴³

The Swedish National Debt Office is responsible for the borrowing of the Swedish state and promotes the functioning of the government bond markets. Among other things, the Debt Office lends government bonds in the short term through so-called repos to market participants who have undertaken to be dealers in Swedish government bonds.⁴⁴ The repo facility has been important in ensuring the smooth functioning of the secondary market and the facility has been used extensively at times. The short-term provision of government bonds on demand to market participants for market-making purposes is common in other countries where the central bank has purchased large amounts of government bonds. The interest that dealers receive for placing money in the repo facility is 0.40 percentage points lower than the Riksbank's policy rate. It is therefore not possible with monetary policy alone to lower short-term market interest rates below this level.⁴⁵

⁴¹ For Sweden, nominal, real, green government bonds and public bonds in foreign currency are included at the end of 2021.

⁴² The Riksbank's holding of nominal Swedish government bonds amounted to 52 per cent. The share of real government bonds was 23 per cent.

⁴³ The starting point for the Riksbank's purchasing programme was that the Riksbank should not hold a predominant part of the total outstanding stock of assets issued by the Swedish state, Swedish municipalities, and regions as well as Kommuninvest i Sverige AB and publicly owned companies.

⁴⁴ In economic terms, a repo or repurchase agreement is a short-term loan, whereas in Sweden it is legally a pair of transactions in which one party sells an asset and then buys it back shortly afterwards.

⁴⁵ Most of the facility lending is done from tomorrow to the following day (so-called T/N) with interest rate conditions that are 0.40 percentage points lower than the Riksbank's policy rate. Lending is modest in the overnight facility (so-called O/N) with an interest rate 0.45 percentage points lower than the policy rate.

3 Lessons from other central banks' asset purchases

There is compelling empirical evidence that financial conditions become more expansionary through, among other things, lower interest rates on safe assets, smaller rate spreads between safe and risky assets, and a weaker exchange rate when a central bank buys assets. Targeted purchases have been particularly effective in restoring market functioning in times of financial stress. Large-scale asset purchases have also been used to provide monetary stimulus to the economy when there has been no scope to cut policy rates.

Asset purchases have boosted economic activity and, to a lesser extent, inflation in major economies, but the magnitude of the impact is uncertain. There is even less analysis on experiences of asset purchases in small, open economies. We do know, however, that domestic asset purchases affect domestic interest rates and have potentially larger effects on the exchange rate. The spillover effects of assets purchases abroad also affect financial and macroeconomic conditions in small open economies and add an additional dimension to monetary policy considerations there.

Asset purchases have become a standard tool in the central banks' toolbox. It was a central feature of the monetary policy response to the global financial crisis of 2008-2009 and its aftermath, as well as the devastating financial and economic disruptions caused by the pandemic. Many central banks have made large-scale asset purchases to make their monetary policy more expansionary when policy rates have been cut to or close to their effective lower bound. In times of crisis, smaller-scale asset purchases targeted at specific markets have stabilised market conditions and improved the impact of monetary policy.

Common themes emerge

While there are significant differences in the size, design and implementation of central bank asset-purchasing programmes, a number of common themes are emerging. One theme is that asset purchases have been a particularly effective tool for restoring market functioning during periods of financial stress and for reducing elevated premiums on risky assets.⁴⁶ Another theme is that large-scale purchases of government and housing bonds have lowered market interest rates, contributed to more expansionary

⁴⁶ See an article published by the Bank for International Settlements (2019) for a summary and evaluation of different central banks' experiences with asset purchases.

financial conditions and increased the impact of monetary policy when policy rates were at their lower bound.

Methodologically different studies and data from a number of large economies show that asset purchases increase economic activity and, to a lesser extent, inflation.⁴⁷ However, estimated effects vary significantly due to the complex transmission of asset purchases to the broader economy and the challenges of controlling for other factors that simultaneously affect economic activity. In addition, it is difficult to distinguish the effects of asset purchases from other measures that were implemented at the same time, so the estimated effects should be interpreted with caution.

Fewer studies on the effects of asset purchases in small, open economies

The research literature analysing foreign central banks' experiences of asset purchases has grown enormously over the past decade and many different data sources and methodologies have been used. The bulk of the literature focuses on the impact of asset purchases on financial markets in major economies, particularly in the euro area, the United Kingdom, and the United States. There are fewer studies of their effects on the real economy and inflation. In particular, research results on the effects in small, open economies are less extensive.

Small, open economies have strong international linkages through trade and financial markets. The impact of domestic asset purchases, and the channels through which they operate, may differ from large economies. In particular, the exchange rate channel may play a more important role for small open economies. In addition, asset purchases in larger economies affect financial and macroeconomic conditions in smaller economies as well. These international dimensions complicate the assessment of the effects of domestic asset purchases (Di Casola and Stockhammar 2021).

3.1 Effect of asset purchases on financial prices

The international evidence clearly shows that asset purchases have lowered interest rates on safe and risky assets when a central bank has announced the purchases and that the effects persist over time. The estimates differ depending on the time period studied and the empirical methodology used, but point in the same direction. The exchange rate also tends to weaken in the context of asset purchases.⁴⁸

The consensus that has emerged among academic researchers and central banks is that asset purchases work through the channels we described in Chapter 2: the purchases can signal lower future policy rates, lower term premiums and reduce liquidity premiums by restoring market functioning in times of financial stress. The fact that purchases may have helped reduce uncertainty among economic agents, increase credit supply and weaken the exchange rate are also mentioned as possible channels. Central banks themselves report that they believe several channels have played a

⁴⁷ See the study by Bhattarai and Neely, (2022) for a review of the international academic research on the macroeconomic effects of asset purchases.

⁴⁸ See studies by the Bank for International Settlements (2019) and Dedola et al. (2021).

role, but there are different views on which mechanisms have been most important in different situations.

Two methods are commonly used to measure the effect of asset purchases on financial prices. Event studies measure the effect on financial prices in a narrow window around the announcement.⁴⁹ Time series methods analyse the dynamic relationship between interest rates and asset purchases at lower frequencies, and take into account other factors that may also drive financial prices.⁵⁰

Targeted asset purchases an important tool in crisis situations

Targeted asset purchases have been particularly effective in restoring market functioning and reducing yield spreads between safe and risky assets during periods of financial stress. By offering to buy in markets where sellers have difficulty finding buyers at reasonable prices, the central bank is stemming a negative spiral of rising risk premiums and a deteriorating market. Targeted purchases have typically involved the central bank buying private assets such as mortgage bonds and corporate bonds, but occasionally also government bonds. Purchases tend to last for a relatively short period of time and the design of the programme is important to get the effect right. The purchases often interact with other crisis measures such as lending to key financial intermediaries. The simultaneous launch of several such measures can have a reinforcing effect.

An example of targeted asset purchases is the turmoil at the beginning of the global financial crisis when the Federal Reserve and the ECB bought mortgage bonds and the Bank of England bought corporate bonds. After that, the functioning of the markets improved. Differences between the price that buyers and sellers could accept narrowed, and yield spreads fell.⁵¹ The Federal Reserve's purchases of mortgage bonds had a larger impact on yield spreads against government bond yields than subsequent purchases of government bonds. The ECB's and Bank of England's 2016 corporate bond purchases, which took place under normal market conditions, also reduced corporate bond spreads and stimulated corporate bond issuance.⁵² Targeted purchases may also have beneficial spillover effects to other market rates, but to what extent this occurs is a subject for debate.⁵³

⁴⁹ Event studies capture the financial market's reaction to the new information from the policy action and require few modelling assumptions. However, estimates are sensitive to the width of the window and the extent to which market participants expected the announced measure, whether multiple policy measures are announced simultaneously, and whether the announcement contains information on the macroeconomic outlook.

⁵⁰ Time series methods rely on more explicit model assumptions than event studies but are better suited to assessing the persistence of the initial effects of the announcements. In addition to event studies and time series analysis, some studies use the historical relationship between the supply of assets and rates on assets to assess the impact on bond purchases.

⁵¹ See the study by Kozicki et al. (2011) describing for instance the experience of the earliest targeted asset purchases and the study by the Bank for International Settlements (2019).

⁵² See, for example, the study by D'Amico and Kaminska (2019).

⁵³ Krishnamurthy and Vissing-Jorgensen (2011) argue that government bond purchases by the Federal Reserve prior to 2011 did not have much impact on mortgage bond yields.

During the "*dash for cash*" that occurred in March 2020, when investors quickly sought highly liquid investments, the Federal Reserve's purchases of government bonds, for example, had a stabilising effect on market functioning and pricing. The Federal Reserve launched its purchases quickly and then bought government bonds on a large scale and at a rapid pace. Purchases of commercial paper also countered the escalating dysfunction and rising yield spreads that were taking place.⁵⁴

Large-scale asset purchases have lowered government bond yields

Meta-studies that have surveyed and compiled a large number of research papers report significant effects of large-scale asset purchases on government bond yields.⁵⁵ These meta-studies are based on pre-pandemic experience of asset purchases. The median estimate for asset purchase programmes in the United States, United Kingdom and euro area between 2009 and 2015 is that government bond purchases equivalent to one per cent of GDP pushed down 10-year government bond yields by about 0.05 percentage points. However, there is a significant variation in point estimates across studies, with estimates ranging from 0.025 to 0.175 percentage points.

The earliest purchasing programmes launched in the US and UK shortly after the global financial crisis produce the largest measured effects on financial variables. The strong response is probably due to the fact that they worked through all the main channels we have mentioned above - they provided better market functioning that mitigated risk premiums, prompted participants to rebalance their portfolios which pushed down risk premiums and signalled the central bank's intention to keep policy rates low for longer.

The measured effects then diminished in later rounds, raising the question of whether the purchases continue to be effective even in normal times in financial markets. However, studies that control for the fact that traders expected the later buying programmes to be more widespread indicate that their effect on financial prices is comparable to the earlier programmes.⁵⁶ Market reactions to the composition of purchases of assets with different maturities also suggest that the risk premium channel has been equally effective even in normal times.⁵⁷ Bernanke (2020) interprets these results as suggesting that asset purchases have not lost efficiency over time. In contrast, some studies argue that the persistence of the estimated effects of the Federal Reserve's asset purchases is overstated and that the initial effects on financial prices observed in event studies fade relatively quickly.⁵⁸

⁵⁴ The Federal Reserve's purchase of commercial paper contributed to narrowing spreads on both *investment grade* and lower-rated paper (Gilchrist et al. 2022). The ECB's purchase of commercial paper improved funding conditions and issuance opportunities in the euro area commercial paper market (Breckenfelder and Schepens 2022).

⁵⁵ Studies by Gagnon (2016) and Andrade et al. (2016) compile and compare the results of many different studies on the effects of government bond purchases on government bond yields.

⁵⁶ See the study by Weale and Wieladek (2016).

⁵⁷ D'Amico and King (2013) study how yields on bonds with different maturities have reacted to information about the maturities the central bank intends to purchase.

⁵⁸ See, for example, studies by Greenlaw et al. (2017), Wright (2012) and Swanson (2021).

Bailey et al. (2020) argue that large-scale asset purchases may have been **particularly** effective in times of financial stress. On the one hand, they may reduce liquidity premiums in stressed markets by restoring market function; on the other hand, they may have been particularly effective when stressed market conditions made market participants less inclined to rebalance their portfolios and engage in arbitrage.

When a central bank buys assets, it lowers the cost of borrowing for those who have access to the financial markets by reducing the cost of market funding. However, there is also some evidence that asset purchases are associated with lower bank interest rates and modest increases in bank lending.⁵⁹ However, these effects depend on the financial position and balance sheet composition of individual banks.

3.2 Impact of asset purchases on the macroeconomy

While there is compelling empirical evidence that asset purchases lower market interest rates and contribute to more expansionary financial conditions, the effects on economic activity and inflation are difficult to estimate. This is not surprising, given the complex transmission of asset purchases and the challenges of identifying and separating their effects from other forces that also affect the macroeconomy.

Asset purchases have supported economic activity ...

International research suggests that asset purchases have supported economic activity, boosting both output and inflation. Again, the academic research has focused on the United States, the United Kingdom and the euro area. A compilation of more than fifty studies on these three economies finds the median effect on output of asset purchases equivalent to 1 per cent of GDP to be 0.16 per cent; the average effect on inflation is 0.11 percentage points.⁶⁰

... but estimates vary

The average effects mentioned above hide a wide range of results, from 0 to just over 1.4 per cent for GDP and from -0.2 to just under 0.6 percentage points for inflation, depending on the method of analysis and the economy being studied. Moreover, the point estimates in each study are shrouded in uncertainty. The estimated effects on GDP and inflation tend to be largest for the United States. But the choice of methodology and identification strategy also matters. Studies typically rely on either multivariate time series analysis or calibrated dynamic general equilibrium (DSGE) models.⁶¹ Di Casola (2021) finds that studies based on data-driven time series methods produce,

⁵⁹ See studies by Hartmann and Smets (2018) for the euro area and Rodnyanski and Darmouni (2017) for the United States.

⁶⁰ These figures are reported in Fabo et al. (2020) and refer to the median of the maximum effect on the variable in question in each individual study.

⁶¹ DSGE models are built on microeconomic principles with explicit economic relationships and are well suited to illustrate transmission mechanisms. They tend to be calibrated to reflect the main features of a given economy. Time series methods are data-driven, less specific about economic structure and measure the dynamic effects of asset purchases.

on average, slightly lower estimates of the effect of asset purchases on output and inflation, but show less variation across studies and countries than estimates from calibrated DSGE models.⁶²

The analytical methods used to measure macroeconomic effects also do not capture all the channels through which asset purchases affect economic activity. For example, it is difficult to capture positive effects on confidence, bank balance sheets and credit flows with current models. In addition, the measured macroeconomic effects should be assessed against an unknown counterfactual in case the asset purchases were launched as an insurance measure against worse outcomes.

3.3 The impact of asset purchases in a small, open economy and the importance of international spillovers

Asset purchases take place in an international context, which can be particularly important for small, open economies. In addition, asset purchases in larger economies have spillover effects to smaller economies that can affect their financial conditions and economic development. Thus, like interest rate policy in the rest of the world, asset purchases in larger economies can also have an impact on monetary policy in smaller countries.

The impact of asset purchases in small, open economies

Before the pandemic, central banks in only a few small, open, advanced economies, including Switzerland and Sweden, purchased assets.⁶³ However, this group grew during the pandemic to include Australia, Canada and New Zealand. Taken together, their experience suggests that asset purchases in small, open economies depress risk premiums on purchased and related assets and induce exchange rate depreciation.

There are fewer studies of these countries than of the large economies discussed above, and they produce mixed results. Some studies report effects on bond yields that are in line with those in large economies while others find effects that are somewhat smaller, given the size of the programme. In Canada, for example, longer-term bond yields fell less than for comparable US purchasing programmes, and Australia also reports a smaller decline in government bond yields than in larger economies.⁶⁴

Assets in small, open economies are easy to exchange for a large pool of international investment options. This may limit the extent to which asset-purchasing programmes

⁶² Fabo et al. (2020) make a different cut, arguing that researchers affiliated with central banks find on average larger effects of asset purchases on output and inflation than colleagues at other institutions.

⁶³ The Swiss Central Bank mainly purchased assets denominated in foreign currencies to counteract strengthening pressures on the Swiss franc.

⁶⁴ Arora et al. (2021) report how financial prices in Canada changed when the Bank of Canada announced asset purchases; the Reserve Bank of Australia (2022) reports the effects on government bond yields in Australia of its pandemic purchases.

affect domestic risk premiums.⁶⁵ The risk premium channel also appears to be somewhat subdued in Canada, Sweden and Switzerland, while the signalling channel is considered to be effective.⁶⁶ More generally, it is more difficult to identify the effects of asset purchases in small economies when central banks abroad conduct asset purchases simultaneously.

The exchange rate also plays a role in the impact of asset purchases and can be particularly important for small, open economies.⁶⁷ The exchange rate tends to weaken in response to asset purchases, both in large economies such as the United States and the euro area and in small, open economies.⁶⁸ But the effect works in both directions. For example, the ECB's asset purchases that began in autumn 2014 led to a strengthening of exchange rates in non-euro area EU countries.⁶⁹ The way that a central bank responds in monetary policy terms to foreign central banks buying assets also complicates the assessment of the role of the exchange rate.

Spillover effects of asset purchases in large economies

Asset purchases in large economies have spillover effects on financial conditions and economic activity in smaller economies. Lower expectations of future policy rates and reduced risk premiums abroad affect financial conditions in small, open economies. In particular, risk premiums covary strongly internationally. When global risk premiums are depressed internationally, this effect is transmitted to domestic financial markets.⁷⁰

When central banks in larger economies buy assets, this can prompt the Riksbank, for example, to respond with monetary policy at home. The macroeconomic interplay between international and domestic asset purchases is complex. Asset purchases in large economies increase economic activity abroad and raise export demand for small, open economies. But they can also lead to exchange rate appreciation in small, open economies. Unless the central bank of the small, open economy responds with monetary policy, the exchange rate appreciation can erode the increase in demand and reduce inflationary pressures. Because of this, asset-purchasing programmes

⁶⁵ Kabaca (2016) presents a theoretical model that illustrates how the substitutability of assets across countries can be expected to affect the impact of asset purchases. Diez de los Rios and Shamloo (2017) find in an empirical study that asset purchases in small, open economies have not depressed term premiums to the same extent as in larger economies.

⁶⁶ Ter Ellen et al. (2019) find that, even after considering the ECB's policy rate changes, spillovers to small, open economies such as Norway and Sweden are particularly large for longer-term rates. However, policy rate changes in Norway and Sweden have a greater impact on domestic shorter-term interest rates.

⁶⁷ For example, Johnson et al. (2020) emphasize that asset purchases in small, open economies may have operated specifically through the exchange rate channel.

⁶⁸ Haldane et al. (2016) and Dedola et al. (2021) report exchange rate effects in the United Kingdom, the United States and the euro area, while Melander (2021) and the Reserve Bank of Australia (2022) report the change in the exchange rate in Sweden and Australia, respectively, associated with asset purchases.

⁶⁹ See the study by Varghese and Zhang (2018).

⁷⁰ Bauer and Neely (2014) document the effects of Federal Reserve asset purchases on bond yields and risk premiums in other countries. In addition to affecting global risk premiums, large-scale asset purchases in the United States encouraged capital inflows to some emerging market economies and rapid outflows when the Federal Reserve announced that the pace of asset purchases would be slowed down. There is less evidence of such flow effects to advanced small, open economies.

abroad can be a strong incentive to make monetary policy more expansionary at home, by lowering the policy rate, buying assets or taking other measures that mitigate exchange rate appreciation (see Chapter 1 on the Riksbank's purchases of government bonds in 2015–2017). Work is underway to extend models for monetary policy analysis to include these international aspects of asset purchases.⁷¹

⁷¹ For example, Akkaya et al. (2023a) develop a general equilibrium model suitable for the analysis of asset purchases in small, open economies.

4 The effects of the Riksbank's asset purchases

Since the Riksbank started buying government bonds for monetary policy purposes in 2015, several studies have been published on the effects of the purchases. The studies have tended to focus either on how the announcements of the purchases immediately affected prices in financial markets or the broader impact on economic activity and inflation. In terms of financial market effects, the Swedish experience supports the view that the purchases have contributed to making monetary policy more expansionary. The magnitude of the effects does not seem to differ significantly from foreign experiences of asset purchases. There are few studies analysing the effects of purchases on economic activity and inflation, but in the studies that do exist, the overall effects are positive.

During the period 2015–2017, when the policy rate was close to its effective lower bound, the Riksbank bought government bonds in order to ensure sustained inflation close to the target. The purchases amounted to SEK 290 billion during this period, or roughly the equivalent of 6.5 per cent of GDP. Given the threat of a financial crisis, the motive for asset purchases during the pandemic were different and the purchases larger, at SEK 700 billion or just under 14 per cent of GDP. The purchases also had a different composition and largely consisted of covered bonds.

Studies of the effects of different purchases often focus on the effects on financial prices, while analyses of the effects on economic activity and inflation are few and more complex. In addition to existing studies, this chapter also discusses other effects of the asset purchases, such as their impact on the functioning of the government bond market and the Riksbank's financial results.

4.1 Effects of asset purchases on financial prices

Several of the studies analysing the effects of the Riksbank's asset purchases on financial prices are so-called event studies. They attempt to estimate how financial prices changed in connection with the Riksbank's announcements of purchases, and interpret these changes as a measure of the effects of the purchases. As we described in Chapter 2 on transmission, one of the channels for monetary policy is through the expectations of economic agents. This means, among other things, that market rates and other financial prices can change even before the Riksbank announces an asset purchase if it is expected by market participants. If they do not expect a purchase, or if, for example, the amount announced by the Riksbank is unexpectedly high or low, this should be reflected in changes in financial prices shortly after the Riksbank has announced the purchase. This is the effect that an event study measures.

However, in order to obtain the total effect of the purchases, it is therefore also necessary to estimate how much of the purchase amount announced by the Riksbank was not expected by the agents and how much they had anticipated before the announcement and had therefore already affected financial prices. When the Riksbank started its purchases in 2015, the purchases were often unexpected. A relatively large part of the total impact could therefore be estimated based on movements in financial prices at the time of the announcements. However, as market participants started to internalise the asset purchases as part of systematic monetary policy, more of the price effects already emerged prior to the actual announcements. This has made it more difficult to identify the effects of the purchases, and in more recent event studies the impact estimates are therefore more uncertain.

The Riksbank's initial purchases of government bonds contributed to more expansionary financial conditions

Diez de los Rios and Shamloo (2017) study the announcement effects of government bond purchases in a number of countries, including Sweden. They find that it is difficult to separate the effects from changes in the policy rate announced at the same time as the asset purchases and interpret the results as the Riksbank's purchases in 2015 and early 2016 having minor effects on financial prices. The authors point specifically to three factors. First, government bond yields declined relatively little or even increased at the time of the announcements when the policy rate was not simultaneously cut. Second, the aggregate effects appear to have worked mainly through the signalling channel, and that effect can be expected to come largely from the changes in the policy rate. Finally, declines in the term premium at the time of the announcements coincided with declines in the global term premium.

The study suggests a possible explanation for why purchases seem to have less impact in Sweden and Switzerland than in, for example, the United States. Sovereign bond purchases in these countries are small relative to the number of close substitutes, including foreign bonds (see the discussion in Chapters 2.4 and 3.3). If we take the author's findings as given and assume that the purchases had no effect through the signalling channel but only had effects on domestic forward premiums, the normalised effect of purchases equivalent to 1 per cent of GDP according to the study amounts to an average of 0.016 percentage points lower ten-year government bond yields (see Table 2).⁷²

In an early study analysing the Riksbank's purchases of government bonds, De Rezende et al. (2015) discuss the effects of the purchases on financial prices in an event study. They study the Riksbank's announcements of government bond purchases totalling SEK 135 billion in February, March, April and July 2015. Unlike Diez de los Rios and Shamloo (2017), they take on the challenge of separating the effects of the different monetary policy instruments used during this period. On several of the announcement dates examined, the Riksbank simultaneously cut the policy rate and changed its published policy rate forecast, which was expected to varying degrees

⁷² This can be compared to De Rezende (2017) who finds that on average more than half of the effect via the signalling channel is explained by the bond purchases in the Riksbank's 2015 announcements. If we were to use this assumption instead, the effect amounts to about 0.04 percentage points.

among market participants (see Table A.1 in the Appendix). The authors therefore rely on the past history of the relationship between policy rates and government bond yields to identify what additional effect the bond purchases may have had on government bond yields. Furthermore, the authors check for the historical covariation of government bond yields with changes in the policy interest rate forecast and interest rate developments in the rest of the world. The results indicate that the Riksbank's purchases lowered government bond yields and that the effects were slightly larger than in the study by Diez de los Rios and Shamloo (2017) (see Table 2). Yield spreads to other countries also appeared to have been lower and the krona weaker than they were deemed to have been if no government bond purchases had been made.

In a related analysis, De Rezende (2017) combines an event study with a regression analysis to analyse the Riksbank's five monetary policy decisions involving government bond purchases in 2015. De Rezende finds that both changes in the policy rate and the bond purchases helped to reduce interest rates. While the cuts in the policy rate mainly contributed to lower short-term interest rates, the bond purchases helped to lower longer-term interest rates, both by signalling low short-term rates ahead, but also by dampening term premiums on longer-term rates as market participants responded to the purchases by rebalancing their portfolios. The author concludes that it is possible to implement rate cuts together with government bond purchases to influence interest rates with different maturities and thereby make monetary policy more expansionary than it would have been if the Riksbank had only used the policy rate. Table 2 shows the standardised effects when the Riksbank buys government bonds for the equivalent of 1 per cent of GDP.

Aggregate expansionary effects of purchases 2015-2017

Melander (2021) complements the earlier analysis of the announcement effects by also studying how financial prices changed when the Riksbank announced its purchases of government bonds in 2016 and 2017 and thus continued to expand its asset portfolio. Overall, these purchases were well expected and thus do not alter the conclusions of the study by De Rezende (2017). The purchases can thus be expected to have helped to lower 10-year government bond yields by just over 0.3 percentage points. However, relative to the studies reviewed above, Melander broadens the analysis somewhat by discussing the effects of the purchases on a wider range of financial prices, including real interest rates and inflation expectations.

The overall conclusion that the Riksbank's purchases of government bonds have contributed to more expansionary conditions in financial markets still holds. They have done so by lowering yields on both government bonds and other riskier bonds, weakening the krona and raising stock prices. Real interest rates fell more than nominal rates when the Riksbank announced the bond purchases, suggesting that inflation expectations were rising. This was key during the period of persistently low inflation, as lower real interest rates can be expected to contribute to higher inflation by pushing up consumption and investment faster, thereby making it easier for the Riksbank to anchor inflation expectations close to the inflation target.

In a forthcoming study, Beechey and Gustafsson (2023) examine how the Riksbank's purchases of government bonds have affected the development of the Swedish term premium 2015–2021.⁷³ The Riksbank's purchases have been important during this period for understanding how the traded volume in the secondary market for government bonds has varied. In the analysis, the authors control for cyclical variations and both domestic and foreign financial factors and find that the term premium declined when the volume of government bonds available for trading decreased. The results from different model specifications indicate that when the Riksbank purchased government bonds for the equivalent of 7 per cent of GDP during this period, it depressed the term premium by between 0.40 and 1.25 percentage points.

De Rezende and Ristinieni (2018) combine a term structure model and an event study to construct a "shadow interest rate". It measures how expansionary the Riksbank's overall monetary policy was, and includes, in addition to actual interest rate changes, the effects of both government bond purchases and changes in the Riksbank's policy rate forecasts. This makes it possible to separate out the effects of these factors. The result suggests that if the Riksbank makes unexpected bond purchases amounting to SEK 10 billion, this has an expansionary effect equivalent to the Riksbank lowering the policy rate by just over 0.03 percentage points. According to this analysis, the Riksbank's government bond purchases of SEK 290 billion during the period 2015–2017 corresponded to a reduction in the policy rate of around 0.9 percentage points.

Table 2. Impact of government bond purchases equivalent to 1 per cent of GDP on government bond yields at different maturities

Percentage points

	De Rezende et al. (2,015)	De Rezende (2017)	Diez de los Rios and Shamloo (2017)	Beechey and Gustafsson (2023)
Government bond yield, 2 years		-0.025		
Government bond yield, 5 years		-0.048		
Government bond yield, 10 years	-0.048 to -0.088	-0.050	-0.016	-0.06 to -0.18

Note. De Rezende et al. (2015) refer to the effect of purchase announcements in March and July 2015. De Rezende (2017) refers to the average effect of all announcements of purchases in 2015. GDP relates to 2014. Diez de los Rios and Shamloo (2017) and Beechey and Gustafsson (2023) refer to effects on the domestic forward premium. The effects have been standardised based on the assumption that they are linearly proportional to the announced purchase volumes.

Source: De Rezende et al. (2015), De Rezende (2017), Diez de los Rios and Shamloo (2017), Beechey and Gustafsson (2022) and own calculations.

Government bond purchases also contributed to lower short-term market rates

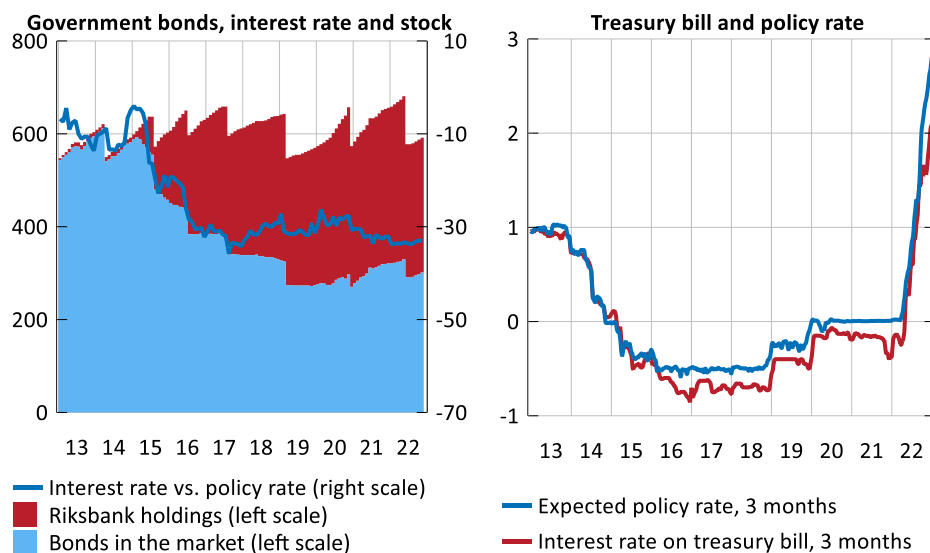
In addition to lowering longer-term bond yields, government bond purchases also helped to lower short-term interest rates. Erikson (2021) studies rates in very short-term Swedish repo transactions with government bonds as the underlying collateral.

⁷³ The analysis is based on forward premiums estimated in the term structure model in Adrian et al. (2013).

The study suggests that the Riksbank's government bond purchases contributed to a fall in these rates relative to the policy rate in 2015–2017. Although rates in repo transactions were already slightly lower than the policy rate before the Riksbank started its purchases, they fell further by almost 0.3 percentage points to close to -0.9 per cent in the second half of 2017, compared with -0.5 per cent for the policy rate (see Chart 10). As discussed in Chapter 2, market rates on repo transactions did not fall further because the Swedish National Debt Office provided unlimited amounts of government bonds via its repo facility at a rate equivalent to the policy rate minus 0.4 percentage points. During the same period, there was evidence that longer-term government bond yields fell by about the same amount relative to the policy rate as short-term repo rates. Yields on short-term treasury bills also fell as the Riksbank began its purchases and were lower than the policy rate.⁷⁴

Figure 10. The Riksbank's government bond holdings, yields and expected policy rate

SEK billions and basis points (left) and per cent (right)



Note. The blue field shows the volume of nominal government bonds owned by others than the Riksbank. Interest rate on repo transactions for nominal government bonds relative to the policy rate. The interest rate on repo transactions that pass over the end of the year may be affected by year-end effects. These interest rate listings have been removed.

Sources: Nordea Markets, the Swedish National Debt Office and the Riksbank.

Foreign portfolio balancing between different Swedish assets

Beechey (2022) studies which agents have sold bonds to the Riksbank during the periods when the Riksbank has built up its asset holdings. According to the study, foreign agents sold Swedish government bonds to the same extent as domestic investors, and foreign capital stayed in Sweden and sought other riskier assets such as covered bonds and corporate bonds. A similar situation occurred during the pandemic years

⁷⁴ The yields on treasury bills with one and three months to maturity were, on average, around 0.16 percentage points lower than the policy rate over the period 2015–2021.

when foreign investors generally exited Swedish bond markets but compensated by buying bonds issued by Swedish non-financial companies and by lending to and buying shares in Swedish non-financial companies. The study thus suggests that foreign investors rebalanced their portfolios with Swedish assets, thereby contributing to lower interest rates.

The asset purchases during the pandemic differed in several respects from previous purchases

Compared to the purchases in 2015–2017, the motives for purchases, but especially their composition, were different in the pandemic years 2020–2021 (see Chapter 1). While the previous purchases had been justified on the grounds that they acted as a more general monetary stimulus, the purchases in the 2020–2021 pandemic were largely aimed at ensuring the supply of credit and that the transmission of the Riksbank's policy rate to the economy would continue to function well in a very uncertain period in financial markets.⁷⁵ The purchases would thereby prevent a development whereby lending to the economy declined sharply. If such a scenario were to materialise, it could significantly worsen the already vulnerable economic situation. The primary objective of the purchases was therefore to prevent a sharp reduction in the supply of credit and an increase in interest rates, not to clearly reduce lending rates to households and companies.

At the outbreak of the pandemic, the Riksbank already had significant holdings of government bonds. Together with the problems in the corporate bond market and concerns about developments in the covered bond market, this contributed to the Riksbank announcing purchases with a different mix of assets than before. The purchases, which totalled almost 14 per cent of GDP, included, in addition to the nominal and real government bonds that had been purchased previously, covered bonds, municipal bonds and commercial paper, and, at a later stage, corporate bonds and treasury bills. Excluding the Riksbank's purchases of treasury bills and commercial paper, purchases consisted of 67 per cent covered bonds, about 17 per cent municipal bonds, 14 per cent government bonds and 2 per cent corporate bonds.

It is somewhat easier to analyse the effects of the asset purchases because the Riksbank did not use the policy rate or signal any significant changes in the policy rate path in parallel with the announcements of the purchases. However, there are several other factors that make it difficult to identify the effects of the purchases, in addition to the period of high volatility in the financial markets.⁷⁶ First, the Riksbank took a number of measures in parallel with the announcements of asset purchases during a few intensive weeks in March and April 2020.⁷⁷ Second, other central banks and governments, both in Sweden and abroad, took a number of measures during the same period that affected both financial markets and economic activity. Third, the purchases were used to a significant extent to prevent undesirable developments. This complicates the analysis because we do not know what developments in the financial

⁷⁵ See Sveriges Riksbank (2020b).

⁷⁶ See discussion in Gustafsson (2022).

⁷⁷ For an overview of measures in Sweden and abroad, see for example Gustafsson and von Brömsen (2021).

markets and the economy would have looked like in the absence of the Riksbank's announcements of asset purchases.

The effects of the Riksbank's pandemic purchases seem to reflect the composition of the purchases

In an event study, Gustafsson (2022) finds that the Riksbank's purchases contributed to more expansive financial conditions during the pandemic. As purchases of several types of assets were announced at the same time, it is difficult to separate the effects based on the different types. The overall movement in long-term government bond yields following the Riksbank's announcements of purchases of government and municipal bonds and covered bonds was small overall. However, the true effect was probably larger as global interest rate rises coincided with some of the announcements. On a standardised basis, asset purchases with this composition equivalent to 1 per cent of GDP, would have reduced the spread between Swedish and German 10-year government bond yields by 0.014 percentage points.⁷⁸

The relatively large share of the purchases that consisted of covered bonds and municipal bonds was reflected in the fact that the effects appear to have been greater on the yields of these types of securities. The yield spread between five-year covered bonds as well as the corresponding municipal bonds and the expected short-term yield for the corresponding period was just over –0.02 percentage points. The study also indicates that the Riksbank's purchases slightly weakened the krona and raised stock prices, which would not have happened if no purchases had been made.

In the analysis by Beechey and Gustafsson (2023), the effect of the Riksbank's purchases during the pandemic appears to be moderate, with a lower term premium of around 0.1 percentage points. This reflects that the Riksbank's purchases of government bonds in 2020 and 2021 were relatively small, but probably also that the study does not take into account the impact of purchases of other securities on the term premium.

Risk premiums in the covered bond market fell sharply in 2020 after the Riksbank announced its asset purchases

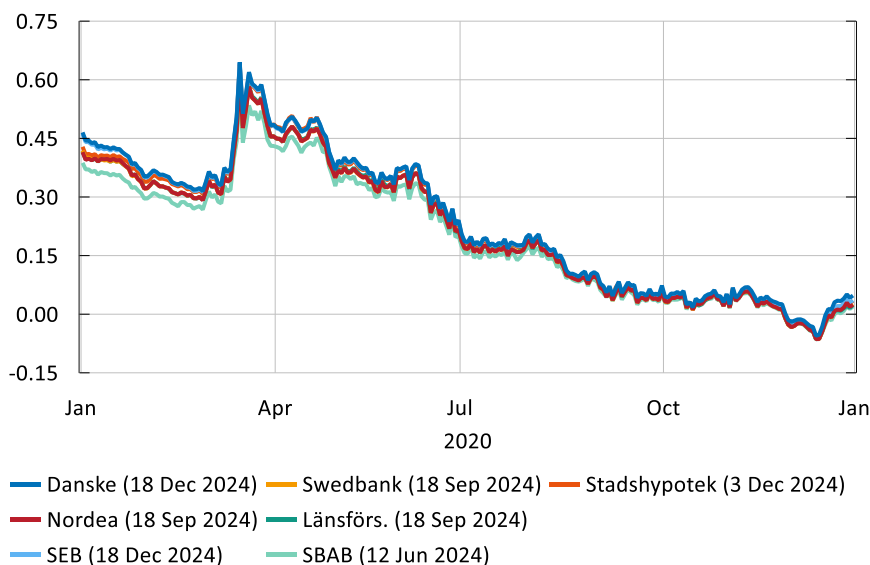
To examine the possible effects of the large-scale purchases of covered bonds, Alsterlind (2021) constructs a measure of yield spreads to shed light on the yield development that was specific to the covered bond market. Alsterlind does so by controlling for both how market participants' expectations of monetary policy changed and how more general risk premiums such as the term premium evolved. According to this measure, the yield spread between covered bonds with a maturity between three and five years and the corresponding government bonds discounted by the market's pricing of the expected short-term rate increased to 0.5–0.6 percentage points when the pandemic broke out in March 2020. However, already at the end of March, after the Riksbank offered to buy securities, this yield spread started to narrow and was followed by a sharp decline to close to 0 percentage points during the rest of 2020,

⁷⁸ The announced asset purchases during the pandemic amounted to SEK 700 billion, just under 14 per cent of 2019 GDP.

which was significantly lower than the pre-pandemic yield spread (see Figure 11). The yield spread between the bonds issued by the various mortgage institutions also narrowed, and yields also fell on covered bonds that the Riksbank had not purchased. However, it is difficult to determine exactly how much of the development was caused by the Riksbank's announced purchases. This is partly because the situation in the financial markets was so uncertain and because both the Riksbank and others took many measures more or less simultaneously, both in Sweden and abroad.⁷⁹

Figure 11. The risk premium in the covered bond market

Percentage points



Note. The risk premium is calculated as the difference between the yield on benchmark bonds, issued by the seven major mortgage institutions, maturing in 2024 and the corresponding bonds discounted at the average expected policy rate over the remaining life of the bond, as priced by the market. The yields for the covered bonds refer to the average bid-ask spread.

Source: Alsterlind (2021).

Perspectives on the magnitude of effects

To put the estimated effects into further perspective, we can compare them with the development of financial prices during the two periods when the Riksbank built up its asset holdings. From the studies above, it is noted that the government bond purchases in 2015–2017 equivalent to just under 7 per cent of GDP are estimated to have contributed in total to about 0.3 percentage points lower 10-year government bond yields. This compares with the actual development in government bond yields, which implied a decline of roughly the same magnitude (see Figure 12).

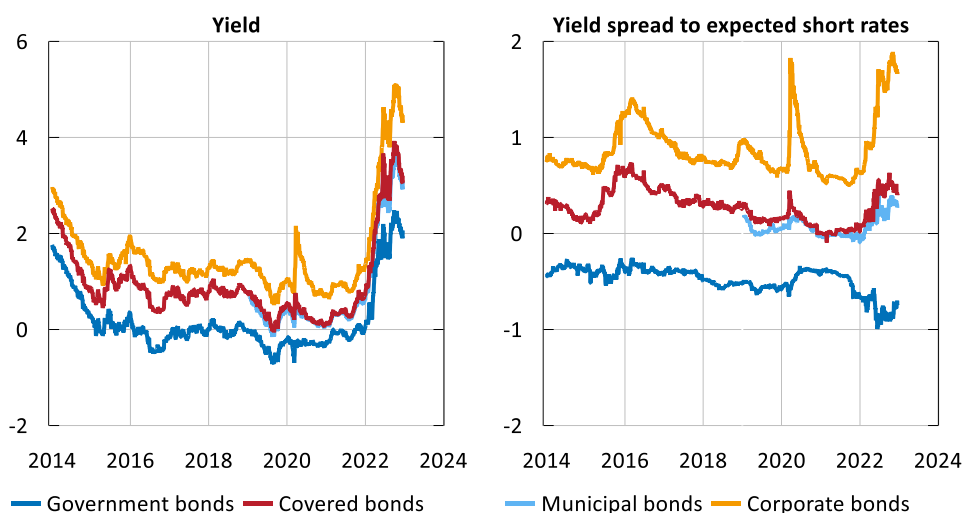
During the period 2020–2021, the Riksbank mainly purchased other securities corresponding to almost 14 per cent of GDP, of which purchases of covered and municipal bonds together amounted to around 85 per cent of these purchases. Estimates of the

⁷⁹ The Riksbank's purchases of government and municipal bonds are also expected to have contributed to the decline in covered bond yields via portfolio balancing among investors.

effect on the risk premiums for these types of securities also amount to about 0.3 percentage points, according to the event study in Gustafsson (2022), while Alsterlind (2021) shows that the risk premium on covered bonds fell from peak to trough by about 0.6 percentage points, although this change should not be linked exclusively to the purchases (see Figure 11). The yield spread between five-year covered bonds and the expected short-term yield also fell by a similar amount between mid-March 2020 and the end of 2020. However, it is important to remember that although the estimated effects correspond to a significant extent to the observed movements in yields and spreads, respectively, this does not mean that asset purchases are the only factor explaining the development.

Figure 12. Swedish yields for various types of bond, 5-year maturity

Per cent (left) and percentage points (right)



Note. Government bonds, municipal bonds, covered bonds and corporate bonds refer to a zero coupon rate. Corporate bonds refer to bonds/companies with a credit rating equivalent to investment grade. Covered bonds refer to bonds issued by Stadshypotek and municipal bonds are issued by Kommuninvest i Sverige AB.

Source: Bloomberg, Macrobond, Refinitiv and the Riksbank.

4.2 Effects on interest rates faced by households and companies and credit volumes

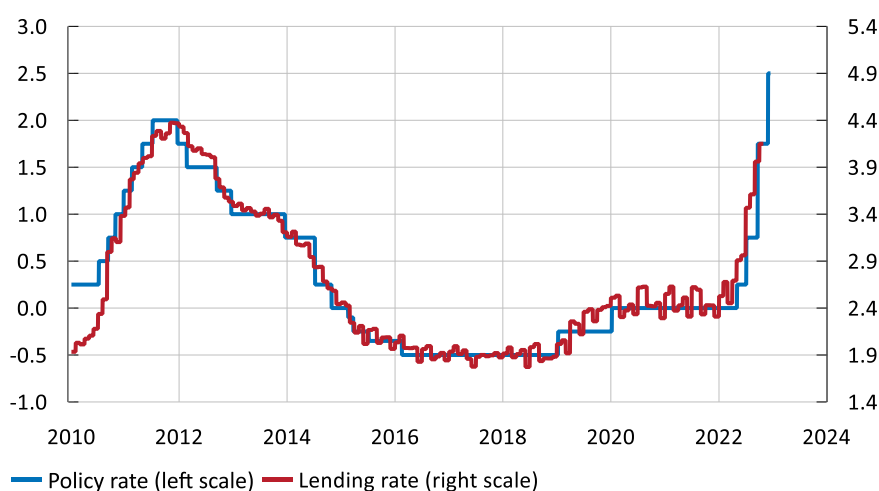
The effects on bond yields suggest an expansionary effect on the later stages of transmission

By buying government bonds, the Riksbank wanted to lower longer-term interest rates in the economy in general. Lower interest rates in general also reduce the funding costs for banks, and this is a prerequisite for the lower market rates to also be reflected in banks' lending rates. There is a limited amount of research describing and analysing these latter stages of monetary policy transmission.

The analyses we have discussed previously, which have looked at government bond purchases over the period 2015–2017, suggest that the purchases have contributed to more expansionary financial conditions by, among other things, lowering government bond yields. In turn, this also appears to have affected the interest rates on riskier bonds, thereby reducing funding costs for banks and companies.⁸⁰ However, looking at data on lending rates, it appears that lending rates to households and companies have followed the policy rate relatively closely even when the Riksbank made large-scale asset purchases (see Figure 13), suggesting that the purchases had limited impact through the interest-rate channel.⁸¹

Figure 13. Policy rate and average lending rate to households and companies

Per cent



Note. Average lending rate of monetary financial institutions to households and non-financial companies, new and renegotiated contracts.

Source: Statistics Sweden and the Riksbank.

The studies discussed above mainly indicate that the asset purchases during the pandemic helped to reduce risk premiums on the securities purchased by the Riksbank. For example, the risk premium on covered bonds fell to close to zero, which is significantly lower than it was before the pandemic.⁸² Given that covered bonds are the single largest source of funding for mortgage lending by large mortgage institutions, Emanuelsson et al (2022) estimate the relationship between changes in covered bond yields when the Riksbank announced its purchases and changes in mortgage rates a number of months ahead.⁸³ They find that the Riksbank's purchases of covered bonds contributed to lowering household mortgage rates, especially those with an interest-rate fixation period of between one and two years. More specifically, a 0.10 percentage point lower covered bond yield is estimated to have led to mortgage rates with a

⁸⁰ See Melander (2021).

⁸¹ See Erikson and Vestin (2021).

⁸² See Alsterlind (2021).

⁸³ For a description of how Swedish bank funding affects mortgage rates, see Eidestedt et al (2020). Covered bonds account for about 70 per cent of total funding for Swedish mortgages. The remaining 30 per cent are funded via a mix of other liabilities and equity.

fixation period of between one and two years being around 0.10 percentage points lower after just over six months. The effect occurred somewhat later and was weaker on variable mortgage rates with fixation periods of up to three months.

The Riksbank's announcement of purchases of commercial paper and corporate bonds probably helped many large companies to regain access in market funding.⁸⁴ One sign of this was that the bid-ask spreads of the bonds fell back from sharply elevated levels after the Riksbank's announcement (see Figure 5 in Chapter 1). Lending rates also remained low overall, which was well in line with the Riksbank's partial attempt to prevent a negative development (see Figure 13). This obviously makes it difficult to identify the impact of asset purchases on lending rates and credit volumes during this period, as one would need to compare actual developments with a scenario in which interest rates rise significantly.

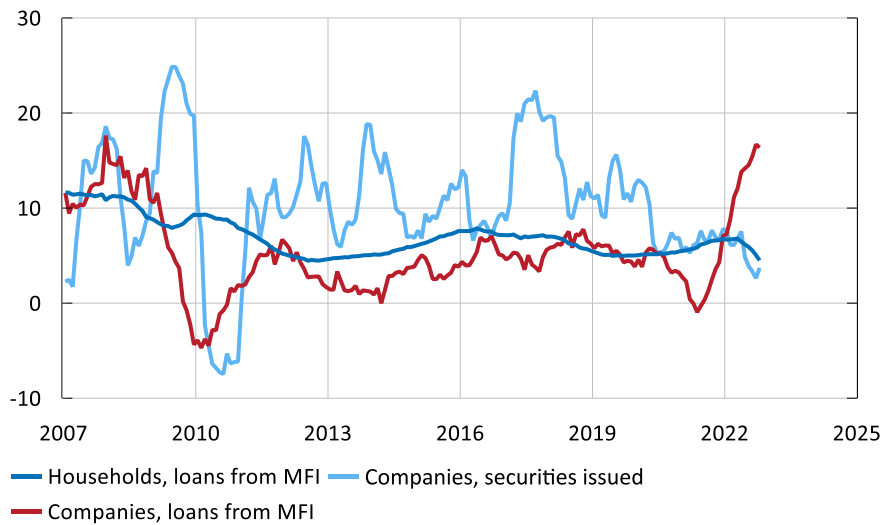
No major credit crunch during the pandemic

Looking at the development of credit volumes during the pandemic also paints a picture of an overall well-functioning credit supply and no major credit crunch during the pandemic (see Figure 14). Doherty et al (2022) study micro data on bank lending by companies and find that developments in bank lending were mainly explained by developments in large companies which, among other things, temporarily replaced loans they had previously raised on the market with bank loans. This occurred during a period in the spring of 2022 when the corporate bond market was not functioning very well. At the same time, borrowing by smaller companies remained at a relatively high level for much of the pandemic, although there are indications that the very smallest ones may have found it somewhat more difficult to obtain loans. At the same time, companies in the sectors most affected by the pandemic had more or less the same lending volumes as before.

⁸⁴ See P. Gustafsson and T. von Brömsen (2021).

Figure 14. Household and corporate borrowing

Annual percentage change



Note. Lending by monetary financial institutions (MFIs) to households and non-financial companies adjusted for reclassifications and bought and sold loans. Securities issued by non-financial companies refer to net issues and are currency-adjusted. Loans from MFIs constitute about two thirds of total lending to companies, while issued securities constitute around a third.

Source: Statistics Sweden.

4.3 Impact of asset purchases on GDP and inflation

There is limited experience of asset purchases and few studies analysing the impact on output and inflation in a small open economy like Sweden where the exchange rate may play a prominent role. This is particularly true of purchases of private securities, which the Riksbank made to a large extent during the pandemic.

Positive effects of purchases on the real economy and inflation, but few studies and uncertain findings

De Rezende and Ristinemi (2020) estimate a shadow interest rate without a lower bound to measure how expansionary monetary policy was if one considers not only changes in the policy rate but also changes in the Riksbank's published policy-rate path and changes in asset purchases. Using the shadow rate and the effects of a change in the policy rate in a macroeconomic model, they calculate that government bond purchases in 2015–2019 contributed to a half a percentage point rise in inflation.

Di Casola and Stockhammar (2021) use a so-called BVAR model to estimate the impact of government bond purchases on GDP and inflation in 2015–2018, where they also control for the ECB's asset purchases. The findings suggest that the Riksbank's purchases had a positive impact on GDP and weakened the krona, but at the same time the weaker exchange rate had a limited impact on inflation. The analysis also suggests that the ECB's asset purchases had clear positive spillover effects to Swedish GDP and inflation.

Akkaya et al (2023a) analyse the effects of government bond purchases in a general-equilibrium model that can explain overall changes in the exchange rate and pricing in bond markets. The model, unlike many other models that have been used to analyse larger economies, takes into account aspects that are important for a small, open economy. In simulations, they find that the government bond purchases contributed to higher GDP, a weaker krona, and higher inflation over the period 2015–2019. More specifically, the findings suggest that government bond purchases equivalent to 1 per cent of GDP contributed to at most 0.02 per cent higher GDP and 0.03 percentage points higher inflation (see Table 3). Overall, the Riksbank's purchases meant that GDP was 0.2 per cent higher, the krona was 2.5 per cent weaker and inflation was 0.2 percentage points higher on average over the period. Akkaya et al. (2023b) analyse the Riksbank's asset purchases during the pandemic, which also included purchases of municipal bonds and covered bonds, and find that these contribute on average to 0.2 per cent higher GDP and 0.25 percentage point higher inflation in 2020–2023.

Table 3. Impact on GDP, unemployment and inflation of government bond purchases equivalent to 1 per cent of GDP

Per cent and percentage points

	De Rezende and Ristiniemi (2020)	Di Casola and Stockhammar (2021)	Akkaya et al (2023a)
GDP (per cent)		0.16 to 0.41	0.02
Unemployment (percentage points)	0.13		
Inflation (percentage points)	0.07	–0.06 to 0.17	0.03

Note. De Rezende and Ristiniemi (2020) refer to a downscaled effect based on the result that purchases equivalent to about 6.5 per cent of GDP in 2015–2019 contributed to just under half a percentage point higher inflation at the end of the period and more than 0.8 percentage point lower unemployment. Di Casola and Stockhammar (2021) refer to the maximum effect on GDP and the total effect on inflation. Akkaya et al (2023a) refers to maximum effect on GDP and inflation.

Source: De Rezende and Ristiniemi (2020), Di Casola and Stockhammar (2021) and Akkaya et al. (2023a).

4.4 Other effects of the Riksbank's asset purchases

So far, we have focused on the purpose of asset purchases and what various studies have found in terms of the intended effects of purchases on various financial prices, on interest rates to households and companies, and ultimately the real economy and inflation. The presentation has thus so far largely focused on how the purchases have helped to achieve the Riksbank's monetary policy objectives.

However, the implementation of monetary-policy measures always entails a trade-off between the desired effects and other effects that may arise. For example, purchases may have effects in areas that are outside the central bank's mandate or that other policy areas are better placed to influence. It is important for the central bank to be

aware of such effects, but also to communicate clearly the purpose of purchases and how they relate to the central bank's mandate.⁸⁵

The international literature discusses several possible effects of central-bank asset purchases, including on market functioning, the financial results of central banks, financial stability, and the distribution of income and wealth in society. In this section, we describe these in the Swedish context. However, few studies specifically analyse these effects.

The transmission of asset purchases can contribute to a more lasting impact on market functioning

Well-functioning markets are a prerequisite for the efficacy of monetary-policy transmission. For example, the Riksbank bought commercial paper during the pandemic to ensure the transmission of the policy rate to this market. At the same time, one possible consequence of the Riksbank starting to buy various securities, such as government bonds and covered bonds, where the Riksbank now owns a significant share of the outstanding volumes, is that it may affect market functioning in various ways on a more permanent basis. The overall risk is that the purchases have a negative impact that could, in the long run, make it more difficult or more expensive for the government and mortgage institutions to borrow. However, there is no clear evidence yet of a deterioration in the functioning of the primary market for government bonds. On the contrary, interest in the Swedish National Debt Office's primary-market issuance has been high and interest rates low.

An important channel for the transmission of asset purchases is through the Riksbank reducing the supply of traded securities, thereby reducing the term premium, which leads investors to rebalance their portfolios. At the same time, financial agents need access to government bonds to manage day-to-day trading in the market. In order to maintain market functioning, the Riksbank has designed the purchase programmes in a way that creates predictability and, for example, limits the Riksbank's holdings in individual bond issues. The Swedish National Debt Office's market-maintaining repo facility, which provides unlimited volumes of government bonds on a short-term demand basis at a price equivalent to 0.4 percentage points below the policy rate, has also been important in ensuring a well-functioning market (see Chapter 2.4). Although the Debt Office's facility is designed to cope with high demand for government bonds, sustained and extensive use of the facility may mean that the Debt Office has to reduce its other borrowing.

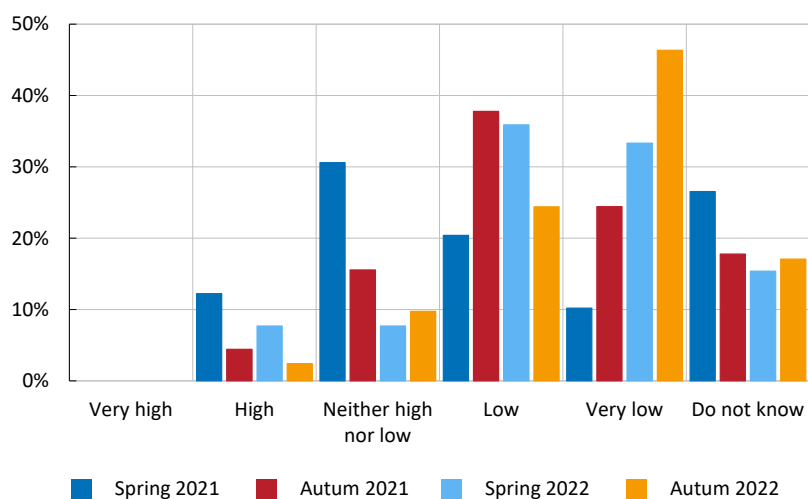
At the same time, market participants have for some time expressed the view in both the Debt Office's and the Riksbank's surveys that liquidity in several secondary markets has deteriorated. Important explanations for this development probably include changes in financial market rules that have made it less attractive to act as an intermediary, but also the reduced supply of securities that have been available for trading as a result of reduced government borrowing needs and the Riksbank's purchases. One way to examine market functioning is to study market liquidity. Blix Grimaldi et

⁸⁵ See, for example, Bank for International Settlements (2019).

al. (2021) analyse how a set of different transaction-based measures of market liquidity relate to how the Riksbank's purchases and holdings evolved over the period 2012-2020. The findings suggest that the Riksbank's purchases initially improved liquidity in the government bond market, but that its large holdings led to a shortage of bonds that worsened market liquidity. The latter effect appears to be non-linear in that liquidity deteriorated markedly when the Riksbank's holdings exceeded 40 per cent of the market.

In the Riksbank's financial market survey, respondents thought that liquidity in the secondary market for nominal government bonds improved after the purchases began in spring 2020, but that it has subsequently deteriorated during a period in which the Riksbank has owned a significant part of the outstanding volume (see Figure 15). A further possible explanation for the developments over the past year is the volatile development in international financial markets which are likely to have contributed to making trades less attractive in this market. One risk is that the negative developments may affect the composition and reduce the number of market participants, which could make government borrowing more difficult at times when borrowing needs are greater and more acute.

Figure 15. How do respondents to the Riksbank's Financial Market Survey currently assess the market liquidity in the secondary market for nominal government bonds?
Percentage of responses



Note. 41 responses in total (autumn 2022).

Source: The Riksbank.

Large asset holdings can mean that central banks make losses when interest rates rise rapidly

Central banks' large asset purchases over the past fifteen years have increased the size of their balance sheets, as we have noted in Chapter 1. One consequence of central banks building up large holdings of bonds and other securities in this way is that they can make financial losses or gains if interest rates rise or fall rapidly. This is an

unavoidable part of the transmission of asset purchases that the Riksbank and other central banks have been well aware of and have communicated.⁸⁶

During the period when the Riksbank purchased securities, interest rates were low both in Sweden and globally. Interest rates have since risen, which means that the market value of the Riksbank's securities has fallen. However, if the Riksbank holds the securities until they mature, the return is known. The Riksbank has paid for the assets with newly-created central bank money that has been placed in the accounts that commercial banks and other counterparties have with the Riksbank. The interest that the Riksbank pays on the money in these accounts varies with the policy rate, which means that when the policy rate rises, the Riksbank incurs higher interest costs.⁸⁷ Having such large holdings of bonds with long maturities and that are financed by increased deposits in the Riksbank therefore gives rise to considerable uncertainty about the Riksbank's financial results. This will be evident for 2022, when the Riksbank will make a significant financial loss on its asset holdings.⁸⁸ The same applies to other central banks with large asset holdings such as the Federal Reserve, the Bank of England and the ECB.⁸⁹

What does it mean for a central bank to make a loss?⁹⁰ Central banks do not aim to make a profit, nor has that been the purpose of buying securities. Instead, depending on the period, the aim has been to ensure that monetary policy has the desired effect, stimulating demand in the economy, raising inflation and maintaining confidence in the inflation target. A loss does mean that the Riksbank has less scope to distribute profits to the state. At the same time, however, the expansionary monetary policy has strengthened public finances through various channels. Among other things, higher economic activity has resulted in higher tax revenues and lower expenditure on unemployment benefits, for example. The government's borrowing costs are also lower because interest rates have been kept low. Above all, however, the losses must be set against the fact that the purchases helped to prevent a far worse economic development during the pandemic and to preserve the credibility of the inflation target.

If the central bank makes a large loss, this can lead to a reduction in the central bank's equity. This need not affect the central bank's ability to conduct monetary policy, but it may have negative consequences if it leads to speculation that it has been reduced. In addition, under certain conditions, low equity may impair the central bank's ability to self-finance its operations, which may weaken its financial independence. For the

⁸⁶ See, for example, af Jochnick (2015) and Flodén (2016), who note that bond purchases increase the risks on central banks' balance sheets in general and on the Riksbank's balance sheet in particular. Losses of the magnitude expected in the year 2022 have also been mentioned previously by the Riksbank as a possible but highly unlikely scenario with large interest rate rises (see Sveriges Riksbank, 2020c).

⁸⁷ For more details on the Riksbank's forthcoming financial results and the consequences of the Riksbank making losses, see Sveriges Riksbank (2022c) and Kjellberg and Åhl (2022).

⁸⁸ The accounting principle followed by the Riksbank means that the loss is relatively large in the year in which the change in interest rates and market value occurs. In subsequent years, the result develops more normally. See further Kjellberg and Åhl (2022).

⁸⁹ See Levin et al (2022).

⁹⁰ For a discussion of this, see Nordström and Vredin (2022).

Riksbank, the low demand for cash is an aggravating factor. The surplus from the monopoly on issuing money is very small and impairs the Riksbank's ability to build up its equity.

Other measures important to counter the build-up of stability risks

The Riksbank and other central banks made their asset purchases during the pandemic in part to ensure that problems with the supply of liquidity and credit would not lead to a financial crisis that would further exacerbate the economic downturn. In this way, the purchases helped to maintain financial stability in the economy. On the other hand, however, asset purchases and other so-called unconventional measures by central banks can have effects that, in more normal times, contribute to the build-up of stability risks.⁹¹

The risks are mainly that the measures will help to depress interest rates, possibly for long periods. This could, for example, have a negative impact on the results and financial position of commercial banks and lead market participants and financial institutions to increasingly turn to riskier securities in order to obtain higher returns, causing the prices of various assets to rise sharply.

Measures can be taken to counter this type of stability risk, not least micro- and macro-prudential measures. These could include, for example, measures to limit the build-up of household debt, and tightening the amount of banks' required capital buffers. When the Riksbank made monetary policy more expansionary in 2015 by lowering the policy rate below zero and starting to buy government bonds, it pointed out that low interest rates would at the same time contribute to the continuation of the trends of rising housing prices and greater indebtedness among Swedish households. The Riksbank therefore noted that it was urgent for the government and other authorities to take measures to reduce the risks associated with household indebtedness and increase household resilience. The Riksbank has reiterated this throughout the period 2015–2022, including in its stability assessments.⁹² During this period, Finansinspektionen has also introduced mortgage repayment requirements for households in two stages, in 2016 and 2018.

Large purchases of private securities highlight the debate on moral hazard and effects on credit allocation

During the global financial crisis and the pandemic, many central banks bought significant volumes of private securities. In many cases, they justified these purchases by the need to safeguard monetary-policy transmission in these markets. However, cen-

⁹¹ See, for example, Dell'Ariccia et al (2018), Bank for International Settlements (2019) and Bernanke (2020).

⁹² The growing indebtedness of Swedish households has gone hand in hand with rising housing prices. The upward trend in housing prices is due to several factors, including low interest rates but also a poorly functioning housing market. The fundamental reason for the low interest rate situation is a trend decline in global interest rates that the Riksbank and other central banks cannot influence but to which they have had to adjust monetary policy.

tral banks taking on risk from investors in a critical situation is likely to increase the incidence of so-called moral hazard, i.e. creditors and borrowers taking greater risks without this necessarily being reflected in higher risk premiums.

During the pandemic, the Riksbank's purchases were to a significant extent private securities, mainly covered bonds but also to a lesser extent corporate bonds. In addition to the moral hazard problem described above, there was another risk associated with these purchases. Because they were prolonged, they risked having a more lasting impact on the pricing mechanisms of markets, which could be expected to reduce the efficiency of credit allocation in the economy in the long run.⁹³

Risk premiums on covered bonds came down sharply after the Riksbank's announcement of purchases in March, and were close to zero by the end of 2020. That was significantly lower than they were before the pandemic.⁹⁴ This made it increasingly cheaper for banks to finance their lending for home purchases. Banks also reported a very good liquidity situation during the summer and autumn of 2020.⁹⁵ These developments also appear to have had some impact on lower short-term mortgage rates, suggesting that purchases of covered bonds may have contributed to greater lending to households and thus indirectly supported the rise in housing prices during the pandemic.⁹⁶ However, neither mortgage rates nor households' interest rate expectations declined much during the pandemic years and covered bond purchases do not appear to have been a particularly important driver of housing demand during this period.⁹⁷

Monetary policy affects income and wealth distribution, but the net effect is unclear

Another question that has been discussed both internationally and in Sweden is whether central banks' asset purchases have contributed to an increase in the dispersion of household income and wealth.⁹⁸ This is because an expansionary monetary policy stimulates the economy, whether or not it is through low policy rates or asset purchases, and contributes, among other things, to an increase in the prices of shares and other financial assets. Since it is mainly people at the top of the income and

⁹³ The Bank for International Settlements (2019) discusses both moral hazard and inefficient allocation of credit as possible side effects. Theoretically, inefficient allocation could lead to structurally lower productivity and a lower equilibrium interest rate.

⁹⁴ See Alsterlind (2021).

⁹⁵ See P. Gustafsson and T. von Brömsen (2021).

⁹⁶ See Emanuelsson et al (2022).

⁹⁷ In Sveriges Riksbank (2021b), the Riksbank analysed developments in the housing market during the pandemic. It concluded that modest declines in mortgage rates and small changes in households' interest rate expectations were not central to understanding the sharp rise in housing prices that took place after the outbreak of the pandemic. Instead, a larger part of the price increase was attributed to a shift in household preferences as a result of the expectation that a larger share of work would be done from home in the future.

⁹⁸ See, for example, Andersson et al (2021) for a discussion of the distributional effects of monetary policy.

wealth distribution who own such assets, the distribution becomes even more unequal when those prices rise.⁹⁹

But an expansionary monetary policy also has other effects. Lower interest rates contribute to higher prices for real assets such as houses and tenant-owned apartments. There, the distributional effect is less obvious, as real assets are more evenly distributed among households. In addition, expansionary monetary policy has an impact beyond asset prices. When economic activity increases, more people are employed and receive wages instead of benefits. As a result, incomes increase relatively strongly for people at the lower end of the income distribution. What the overall effect is on the distribution of income and wealth is therefore not clear and the results from studies of this are mixed.

It is therefore not clear whether an expansionary monetary policy contributes to a more equal or more unequal distribution of income and wealth. Moreover, in a longer perspective, over a full business cycle of both expansionary and restrictive monetary policies, the distributional effects should largely cancel each other out. It is for these reasons, among others, that distributional policy has not normally been an explicit task of central banks, but is better tailored within the framework of fiscal policy.

⁹⁹ This is particularly true for the distribution of wealth, but also for the distribution of income if the gains from the sale of assets are included in income. It is also important to note that most households in Sweden own shares through public and private pension funds. If these assets are included, wealth is more evenly distributed among households.

5 Discussion of the effects and experiences of the Riksbank's asset purchases

In the previous chapter, we presented the results of various papers that have studied the effects of the Riksbank's asset purchases. Overall, the studies suggest that the purchases have contributed to more expansionary conditions in financial markets and that this has also led to higher economic activity and inflation. However, more analysis is needed to better understand the effects of asset purchases in small, open economies such as the Swedish one, particularly how asset purchases work through the financial system and ultimately affect economic activity and inflation. Statements about the magnitude of the macroeconomic effects of purchases are uncertain. The studies are few and necessarily based on simplifying assumptions about how purchases work through the economy. In addition, there are factors that complicate the calculations but are also important to take into account in order to make a judgement on the actual impact of the purchases.

At the end of 2020 and 2021, the Riksbank carried out the previously announced purchases of covered bonds and corporate bonds despite the fact that interest rates in these markets were close to or lower than before the pandemic. This was done partly in view of the continuing uncertainty surrounding the development of the pandemic and its consequences for financial markets.

More studies of small, open economies are needed

In the late summer of 2012, the then Federal Reserve Chairman Ben Bernanke made some opening remarks at the annual Jackson Hole conference.¹⁰⁰ He talked about monetary policy and the Federal Reserve's experience of buying securities and other so-called non-traditional measures during and after the global financial crisis. At the outset of the purchases, the Federal Reserve's Open Market Committee was guided by some general principles and some insightful academic work, but – with the important exception of Japan – limited historical experience. Bernanke therefore argued that monetary policy in the US had been characterised by a degree of "learning by doing", just as it had been in other countries where central banks had implemented similar measures.

Fifteen years after the financial crisis, the literature on central bank asset purchases has grown considerably, and the historical experience of such purchases is now much more extensive, involves more central banks and also includes a new type of crisis. In

¹⁰⁰ Bernanke (2012).

this study, we have attempted to summarise the state of knowledge on such asset purchases, with a particular focus on the experience from the Riksbank's purchases. A first reflection on this is that while the theoretical and empirical literature on asset purchases has grown, we still lack some knowledge about how the purchases work through the economy and what effects they have. This is particularly true for Sweden and other small, open economies.

Continued high uncertainty around the transmission of asset purchases

One example of something we need to understand better is when asset purchases can be expected to be most effective and, given this, how they should be used. When the Riksbank started buying government bonds in 2015, experience from other central banks suggested that asset purchases could act as a substitute for changing the policy rate. However, there were different views on how effective the purchases were. The experiences of the pandemic and the large asset-purchasing programmes carried out by various central banks have shown that the effects of the purchases depend on the state of the financial markets. In the light of that experience, there is now a broad debate as to whether asset purchases should be seen primarily as a crisis tool, or whether they are a tool that is effective in normal times but **particularly** effective in times of crisis. Bernanke (2020) concludes that the effects of asset purchases do not diminish as financial market turmoil subsides, while Bailey et al. (2020), for example, argue that experience may suggest that their effects are state-dependent.

Judging from the available studies of the Riksbank's asset purchases, the Riksbank's announcements of purchases have contributed to lower bond yields, a weaker exchange rate and more expansionary financial conditions in general. Qualitatively, and to some extent in terms of size, the results are similar to those found in studies of other central banks' purchases. Thus, the conditions are in place for the purchases to have had an impact on output, employment and inflation. However, a lack of studies makes it much more difficult to say how the pass-through from financial prices onwards through the financial system works. To get a better idea of the final impact of the purchases on the real economy and inflation, more analysis would be needed on how they affect interest rates faced by households and firms and credit volumes. The few studies available indicate that, overall, the purchases have had positive effects on the economy and inflation, but the results are uncertain.

Estimating the total impact of purchases is difficult for several reasons

For several reasons, it is complicated to estimate the macroeconomic effects of the Riksbank's asset purchases. First, the models used for the calculations need to be appropriate. This means that, in addition to the traditional channels relating to the policy rate, they obviously also need to include channels specific to asset purchases. Progress has been made, but asset purchases are not yet very common in economic models. Moreover, in Sweden, experience with large-scale asset purchases is limited, which makes it difficult to build empirically reliable models.

There are also practical difficulties. One of these is separating the effects of the purchases from other measures implemented at the same time. An obvious example is

during the pandemic, when the Riksbank took a variety of actions in parallel with announcing its asset purchases during a few intense weeks in March and April 2020.¹⁰¹ Moreover, other central banks, governments and authorities in Sweden and around the world took a range of measures during the same period, affecting both financial markets and economic activity. Another general challenge in modelling the effects of asset purchases is to know to what extent the purchases are unexpected or expected and part of systematic monetary policy. Do economic agents view the purchases as temporary or more permanent stimulus? These assumptions may affect the results of the models' impact calculations.

Preventive motives have been important for the Riksbank's asset purchases

During the pandemic, the Riksbank took measures to reduce the risks that the major economic downturn might become even deeper and more prolonged in a situation where there was great uncertainty about economic developments and the effects of various measures.¹⁰² This also applied to the asset purchases. Fundamentally, the uncertainty involved how the pandemic would develop and the risks posed by new waves of contagion.

Without drawing any other parallels, it is evident that the Riksbank also bought securities in 2015 and beyond on a precautionary basis to try to reduce the risk of a very negative development. As we described in Chapter 1, the Riksbank judged that international economic activity and exchange rate developments could hold back Swedish inflation, which was already low. The period of inflation below 2 per cent would then be even longer, increasing the risk that households and businesses would stop expecting inflation to reach the 2 per cent target even in the long term. Such a development could undermine the basic purpose of the inflation target, which would be very serious.¹⁰³ In 2015 and 2016, monetary policy was therefore largely geared towards countering the risks of such a development.

To capture all the effects of the purchases, the effects related to these preventive motives should also be included. However, it is difficult to calculate the full impact of a measure that is partially taken and designed to **prevent** something from happening – after all, if the measure succeeds, there is no worse outcome to compare it with. To

¹⁰¹ The assessment of the effects of the Riksbank's asset purchases in 2015–2019 has a similar difficulty, but on a much smaller scale, since in several cases the Riksbank cut the policy rate at the same time as announcing the purchases.

¹⁰² In its final report on Sweden during the pandemic, the Coronavirus Commission expresses the view that both monetary and fiscal policy in the emergency situation were characterised by a precautionary principle where policy was focused on minimising the risks of a very negative economic development, see SOU 2022:10.

¹⁰³ Ensuring that there is a nominal anchor, i.e. that there is confidence in the 2% inflation target, is the primary task of monetary policy. This does not mean that the aim of monetary policy is that inflation should always be exactly 2.0%. Even if monetary policy could be conducted with such precision, which it cannot, monetary policy should not normally discourage inflation from deviating from the target if the deviation is likely to be temporary. It is also possible to allow deviations from the target for a somewhat longer period of time if this can lead to better output and employment developments. However, for monetary policy to be able to see through temporary deviations and take account of the real economy, households and businesses need to have confidence that deviations from the target will not be too prolonged.

get a fair picture, one then needs to create counterfactual scenarios to try to determine the size of the preventive effects that, for example, asset purchases had. This requires, among other things, quantifying both the probability and the magnitude of the worse outcome that never happened. It is also difficult to comprehensively capture, for example, the risks of households and businesses losing confidence in the inflation target. After all, it is possible that the purchases were important for their confidence in the Riksbank and in the inflation target, even if the measured effects of the purchases on inflation were ultimately not very large.

Of course, the difficulty of making preventive motives concrete and measurable does not just make it difficult to analyse the effects *ex post*. It also affects the Riksbank's real-time decision-making; how much action to take and how to communicate about measures and programmes in order to create confidence and influence the expectations of economic agents in a desirable way. It is in the nature of the preventive motive to calibrate measures to do too much rather than too little and over too long a period rather than too short a period. It is therefore unreasonable to expect that calibration would appear perfect with hindsight. However, it is of course debatable whether the Executive Board made a correct assessment of how large the risks of the very bad scenario were in reality.

Covered bond purchases partly an insurance against rising mortgage rates in a sensitive environment

During the pandemic, the Riksbank's asset purchases consisted mainly of covered bonds. These decisions to purchase covered bonds have faced some criticism, partly because the Riksbank risked influencing the economy's credit allocation. This could have contributed to an excessive rise in housing prices during the pandemic.

When the pandemic broke out, there was widespread concern that if borrowing became more difficult and expensive at the same time as housing prices fell, the downturn in economic activity could be much more severe. At worst, developments could also threaten financial stability.¹⁰⁴ This could ultimately lead to a very deep recession and prolonged period of too low inflation, not least because inflation had already been rather low for some time. To prevent this from happening and ensure that banks could continue to lend money to households at an interest rate slightly above the policy rate, the Riksbank announced in March 2020 that it would make extensive purchases of covered bonds, as one of several measures.

As financial markets stabilised, housing prices began to rise after falling slightly at the start of the pandemic. However, increased contagion and tighter restrictions in autumn 2020 set back the recovery. Concerns about the long-term effects of the crisis, such as sustained unemployment, intensified and uncertainty about the economic outlook and the resilience of financial markets remained elevated. Against this background, the Riksbank expanded and extended its asset purchases, including purchases

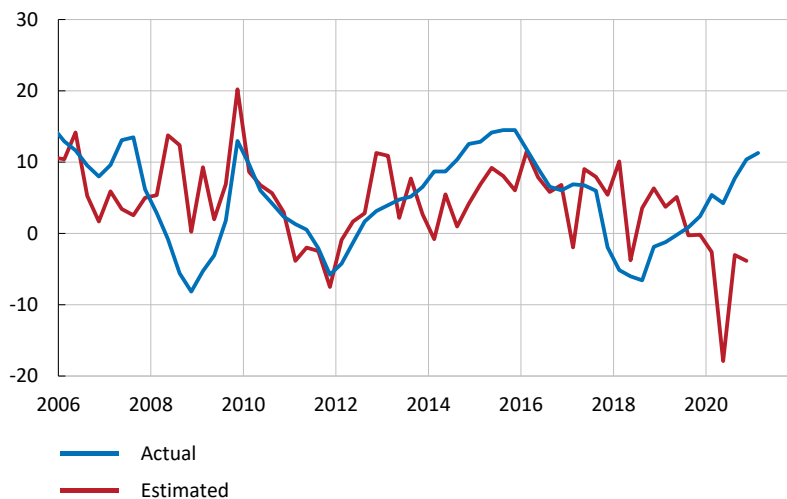
¹⁰⁴ Housing prices fell according to Valueguard's HOX housing price index in March and April 2020, contributing to concerns among many analysts that the pandemic would cause significant falls in housing prices, see for example National Institute of Economic Research (2020).

of covered bonds, but now with a clearer intention to facilitate the economic recovery, stabilise inflation expectations and move inflation towards the target.¹⁰⁵

Households and the housing market are important for the transmission of monetary policy in Sweden and the expansionary policy could be expected to support the recovery not only in particularly vulnerable sectors with very low capacity utilisation but also in sectors that were not particularly hard hit, such as the Swedish housing market. In spring 2021, the Riksbank concluded in an article in the Monetary Policy Report that traditional determinants of housing prices such as household income and mortgage rates were insufficient to understand the sharp rise in housing prices during the pandemic (see Figure 16). Instead, it was concluded that, more likely, the price developments were largely explained by households expecting to work more at home in the future and therefore being willing to spend a larger share of their income on their home.

Figure 16. Developments in actual and estimated housing prices

Annual percentage change



Note. In the model, housing prices are explained by household disposable income and a 3-month mortgage rate after tax and property tax. All variables are expressed in inflation-adjusted terms. The model is a modified version of the one used in Claussen (2013).

Source: Valueguard and the Riksbank.

Thus, although the Riksbank's purchases probably helped to prevent mortgage rates from rising and, at the margin, also contributed to a fall in interest rates at certain maturities, this was hardly an important explanation for the sharp rise in prices. However, low interest rates and good access to credit helped to ensure that households' new preferences had an impact on housing prices. At the same time, the low interest rate environment was not only due to the Riksbank's expansionary monetary policy, but is also largely explained by a prolonged decline in global real interest rates, which

¹⁰⁵ See, for example, Sveriges Riksbank (2020d, 2021c).

had generally contributed to rising asset prices. One explanation for why Swedish housing prices rose so much, even in an international perspective, is to be found in the more specific challenges that characterise the Swedish housing market.¹⁰⁶

One question that remains, however, is how important the purchases of covered bonds in 2021 were for the Riksbank to achieve its monetary policy objective when the economic recovery really took off. While the Riksbank's Executive Board decided to reduce the reinvestment rate in 2022, what would have happened if the Riksbank had scaled back its purchases of covered bonds earlier and more significantly as the worst-case pandemic-related scenarios looked increasingly unlikely? It is difficult to draw any clear conclusions just from the results of the studies of the effects of asset purchases. The impact on economic activity and inflation can be expected to have been limited, based on the results of the studies discussed here. At the same time, inflation and long-term inflation expectations were below target in 2020 and early 2021. Less monetary stimulus also risked further dragging out the economic recovery, with a greater risk of damaging effects from the pandemic on the functioning of the economy. If the Riksbank had adjusted the announced purchases too sharply, it would have also risked reducing its credibility in future announcements.

Uncertainty and the nature of pandemic effects important for understanding corporate bond purchases

Although the Riksbank was far from alone in buying corporate bonds during the pandemic, the decision to purchase corporate bonds has faced some criticism. For example, in their evaluation of the Riksbank's monetary policy between 2015 and 2020, Honohan and Flug (2021) argue that the Riksbank was justified in announcing purchases of corporate bonds in the early phase of the pandemic but that the need for the purchases had passed by the time they were implemented in September 2020. Moreover, they are doubtful that the benefits of buying corporate bonds over a long period of time outweigh the risks.

Direct government intervention in corporate debt markets increases the likelihood of well-known problems such as moral hazard and undesirable effects on the market pricing mechanism.¹⁰⁷ At the same time, these undesirable consequences had to be contrasted with the fact that the pandemic had a very severe and direct impact on economic activity in the corporate sector. Many companies had to face the fact that demand for their products or services either decreased or disappeared completely in a very short time. Market financing for businesses has become increasingly important over the past decade and, at the beginning of the pandemic, accounted for about one-third of total business credit volumes or just over one-quarter of Swedish GDP.

¹⁰⁶ See, for example, Sveriges Riksbank (2011).

¹⁰⁷ The Riksbank's entry into the markets for private securities also increases certain reputational risks for the Riksbank. Requirements are placed on the Riksbank as the owner of debt to private companies, and ethical rules for the Riksbank's employees need to take account of the Riksbank's holdings.

The Riksbank therefore found it necessary to take measures to support the functioning of the market and thereby ensure that businesses could obtain credit via this market.

The Riksbank's purchases of commercial paper, which were aimed at securing short-term market financing for companies, were implemented relatively quickly.¹⁰⁸ However, the purchase of corporate bonds entailed a greater credit risk than both the commercial paper and the Riksbank's other asset purchases. As a consequence of this and the immaturity of the market, the Riksbank needed a longer operational lead time to build up the necessary expertise and a well-functioning infrastructure to be able to carry out the announced purchases.¹⁰⁹

Thanks to several measures directed at companies, including the Riksbank's announcements of asset purchases, and the fact that the consequences of the spread of the disease appeared to be somewhat mitigated, corporate bond yields had largely returned to their pre-pandemic levels by the time the Riksbank implemented the purchases in autumn 2020. The Riksbank nevertheless carried out the announced, relatively small purchases starting in September because there was still considerable uncertainty about how the pandemic would evolve and how resilient the financial system was to a more adverse development. In addition, the Riksbank considered that the favourable interest rate development was to a considerable extent dependent on the purchases previously announced by the Riksbank. A further tightening of financial conditions risked postponing the recovery in economic activity and thereby making it more difficult to bring inflation up to target. Moreover, the visibility of the Riksbank's operational capacity in a market where it had not previously intervened could increase the credibility of interventions in this market in the longer term.¹¹⁰

More generally, a prerequisite for stabilising markets in crises and preventing a tightening of credit conditions and supply is a credible contingency preparedness for the central bank. The most appropriate measures will depend on the nature of the crisis, but asset purchases have proven to be one effective tool among others. Ensuring in advance that the central bank can purchase different types of securities as needed in an appropriate manner is crucial for the central bank to be able to take stabilising measures quickly.

Riksbank's asset purchases not a main cause of high inflation in 2021–2022

International and Swedish studies suggest that central bank asset purchases have had a positive effect on inflation through the various transmission channels discussed in

¹⁰⁸ The purchases of commercial paper were designed so that it would only be attractive to sell to the Riksbank in a stressed market situation and they were characterised by relatively low credit risk, given the maturity of the instruments.

¹⁰⁹ On the need to reform the corporate bond market, see Sveriges Riksbank (2021d) and Ingves et al. (2022).

¹¹⁰ The purchases in September 2020 were justified, among other things, from the perspective that the Riksbank would be prepared to scale up its purchases of corporate bonds if an unfavourable scenario were to materialise. See Chapter 1.

Chapter 2. For Sweden, the effects are estimated to have been relatively modest compared to the international literature, but even if the effects had been much larger, it is difficult to argue, based on the channels identified in the international research literature, that the purchases could explain a significant part of the inflation pick-up in the second half of 2021 and 2022. Resource utilisation, while tight in several economies, is nowhere near what would be consistent with inflation close to 10 per cent according to historical correlations. However, a significant part of the upturn is linked to pandemic-related supply disruptions and Russia's invasion of Ukraine.¹¹¹

¹¹¹ See Shapiro (2022).

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APPENDIX

Table A.1. The Riksbank's decisions on government bond purchases, 2015–2019

Nominal amounts, SEK billion

Date	Size	Types of bonds	Purchase period	Simultaneous decisions
11 Feb 2015	10	Nominal	Feb–Mar 2015	Policy rate cut to –0.10%, downward revision of the rate path ^a
18 Mar 2015	30	Nominal	Mar–May 2015	Policy rate cut to –0.25% ^b
28 Apr 2015	40–50	Nominal	May–Sep 2015	Significant downward revision of the rate path
1 Jul 2015	45	Nominal	Sep–Dec 2015	Policy rate cut to –0.35%, downward revision of the rate path
27 Oct 2015	65	Nominal	Dec 2015–Jun 2016	Postponement of the rate increase in the forecast
10 Feb 2016	Reinvestment of coupons received and repayments when nominal government bonds mature		In close connection with the receipt of funds to be reinvested	Policy rate cut to –0.50%, downward revision of the rate path, extension of the delegation mandate to intervene in the foreign exchange market ^c
20 Apr 2016	30 + 15	Nominal + real	Jul–Dec 2016 + to start in June	Reinvestment of coupons received and repayments when real government bonds mature
20 Dec 2016	15 + 15	Nominal + real	Jan–Jun 2017	Frontloading of reinvestments
26 Apr 2017	7.5 + 7.5	Nominal + real	Jul–Dec 2017	Postponement of the first forecasted rate increase
19 Dec 2017			Frontloading of reinvestments	
24 Apr 2019	40 + 5	Nominal + real	Jul 2019–Dec 2020	Rate increases at a slower pace in the forecast, revocation of reinvestment decisions ^d

Note: ^a Also decision to reset the interest rates for the fine-tuning operations in the Riksbank's control system to the policy rate ± 0.10 percentage points. ^b The Riksbank also communicated a downward revision of the rate path, but did not publish a new quantified forecast. ^c In January 2016, a majority of the Executive Board decided to instruct the Governor and the First Deputy Governor to decide on the details of any intervention in the foreign exchange market that could supplement monetary policy if necessary. ^d In April 2019, the Riksbank revoked the decisions to reinvest funds and redemptions until further notice and instead opted to start making decisions on total purchases for a certain period. The decision is therefore not fully comparable with previous decisions.

On all occasions, decisions were taken to purchase government bonds with a maturity of up to 25 years, except for the decision in February 2015, which concerned government bonds with maturities ranging from 1 year to around 5 years.

Source: The Riksbank.

Table A.2. The Riksbank's decisions on the framework for the asset-purchasing programme 2020–2021

Nominal amounts, SEK billion

Decision date	Amount	Time period	Securities included in the programme
16 Mar 2020	max 300	Mar 2020– Dec 2020	<ul style="list-style-type: none"> • Swedish nominal and real government bonds • Bonds issued by Swedish municipalities and Kommuninvest i Sverige AB • Covered bonds issued by Swedish institutions
19 Mar 2020			In addition to previously decided securities: <ul style="list-style-type: none"> • Commercial paper issued in Swedish kronor by Swedish non-financial companies • Bonds issued in Swedish kronor by Swedish non-financial companies
30 Jun 2020	max 500	–Jun 2021	
25 Nov 2020	max 700	–Dec 2021	<ul style="list-style-type: none"> • Swedish nominal and real government bonds and Swedish sovereign green bonds • Swedish treasury bills • Bonds issued by Swedish municipalities and regions and Kommuninvest i Sverige AB, including green municipal bonds • Covered bonds issued by Swedish institutions • Commercial paper issued in Swedish kronor by Swedish non-financial companies • Bonds issued in Swedish kronor by Swedish non-financial companies that are deemed to meet international sustainability standards and norms

Source: The Riksbank.

Table A.3. Decisions on the purchase of Swedish government bills 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period
25 Nov 2020	10	1 Jan–31 Mar 2021
9 Feb 2021	20	1 Apr–30 Jun 2021
26 Apr 2021	20	1 Jul–30 Sep 2021
30 Jun 2021	20	1 Oct–31 Dec 2021
24 Nov 2021	20	1 Jan–31 Mar 2022
9 Feb 2022	20	1 Apr–30 Jun 2022
27 Apr 2022		Purchases end

Note. The purchases were of treasury bills that were negotiable debt instruments and had a remaining maturity of at least 70 days at the time of purchase. As from 9 February 2020, the decisions were not structured as purchases for a specific period, but in such a way that the holding of the bills would be within the programme's envelope. The decisions thus meant that the Riksbank's total holdings of treasury bills at the end of the specified period would amount to SEK 20 billion. The asset-purchasing programme expired at the turn of the year 2021/2022.

Source: The Riksbank.

Table A.4. Decisions on the purchase of Swedish government bonds 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period	Type of Swedish government bonds
17 Mar 2020	2.5	18 Mar 2020	Nominal
27 Mar 2020	5	30 Mar–30 Apr 2020	Nominal
27 Apr 2020	18	1 May–30 Sep 2020	Nominal
30 Jun 2020	20	1 Oct–31 Dec 2020	Nominal and real
25 Nov 2020	13.5	1 Jan–31 Mar 2021	Nominal and real and Swedish sovereign green bonds
9 Feb 2021	12	1 Apr–30 Jun 2021	Nominal and real and Swedish sovereign green bonds ^a
26 Apr 2021	10	1 Jul–30 Sep 2021	Nominal and real and Swedish sovereign green bonds
30 Jun 2021	10	1 Oct–31 Dec 2021	Nominal and real and Swedish sovereign green bonds
24 Nov 2021	12	1 Jan–31 Mar 2022	Nominal and real and Swedish sovereign green bonds
9 Feb 2022	12	1 Apr–30 Jun 2022	Nominal and real and Swedish sovereign green bonds
27 Apr 2022	12	1 Jul–31 Dec 2022	Nominal and real and Swedish sovereign green bonds
29 Jun 2022	6	1 Jul–31 Dec 2022	Nominal and real and Swedish sovereign green bonds

Note: ^a In connection with this decision, the Riksbank announced that purchases would for the time being be directed towards government bonds with maturities longer than 10 years, since at that time the holdings largely consisted of nominal government bonds with maturities of less than 10 years and the Riksbank's aim was to have a relatively even distribution of different bonds.

The purchases of government bonds made under the asset-purchasing programme were in addition to the purchases of government bonds in 2020 decided earlier, see Section 1.2. The asset-purchasing programme expired at the turn of the year 2021/2022. The decision in June 2022 amended the previous decision in April 2022.

Source: The Riksbank.

Table A.5. Decisions on the purchase of municipal bonds 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period
21 Apr 2020	15	27 Apr–30 Jun 2020
15 May 2020	15	1 Jul–30 Sep 2020
30 Jun 2020	15	1 Oct–31 Dec 2020
25 Nov 2020	23.5	1 Jan–31 Mar 2021
9 Feb 2021	15	1 Apr–30 Jun 2021
26 Apr 2021	13	1 Jul–30 Sep 2021
30 Jun 2021	12.5	1 Oct–31 Dec 2021
24 Nov 2021	12	1 Jan–31 Mar 2022
9 Feb 2022	12	1 Apr–30 Jun 2022
27 Apr 2022	12	1 Jul–31 Dec 2022
29 Jun 2022	6	1 Jul–31 Dec 2022

Note. Purchases of bonds issued by Swedish municipalities and regions and Kommuninvest AB. As of the decision of 25 November 2020, the purchases could also include green bonds issued by these issuers. The asset-purchasing programme expired at the turn of the year 2021/2022. The decision in June 2022 amended the previous decision in April 2022.

Source: The Riksbank.

Table A.6. Decisions on the purchase of covered bonds (mortgage bonds) 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period
20 Mar 2020	10	25 Mar 2020
27 Mar 2020	50	30 Mar–30 Apr 2020 ^a
27 Apr 2020	85	1 May–30 Sep 2020
30 Jun 2020	65	1 Oct–31 Dec 2020
25 Nov 2020	70	1 Jan–31 Mar 2021
9 Feb 2021	60	1 Apr–30 Jun 2021
26 Apr 2021	50	1 Jul–30 Sep 2021
30 Jun 2021	45	1 Oct–31 Dec 2021
24 Nov 2021	12	1 Jan–31 Mar 2022
9 Feb 2022	12	1 Apr–30 Jun 2022
27 Apr 2022	12	1 Jul–31 Dec 2022
29 Jun 2022	6	1 Jul–31 Dec 2022

Note: ^a Of this 50 billion, 20 billion was to be purchased on 1 April.

Purchases of covered bonds with maturities over one year. The asset-purchasing programme expired at the turn of the year 2021/2022. The decision in June 2022 amended the previous decision in April 2022.

Source: The Riksbank.

Table A.7. Decisions on the purchase of corporate bonds 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period	Modifications to purchase decisions
30 Jun 2020	10	1 Sep 2020– 30 Jun 2021	
31 Aug 2020			The conditions of the purchases: restriction rules, purchase procedure, etc.
6 Nov 2020			Additional conditions for purchases: minimum residual maturity, clarification of the definition of non-financial companies, etc. ^a
25 Nov 2020		1 Jan 2021–	Only purchase bonds issued by companies deemed to meet international sustainability standards and norms.
26 Apr 2021	2	1 Jul–30 Sep 2021	
30 Jun 2021	1	1 Oct–31 Dec 2021	
24 Nov 2021	1	1 Jan–31 Mar 2022	
9 Feb 2022	1	1 Apr–30 Jun 2022	
27 Apr 2022	1	1 Jul–31 Dec 2022	
29 Jun 2022	0,5	1 Jul–31 Dec 2022	Only purchase bonds issued by companies that report their annual direct and indirect emissions of greenhouse gases (scope 1 and scope 2) in accordance with the recommendations of the Task Force for Climate-related Financial Disclosures

Note. ^a Some of these decisions also had implications for the purchase of commercial paper.

The purchases meant that the Riksbank offered to buy from monetary policy counterparties bonds issued in Swedish kronor by Swedish non-financial companies, including green corporate bonds. The purchases included non-subordinated bonds with a remaining maturity of at least 6 months and up to 5 years. At the time of each purchase, the Riksbank applied the rules that the Riksbank could not own more than 50 per cent of an individual issuer's total outstanding volume of SEK-denominated corporate bonds, nor could it own more than 50 per cent of any individual bond issue. Only purchases of bonds issued by companies with credit ratings equivalent to Baa3/BBB– or higher and where there were no indications on the day of purchase that the ratings would fall below the lowest acceptable level. From January 2021, the Riksbank only purchased bonds issued by companies that the Riksbank, based on external sustainability data, deemed to meet international sustainability standards and norms. The decision meant that the Riksbank applied norm-based negative screening when selecting corporate bonds, see further Andersson and Stenström (2021). The asset-purchasing programme expired at the turn of the year 2021/2022. The decision in June 2022 amended the previous decision in April 2022.

Source: The Riksbank.

Table A.8. Decisions on the purchase of commercial paper 2020–2022

Nominal amounts, SEK billion

Decision date	Amount	Purchase period	Modifications to purchase decisions
26 Mar 2020	4	2 Apr 2020	
3 Apr 2020	32	8 Apr–31 May 2020 ^a	
8 May 2020	≤ 32	1 Jun–30 Sep 2020	<ul style="list-style-type: none"> Commercial paper with a remaining maturity of up to six months at the time of each auction available for purchase. Previous limit was 3 months. Decision changed to maximum size of holding during the period (later at each purchase) – see note.
30 Jun 2020	≤ 32	1 Oct–31 Dec 2020	<ul style="list-style-type: none"> From 1 July, the rule applied that the Riksbank, when purchasing commercial paper, should not own more than 70 per cent of an individual issuer's total outstanding volume of commercial paper denominated in SEK at any given time.
25 Nov 2020	≤ 32	1 Jan–31 Mar 2021	
9 Feb 2021	≤ 32	1 Apr–30 Jun 2021	
26 Apr 2021	≤ 32	1 Jul–30 Sep 2021	
30 Jun 2021	≤ 32	1 Oct–31 Dec 2021	

Note: ^a Of this 32 billion, 4 billion was to be purchased on 8 April.

The purchases implied that the Riksbank offered to purchase from its monetary policy counterparties commercial paper issued in Swedish kronor by Swedish non-financial companies for a certain amount during the specified period. The purchases included paper issued by companies with a credit rating equivalent to Baa3/BBB– or higher. As of 8 May 2020, the decisions were designed in such a way that the holding of the commercial paper would be within the programme's envelope. The decisions thus implied that the Riksbank's total holdings of paper at each purchase date during the specified period would not exceed SEK 32 billion. The asset-purchasing programme expired at the turn of the year 2021/2022.

Source: The Riksbank.



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