

SPEECH



DATE: 13/04/2018
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The Riksbank's balance sheet: How large should it be in the future?*

Prior to the financial crisis, the Riksbank had a balance sheet of about SEK 200 billion. It now amounts to SEK 870 billion. The balance sheet has thus risen from 6 per cent to 20 per cent of GDP (see figure 1). This recent growth in the balance sheet is an experience we share with many other central banks. It is primarily a result of central banks having complemented low interest rate policy with asset purchases in order to make monetary policy even more expansionary.

This expansionary monetary policy has had an impact and helped strengthen the economy as well as push up inflation to levels that are compatible with the inflation target. In Sweden, we are therefore approaching a situation where the monetary policy expansion can start to be tapered and the interest rate and balance sheet can start to be normalised. But what will monetary policy actually look like in a future “normal situation”? This is currently a subject of intense discussion among many central banks and other agents. Analyses by the Riksbank and others indicate that average *interest rates* in the future will be lower than what was deemed normal in the decades before the financial crisis.¹ But what are we to expect from the Riksbank's *balance sheet* in the future? This is the question I would like to discuss today.

My discussion will be based on a monetary policy perspective, which means that the focus is on the holdings of Swedish government bonds built up by the Riksbank in recent years and on the monetary base and the liquidity surplus that is now on the liability side of the balance sheet. There are other components that also have a major impact on the Riksbank's balance sheet but I will not discuss these in any particular detail. Here, I am thinking mainly about the foreign exchange reserve.

I will also refer to the international discussion, in which arguments have been put forward both for and against “large” central bank balance sheets. The arguments

* I thank Henrik Erikson, Jesper Hansson, Björn Lagerwall, Marianne Sterner, and Anders Vredin for discussions and comments on previous versions of the text.

concern two related questions: Should the purchase and sale of bonds be an active monetary policy tool even in the future? Do large bond holdings strengthen the transmission of central bank policy rates to market rates?

Before I analyse these questions in more detail, I would like provide some background by describing both what central bank balance sheets looked like before the crisis and how they have developed since, and how the design of monetary policy interacts with the balance sheet. This background is important in order to be able to assess how the Riksbank's balance sheet should develop over the longer term and be able to relate to the discussion in other countries. Central bank balance sheets were quite different prior to the financial crisis, both in composition and size. We can expect countries in which monetary policy steers towards similar future inflation targets to have comparable interest rate levels. The balance sheets may, however, look quite different.

My main message today is that the monetary policy arguments for a large balance sheet are, in my opinion, not particularly strong in the Swedish context. Indeed, there are also risks associated with maintaining a large balance sheet. The most likely scenario is therefore that the Riksbank's balance sheet will, in a future normal situation, be substantially smaller than it is today.

There is no “normal” balance sheet

Figure 2 shows what various central bank balance sheets looked like just over a decade ago, prior to the global financial crisis. The most striking feature of the figure is that balance sheets looked different in different countries.

In some countries, for example the United States and Canada, the central bank had a lean balance sheet, the size of which was determined in practice by the demand for banknotes in the economy. The asset side was dominated by domestic government bonds while the liability side was dominated by issued banknotes. These lean balance sheets meant that they had an almost entirely risk-free financial position as the central bank receives interest payments on the assets while the liabilities are cost-free. In this way and if the interest rate is sufficiently high and the banknote demand sufficiently large, the central bank can fund its own operations and deliver a surplus to the state.

The Riksbank and the Swiss National Bank also had relatively minimalistic balance sheets where the liability side was dominated by cost-free capital, but, apart from banknotes, these central banks had accumulated equity on the liability side. The asset side was dominated by gold and foreign exchange reserves, and the Riksbank held no government bonds at all. Despite these similarities, the Swiss National Bank had a significantly larger balance sheet than the Riksbank. This was due to both a substantially higher demand for cash in Switzerland and the fact that the Swiss National Bank had more equity.

In other countries, such as Japan and New Zealand, central banks had balance sheets that were larger than was justified by the cost-free capital. The Bank of Japan had already implemented quantitative easing before to the financial crisis in order to bring up inflation. As a consequence of this, Japanese banks had liquidity reserves on the central bank balance sheet. The Reserve Bank of New Zealand had

a balance sheet with several large items on the liability side. There were deposits from both banks and the state, as well as currency loans which funded some of the country's foreign exchange reserve.

There are several explanations why the balance sheets looked different in different countries. To a certain extent, it depends on the monetary policy regime. For example, the need to maintain a foreign exchange reserve may depend on whether the country has a fixed or floating exchange rate. To a certain extent, it depends on history and previous monetary policy regimes. The size of the gold reserve can often be explained by previous links between the currency and the gold, and the currency reserve can be a remnant from previous regimes with a fixed exchange rate. The way the balance sheet looks is also influenced by what tasks the central bank has and how profits and risks are distributed between the bank and its owners.²

Figure 3 shows that many central bank balance sheets, including the Riksbank's, have grown rapidly after the financial crisis. But how will the balance sheet develop when monetary policy is normalised? Should central banks strive for a lean balance sheet or is there reason to let balance sheets remain large? This review shows that there is no "normal" balance sheet that can be seen as an obvious benchmark. The development will instead be determined by central banks' analysis of, for example, how the size and composition of the balance sheet interact with interest rate policy in normal times.

The interest rate level does not affect the Riksbank's balance sheet

According to traditional textbook models, the central bank steers the short-term interest rate by buying and selling securities in order to expand or contract the money supply, known as "open market operations". The basic premise is that commercial banks that receive deposits from households must keep a certain amount of liquid funds to be able to serve customers wishing to withdraw money from their accounts. These liquid funds constitute the monetary base of the economy and can consist of either banknotes in the banks' cash vaults or reserves held by the banks in non-remunerated accounts at the central bank.

When the market rate is positive, the banks lose money as they are obliged to maintain liquidity reserves, and the higher the interest rate is, the less willing the banks are to maintain reserves. According to this textbook model, there is therefore a directly negative correlation between the size of the monetary base and the level of the interest rate. The central bank can conduct monetary policy either by setting an interest rate and letting the monetary base adapt to it, or by determining the size of the monetary base and thereby let the interest rate adjust itself.

Up until the outbreak of the financial crisis, the textbook model was quite an applicable description of monetary policy in the United States. The Federal Reserve took a decision on a policy rate and then implemented it in the form of open market operations that increased or decreased the volume of reserves the banks held in accounts at the central bank until the market rate coincided with the decided interest rate level.

It is a long time, however, since the textbook model was an applicable description of monetary policy in Sweden.³ There is little cash use and the cash reserves of commercial banks are therefore only negligible. Furthermore, there is no requirement in Sweden for commercial banks to hold liquidity at the Riksbank in proportion to their deposits.⁴ Put simply, one can say that there is no monetary base in Sweden.⁵ In other words, the Riksbank does not conduct monetary policy by changing “the amount of money” in the economy. Instead, the Riksbank determines “the price of money” by directly setting the interest rate on certain financial assets.⁶ These assets are either deposits or lending from the Riksbank to commercial banks depending on how much liquidity there is in the system.

If there is a surplus of liquidity in the economy, banks will have credit balances on the Riksbank’s balance sheet in the same way as when they are forced to hold liquidity reserves in accordance with the textbook model. The major difference from the textbook model is that the Riksbank pays the market rate on the reserves.⁷ Accordingly, the link between monetary base and size of the central bank balance sheet and the interest rate has also been broken; bank reserves are remunerated at the market rate and the Riksbank can thereby determine the interest rate irrespective of how large the liquidity reserves in the economy are.⁸

The repo rate is the main monetary policy tool ...

When, in the initial stages of the financial crisis 2008–2009, policy rates had been lowered to levels close to zero, there was a need for further monetary policy expansion in several parts of the world. Central banks like the Federal Reserve and the Bank of England bought large quantities of bonds. The aim of these purchases was both to push down the general level of interest rates and to support some sub-markets that functioned poorly during the crisis, for example the market for mortgage bonds in the United States. In the euro area and in Sweden, central banks began similar purchasing programmes a few years later.

The theoretical support for the claim that bond purchases make monetary policy more expansionary is quite weak and controversial. In spite of the weak theoretical support, many argue that the experiences of bond purchases are good.⁹ Some even say that the bond purchases have worked so well that they should remain part of the monetary policy toolbox even in normal times.¹⁰ This is a conclusion I find rash, at least as far as the Riksbank is concerned.

The fact that bond purchases seem to have worked well in certain situations and countries does not mean that they will work well in normal times. To draw that conclusion, one needs to consider how bond purchases may have contributed to making monetary policy more expansionary. There are at least four different ways that are usually mentioned. First, the purchases may have functioned as a market stabiliser during the most acute phases of the financial crisis when the markets functioned poorly. The asset purchases then helped to keep the pricing of bonds going and to push down interest rates.

Second, it may have been a question of risk transfer. This is when the central bank purchases private assets (e.g. mortgage bonds) so that the market risk for these assets is transferred to the public balance sheet, or similarly when a central bank in a currency union purchases government bonds from countries with different

credit risks. Even in this case, market prices can be maintained so that some market rates are pushed down despite the monetary policy interest rate not being lowered.

Third, bond purchases can be a way of influencing expectations of future policy rates. The central bank loses money if it raises the policy rate after it has purchased bonds with long maturities. Bond purchases can therefore make it more credible that the central bank will keep the policy rate low going forward. This would cause the market rates for bonds with long maturities to fall.

Fourth, bond purchases can affect yields at different maturities through a so-called portfolio balance channel. This occurs if market participants don't see short-term deposits at the central bank as a perfect substitute for the government bonds they have sold to the central bank. The purchasing of long-term government bonds by central banks reduces the supply of safe assets with long maturities, which drives up the price and drives down yields on long-term government bonds.¹¹

I find it difficult to believe, however, that these channels will be particularly effective in the Swedish economy in a future environment of more normal monetary policy.

As I have said previously (Flodén, 2015), I also suspect that the effects via these channels have not been particularly strong in recent years, as the Riksbank has purchased large volumes of bonds. The Riksbank's purchases have taken place in an environment where the markets are well-functioning. Furthermore, the purchases have only been of government bonds, which have the same risk profile as the certificates issued by the Riksbank to fund the purchases. In addition, the portfolio balance channel has been partly rendered inoperative as a result of the Swedish National Debt Office's repo facility, where market participants can borrow an unlimited amount of government bonds with the desired maturity.

I think that the positive effects of the Riksbank's bond purchases have instead been mainly achieved in another way. When the Debt Office's dealers make use of the repo facility and borrow bonds, it is done at an overnight interest rate that is 0.40 percentage points below the Riksbank's repo rate. As the Riksbank's holdings of government bonds have increased, the *short-term* market rates for government securities have therefore been pushed down towards -0.90 per cent, i.e. the repo rate minus the cost for the facility (see Figure 4). Via expectations, the low level of these short-term rates has then also pushed down yields on long-term government bonds.¹²

In practice, there are hence two levels on the money market in Sweden, one around the repo rate and one around the cost for the National Debt Office's facility. My assessment is that an equally expansionary monetary policy could in principle have been achieved without quantitative easing but with a repo rate somewhere between these two interest rate levels. In recent years, setting a lower repo rate could have been problematic but in a future scenario with more normal interest rate levels, I see no need to try to affect short-term market rates with tools other than the repo rate.

And as regards the formation of expectations and the transmission from short-term rates to rates on longer maturities, the Riksbank has a long tradition of using transparent communication to signal future monetary policy plans, for example by publishing forecasts of the repo rate's development.¹³ If it is considered important to influence market expectations in a certain way, I believe that it is normally easier to achieve this using well-considered communication, for example in the form of more or less forceful statements from the Executive Board about future interest rate policy, rather than in the form of bond purchases.

... but increased likelihood of unconventional monetary policy in times of economic slowdown

When the acute phases of the financial crisis began in the autumn of 2008, the Riksbank owned no domestic bonds. As a result, the Riksbank found it difficult to quickly intervene on the market with appropriate support measures. A lesson learnt from this episode was that the Riksbank needed to have preparedness in order to be able to act on the bond market in special situations. Such preparedness presupposes that the Riksbank maintains at least a small portfolio of government bonds in order to have the necessary systems, agreements and knowledge in place. The Riksbank therefore built up a government bond portfolio in 2012–2013.¹⁴

This justification for maintaining a bond portfolio is still relevant. A future reduction of the Riksbank's bond holdings will therefore most likely not result in a complete phasing out of the portfolio. But the bond portfolio built up in 2012–2013 was small in relation to the one built up for monetary policy purposes. Bond purchases in 2012–2013 totalled SEK 10 billion, compared with purchases for monetary policy purposes since 2015 totalling more than SEK 300 billion.

The support measures that may become relevant in special situations can either relate to market stabilisation, as was the case in the autumn of 2008, or to bond purchases as a complement to monetary policy when the policy rate is restricted by its lower bound.

There is a great deal to suggest that real interest rates in Sweden and abroad will be lower in the future than they were during the decades preceding the financial crisis, partly as a result of demographic changes and a new saving pattern in the global economy.¹⁵ As a consequence, several central banks, including the Riksbank, have revised down their assessments of what is a normal level for the policy rate. The likelihood is therefore greater than we will touch the lower bound for the repo rate in the event of economic slowdown. This means that we in the future more often may need to use bond purchases as a complement to the repo rate and repo rate forecast.

So, even if I have argued that a portfolio of government bonds has a limited role to play in monetary policy in normal conditions, I nevertheless expect that the Riksbank, along with other central banks, will find itself in situations where bond purchases are justified as a complement to interest rate policy.

Other arguments for a large bond holding

The arguments for large bond holdings in normal circumstances that I have so far discussed seem not to be particularly relevant to the Riksbank's monetary policy in a future normal situation.

Another argument put forward by some is that a large bond holding, and thereby a larger liquidity surplus in the economy, may strengthen the monetary policy transmission mechanism.¹⁶ The arguments basically say that a liquidity surplus – when the banking system has plenty of central bank reserves – can mitigate the risk of frictions on the money market. During the financial crisis, the interbank market functioned poorly, causing market rates to become more volatile and making it more difficult for financial institutions with no direct access to central bank facilities to get access to liquidity. With a large liquidity surplus, the economy becomes less dependent on a well-functioning interbank market.

Regardless of the soundness of these arguments, they have no implications for the Riksbank's bond holdings. The fact is that the liquidity surplus in Sweden will, in all likelihood, be large irrespective of how the bond portfolio develops in the future. We already had a structural liquidity surplus in the economy before the Riksbank began its bond purchases in 2015, and the surplus has increased since then as a result of reduced cash use and the Riksbank's dividend payments. The Riksbank's bond holdings now amount to SEK 363 billion while the liquidity surplus, i.e. commercial banks' claims on the Riksbank, amounts to SEK 435 billion. The liquidity surplus would therefore be about SEK 70 billion even if the entire bond portfolio was sold.¹⁷

Another argument sometimes put forward in favour of large bond holdings is that the central bank's purchases would increase the supply of safe assets in the economy, and that there is otherwise a shortage of such assets.¹⁸ The Riksbank's bond purchases result in that government bonds with a specific maturity disappear from the market and are replaced by Riksbank certificates with a maturity of one week.¹⁹ The Riksbank then takes over some of the maturity transformation that the market otherwise tries to achieve on its own, and helps to reduce the interest rate risk in the outstanding portfolio of government securities. This argument isn't particularly convincing either. If it is considered important to have short maturity on the national debt in normal times, this should be dealt with when the government bonds are issued, and it is then a question for the National Debt Office.

Furthermore, the conversion from government securities to Riksbank assets does not seem to increase the supply of safe assets in Sweden; the interest rate on (short-term) government securities is lower than the repo rate which means that the market price of government bonds is higher than the price of Riksbank certificates with the same maturity. This pricing indicates, if anything, that the market prefers to hold government bonds rather than central bank reserves and hence that the Riksbank's bond purchases are reducing the supply of the safest assets. Another indication of this is that the term premiums on government bonds have been very low, and probably negative, in recent years.²⁰ This suggests that government bonds with long maturities are not being priced with risk premiums in relation to Riksbank certificates or government securities with short maturities.

I have now discussed arguments that could indicate that the Riksbank should continue to maintain a large portfolio even in the future, and I don't consider these arguments to be particularly strong. But does this mean that the size of the balance sheet has no significance or are there strong arguments indicating that the Riksbank's balance sheet should be small?

Arguments *against* substantial bond holdings in normal times

Maintaining a large balance sheet can be associated with risks, but the nature of these risks depends both on the assets held by the central banks and how these are funded on the liability side. The risks may relate to the central bank's financial position and ability to conduct monetary policy and simultaneously fund its own operations, as well as to its reputation and possibility to safeguard its independence in monetary policy issues.

Plosser (2018) discusses risks to reputation and argues that the central bank must have a narrow mandate to be able to justify continued independence from the political sphere. The risks he discusses are mainly linked to central banks that buy assets other than government bonds. The more the central bank involves itself in risk and capital allocation in the economy, the greater the risk of it being exposed to political pressure with respect to how it should conduct its policy. And more generally, the larger the central bank's balance sheet, the greater the risk of politicians wishing to utilise the resources in a specific way.

Plosser's arguments are important, but they are not particularly applicable to the Riksbank's current situation. The Riksbank has only purchased government bonds, and we have spread our purchases fairly evenly on the outstanding bond stock in order to affect the general level of interest rates rather than specific bond prices. And despite the Riksbank's balance sheet having grown rapidly in recent years, it is significantly smaller in relation to GDP than in many other countries.

As far as the Riksbank is concerned, I consider the financial risks to be more problematic. The large bond portfolio means that the interest rate risk on the balance sheet has increased. The bonds we have purchased have an average maturity of 5 years, but are funded with Riksbank certificates with a maturity of one week. If the interest rate rises, the funding costs will therefore increase while the return on the bonds already purchases remains unchanged. In addition, the expected return on the Riksbank's bond portfolio is low. This is due partly to term premiums being generally depressed in recent years, and partly to the return on government bonds being, so to speak, based on the interest rate in the National Debt Office's facility (i.e. 0.40 percentage points below the repo rate) while the funding costs are based on the repo rate.

Central banks can normally fund their own operations and conduct an independent monetary policy using the return on their cost-free capital, i.e. the assets they hold that correspond to the cost-free liabilities. These liabilities consist of the volume of banknotes in the economy and the central bank's equity.

Compared with other central banks, the conditions for the Riksbank to bear risk are less favourable. This is because cash use is limited and, as a result, the volume

of banknotes only amounts to about one per cent of GDP, compared with around 10 per cent in the euro area, the United States and Switzerland, and almost 20 per cent in Japan. Admittedly, the Riksbank's equity is greater than that of central banks in certain other, mostly Anglo-Saxon, countries. But the overall picture is nevertheless that the Riksbank has less cost-free capital than other central banks and hence the conditions for holding financial risk on its balance sheet are less favourable (see Figure 5). This picture has been reinforced in recent years as the volume of banknotes has rapidly declined. Furthermore, the earning capacity of all central banks has weakened as underlying interest rates have fallen.²¹

I have previously discussed the financial risks that occur on the Riksbank's balance sheet when we have large bond holdings.²² These risks in combination with the Riksbank's weak earning capacity constitute an argument in favour of a smaller balance sheet in the long run. This is the best way of safeguarding the Riksbank's future capacity to fund its own operations and conduct an independent monetary policy.²³

Reasonable for the Riksbank's balance sheet to shrink in the long run

The Riksbank's balance sheet has grown rapidly in recent years, partly because we have purchased government bonds for monetary policy purposes, and partly because the foreign exchange reserve has been strengthened.

In other countries, arguments have been put forward indicating that central banks should perhaps continue to hold large bond holdings even in the future when monetary policy has been normalised. In my opinion, these arguments are of limited relevance to Sweden and the Riksbank.

On the other hand, there are arguments indicating that the Riksbank should mitigate its financial risk by winding down most of its bond holdings when monetary policy is normalized. My assessment is that the best way of winding down the bond holdings with as little market influence as possible is to hold the bonds in the portfolio until they mature. Over the next decade, the Riksbank's bond holdings will then develop approximately as shown in Figure 6.

The repo rate and the rate path will thus be the main monetary policy tools when monetary policy has been normalized. But normal interest rates appear to be lower than previously thought. It is therefore more likely that we touch the lower bound for the repo rate in times of economic recessions, and we may then again need to use bond purchases as a complement in monetary policy.

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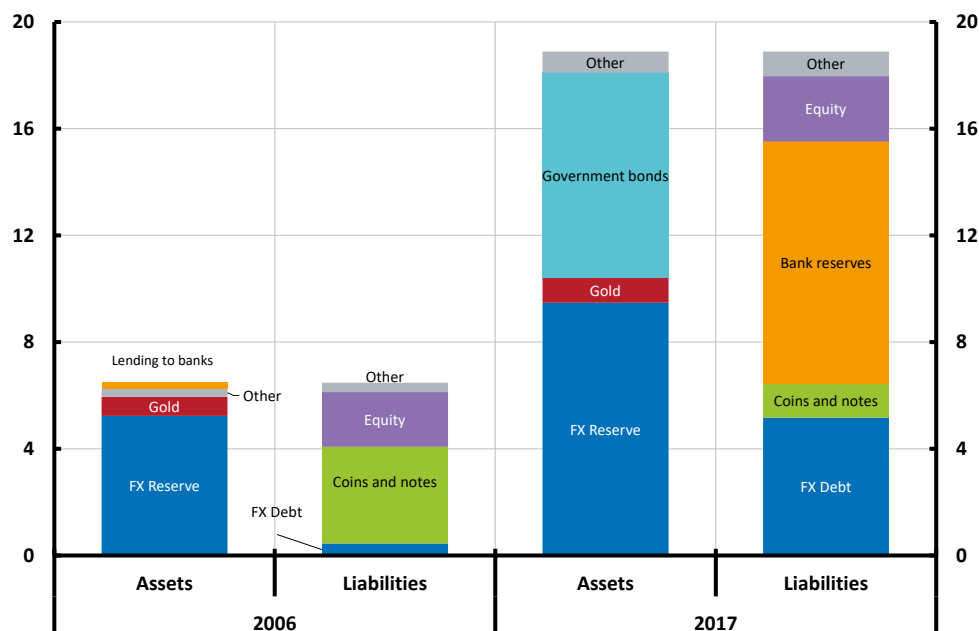
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Figures

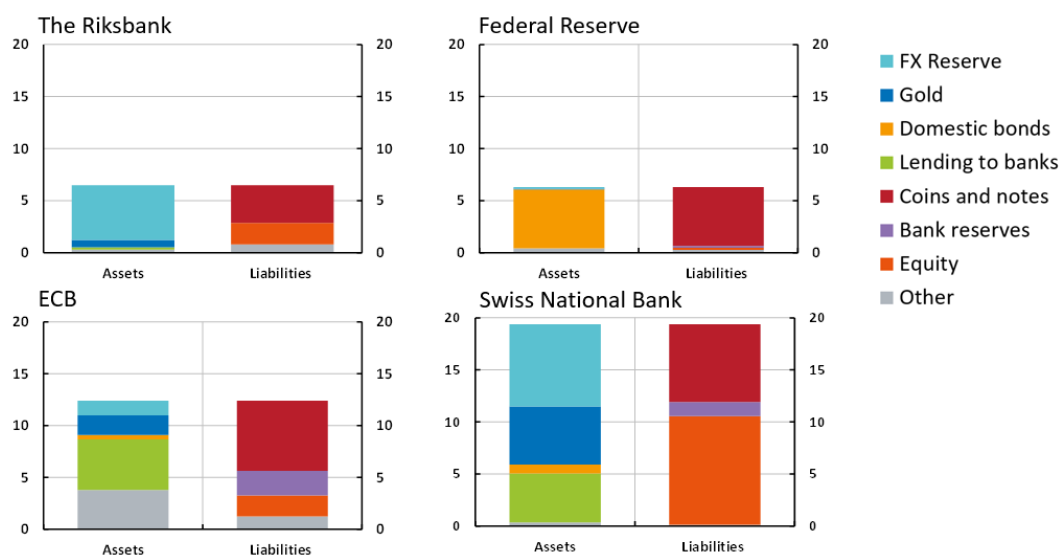
Figure 1. The Riksbank balance sheet, 2006 and 2017



Note. Per cent of GDP

Sources: Statistics Sweden and the Riksbank

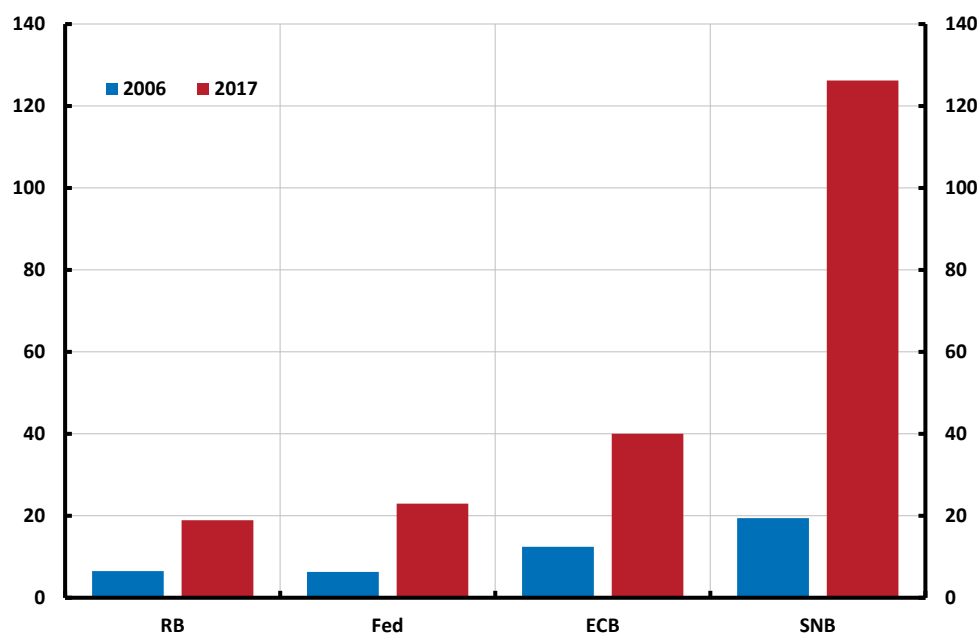
Figure 2. Central bank balance sheets before the financial crisis



Note. Per cent of GDP. Refers to 2006. The breakdown into asset and liability classes should be seen as indicative

Sources: Respective central bank and national statistics sources

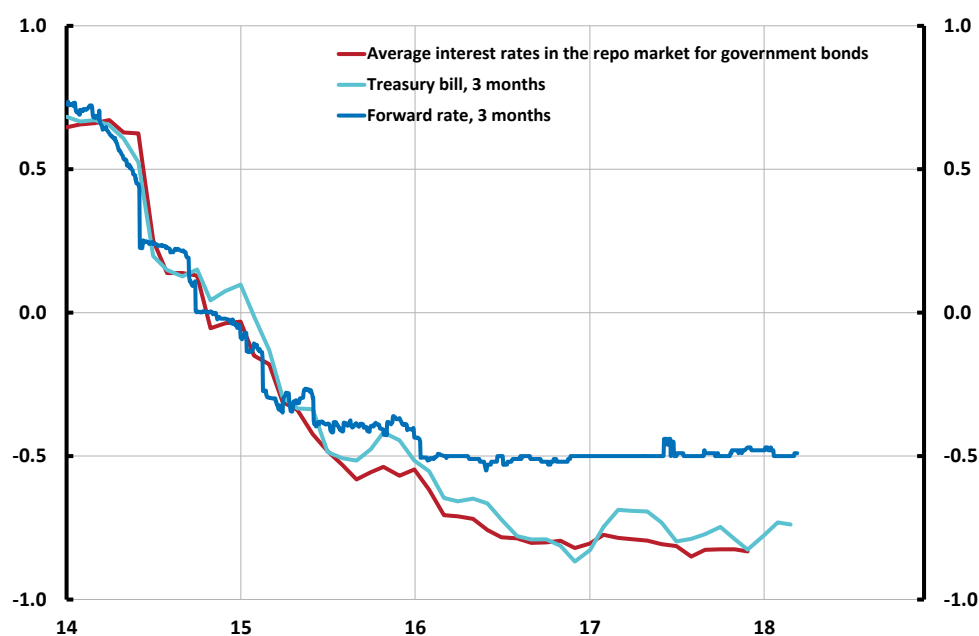
Figure 3. Central bank balance sheet totals, 2006 and 2017



Note. Per cent of GDP

Sources: Respective central bank and national statistics sources

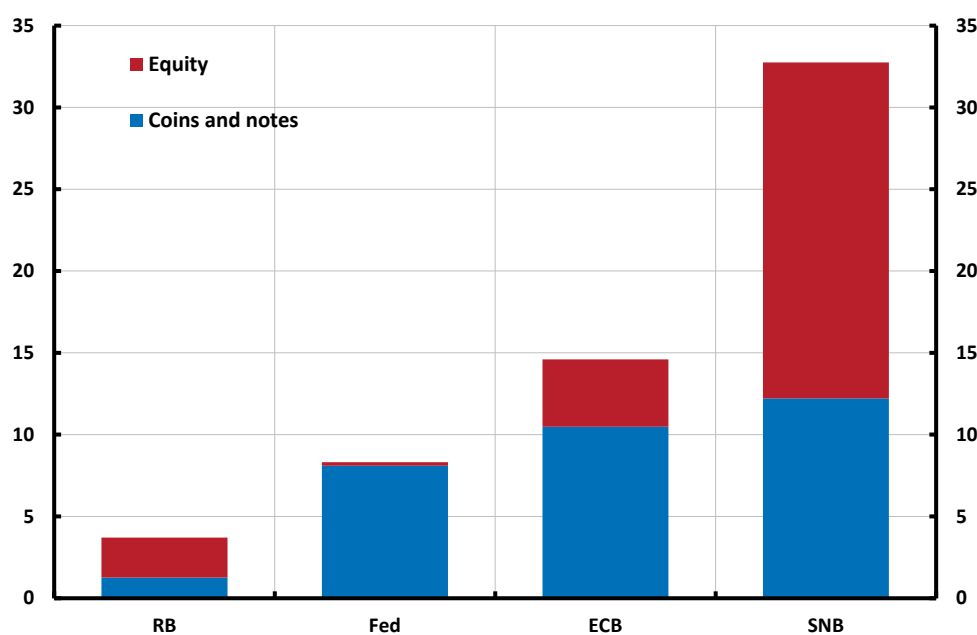
Figure 4. Two levels of short-term interest rates



Note. Per cent. The forward rate reflects the expected level of the repo rate over the next three months.

Sources: Macrobond and the Riksbank

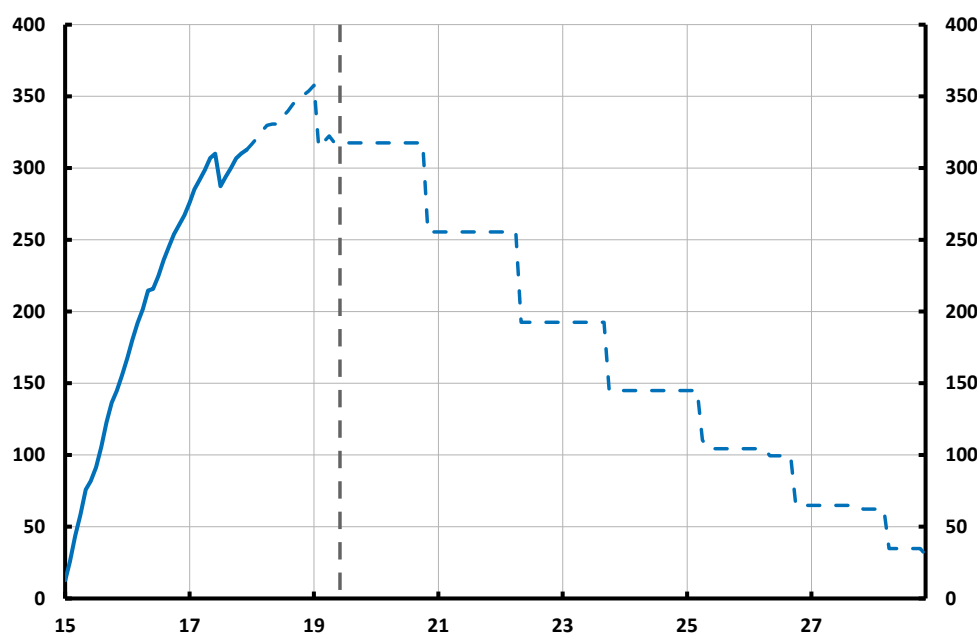
Figure 5. Central banks' cost-free capital



Note. Per cent of GDP

Sources: Respective central bank and national statistics sources

Figure 6. The Riksbank's government bond holdings



Note. Nominal amounts, SEK billions. Forecast up until June 2019, then a technical projection with the assumption that no further reinvestments are made. The development of the holdings is also affected to a certain extent by the market prices of the bonds and which bonds the Riksbank chooses to reinvest in. The vertical line marks the shift between forecast and technical projection.

Source: The Riksbank

¹ See Sveriges Riksbank (2017a).

² See Archer and Moser-Boehm (2013).

³ The major features of the Swedish operational framework are not unique, but common to monetary policy in most countries.

⁴ Regulatory frameworks set other liquidity requirements for banks, but the liquidity need not consist of central bank money.

⁵ Up until 2009, banks' remunerated liquidity surplus was not part of the monetary base in Sweden, but in 2009 the definition was changed to include the liquidity surplus (see Sveriges Riksbank, 2009). The new definition is more in line with international recommendations and practice, but, in my opinion, is a poor measure of what the literature refers to as the "monetary base".

⁶ This is a simplified description of the Riksbank's operational framework for the implementation of monetary policy. More detailed descriptions can be found in Nessén, Sellin and Åsberg Sommar (2011) and Sveriges Riksbank (2014).

⁷ Goodfriend (2011) calls this way of conducting monetary policy "interest on reserves policy" which he differentiates from the textbook model's "monetary policy". See also Woodford (2000) for an analysis of how monetary policy works in a world without a monetary base.

⁸ There was a liquidity deficit in Sweden before the financial crisis. At that time, the Riksbank supplied liquidity to the market by lending to banks via repos (hence the "repo" rate). Using today's definition, one could say that we in a sense had a negative monetary base in Sweden. This illustrates that the currently used definition of "monetary base" is actually rather strange. The liquidity deficit has thereafter shifted to a surplus. The Riksbank is now draining the surplus liquidity by issuing certificates (and sometimes via fine-tuning transactions) with one-week maturity at an interest rate which we still call the repo rate. A better term would be the "certificate rate".

⁹ See Yu (2016) and Chapter 1 in Walsh (2017) for summaries of studies based on US data. These studies usually investigate the immediate impact on asset prices when news of asset purchases is made public. It is more difficult to study whether the price effects are permanent and here the empirical support is therefore weaker. Altavilla et al. (2015) find that the ECB's purchasing programme has pushed down interest rates across quite a broad spectrum of European assets, and particularly as regards government bonds in countries with high interest rates (such as Italy and Spain). De Rezende et al. (2015) find that the initial stages of the Riksbank's purchasing programme contributed to rate falls in about the same way as purchasing programmes in other countries.

¹⁰ In a survey of central bank governors and leading researchers, a high percentage in both groups say that the purchasing of government bonds and/or other assets is a tool that should continue to be part of the central bank toolbox even after the crisis (Blinder et al., 2017).

¹¹ Alsterlind et al. (2015) describe the signalling and portfolio balance channels in more detail.

¹² In Sweden, the effect on rates with short maturities is probably more important than the effect on rates with long maturities. This is because most lending to household and

companies is done at variable interest rates. According to Statistics Sweden's Financial Market Statistics, 73 per cent of lending to households and non-financial corporations had a remaining interest-rate fixation period of 3 months or less in February 2018.

¹³ The primary purpose of repo rate forecasts has so far been to influence market rates, and periodically there have been major differences between the Riksbank's forecasts and market expectations (see Sveriges Riksbank 2017b).

¹⁴ See Sveriges Riksbank (2012).

¹⁵ See Rachel and Smith (2015) and Holston et al. (2017).

¹⁶ See, for instance, Duffie and Krishnamurthy (2016), Bernanke (2016) and Constancio (2017).

¹⁷ The Riksbank could reduce the liquidity surplus further by selling other assets, i.e. gold and foreign exchange reserves. But such a change of its asset holdings is not likely; the Riksbank has in the last decade instead enhanced its foreign exchange reserves by more than SEK 200 billion financed by loans in foreign currency.

¹⁸ See Greenwood et al. (2016), Constancio (2017) and Krishnamurthy (2018).

¹⁹ This is still a simplified description of the Riksbank's operational framework. See the references in footnote 6 for a more complete description.

²⁰ See Figure 3 in Flodén (2016).

²¹ See af Jochnick (2015).

²² Flodén (2016). Sims (2016) discusses more generally how large balance sheets risk weakening the financial independence of central banks.

²³ This conclusion is not self-evident, however. One could also argue the opposite and say that the Riksbank, as a result of low interest rates and small amount of cost-free capital, should seek higher returns. And in normal times, government bonds with long maturities can be expected to give a return that is higher than the anticipated funding costs via the repo rate. Such a search for yield is associated with risks and will sometimes succeed, sometimes fail. It is therefore hardly a sustainable strategy for an institution like the Riksbank, which is now celebrating its 350th anniversary and is striving for an equally long future existence.