The storm after the calm – lessons for monetary policy analysis

Jesper Hansson, Marianne Nessén and Anders Vredin*

Jesper Hansson is Head of the Monetary Policy Department, Marianne Nessén is senior advisor to the Executive Board and Anders Vredin is Head of the General Secretariat of the Riksbank. Mr Vredin was Head of the Monetary Policy Department from 2003–2009, Ms Nessén was Head of Department from 2012–2016.

The financial crisis and our experiences since then have exposed a number of weaknesses in the monetary policy analysis framework applied under the inflation targeting regime. This article describes some of these experiences and discusses areas into which we consider it to be particularly important to expand monetary policy analysis: the role of the financial system in the monetary policy transmission mechanism, the supply side of the economy, and the links between monetary policy and fiscal policy.

1 Introduction

The material underlying monetary policy decisions, which is to say monetary policy analysis, looks largely the same today as it did before the financial crisis. This is not to say that new types of analyses in important areas have not been made. But the actual material upon which monetary policy decisions have been based, for example monetary policy reports, have not changed very much. Our view is that this is the situation not only in Sweden but in other countries too. At the same time, the financial crisis and subsequent experiences showed that the materials, communication and analyses need to be expanded in certain regards. For example, this applies to the way monetary policy affects inflation and economic developments in general via the financial system, the so-called transmission mechanism, and what consequences changes to this mechanism may have. The latter could, for example, concern how changes in credit- and asset market conditions influence the pass-through of policy changes, the point at which so-called quantitative easing (or tightening) may be justified in addition to changes in the policy rate, or whether risks to financial stability should be considered in monetary policy decisions. Experience also shows that analysis needs to focus to a greater extent on more permanent structural changes in addition to the more short-term cyclical developments that are traditionally in focus. The relationship between monetary policy and fiscal policy is a further area to which sufficient attention has not been paid under the inflation targeting regime. We are not saying that these issues have been ignored – on the contrary there are many boxes, working papers, and other types of publications – but the new analyses have not had a lasting impact on how actual decision making is made. An important task going forward is incorporate the new research and insights into practical monetary policy decision making.

In our view, the lack of major changes to monetary policy analysis, despite these experiences, is not because central banks and other forecasters are unwilling to rethink,

* We are very grateful for comments, sometimes critical, from Meredith Beechey Österholm, Vesna Corbo, Mattias Erlandsson, Magnus Jonsson, Stefan Laséen, Jesper Lindé and Ulf Söderström. All remaining errors are our own. The views presented in this article are those of the authors and they do not necessarily coincide with those of the Executive Board of Sveriges Riksbank.

but because the new analyses that must be made and the new models needed for this are genuinely difficult to develop and adapt to the needs of central banks. At present, there is no generally accepted new benchmark framework from which to proceed, unlike when the Riksbank about fifteen years ago more explicitly adopted the flexible inflation targeting framework and started using a set of new macro models designed for that framework. But it is also because the basic structure of the analytical tools applied before and after the financial crisis are still seen as highly useful and are considered, for good reason, to have served monetary policy and the economy well.[1] No widespread support exists, either among central banks themselves or among leading researchers in the area, for completely new thinking. The so-called inflation-targeting policy is perceived, on the whole, as a successful monetary policy strategy. For example, in the decades before inflation targeting was introduced, inflation in Sweden averaged 8 per cent.[2] Average inflation is now considerably lower. Calculated as an average between January 1995 and October 2018 it is 1.3 per cent in terms of the consumer price index (CPI) and 1.6 per cent if the CPI with a fixed interest rate, the CPIF, is used instead.

Sweden's development reflects an international trend towards lower and more stable inflation, so it would be misleading to claim that the development of inflation in Sweden is entirely a result of the Riksbank's successes or shortcomings. In addition, in the 1990s the framework for wage formation – formalized in the Industrial Agreement of 1997 – was changed, as was the framework for fiscal policy in Sweden with an increased focus being placed on long-term sustainable public finances. Budget consolidation in the first half of the 1990's strengthened the general government structural balance by the equivalent of 7 per cent of gross domestic product (GDP) between 1994 and 1998.[3] Fiscal policy was also reformed in many other EU countries after the implementation of the Maastricht Treaty. In international discussions on economic policy, the period from the middle of the 1980s until 2008 is often referred to as the Great Moderation.[4] After the problems in the 1970s with stagflation, which is to say high inflation combined with low growth, inflation fell to low and stable levels at the same time as economic growth was good.

This period of calm came to an end, initially in the United States in 2007 and then transitioned into the Great Recession in 2008, when the international financial crisis advanced like a storm over large parts of the world economy – 'the storm after the calm'. Central banks and governments around the world adopted powerful measures with the aim of mitigating the effects of the financial crisis on inflation, growth and employment. Sweden was among those countries experiencing the greatest falls in GDP and the Riksbank and other authorities were highly active. The repo rate was cut from 4.75 to 0.25 per cent over the course of 7 months from October 2008 to April 2009, and at the same time as the Riksbank lent large amounts of foreign currency and Swedish krona to banks to stabilise the financial sector and stop a credit crunch.

Ten years have now passed since the economic 'storm' of the autumn of 2008. It can be noted that the recovery from the financial crisis has been much more sluggish than expected, both in Sweden and globally, despite unprecedented measures from central banks and governments (see Berg et al. 2018). No normalisation of monetary policy has taken place yet, at least not in Europe. Neither is there any new consensus on how monetary policy should best be conducted, as there was during the Great Moderation. When the financial crisis spread around the world in 2007–2008, inflation targeting was not abandoned, but the relatively simple principles of interest rate management that had been established during the Great Moderation needed rapidly to be complemented by other measures.

1 See Galĺ (2018) and Lindé (2018) for recent descriptions of the analytical framework.
2 Average in 1973–1992 for the annual percentage change in the CPI.
3 Structural balance in the public sector, per cent of potential GDP according to Konjunkturinstitutet (2018).
4 In Sweden, this more stable development did not start until a little way into the 1990s.

In this article, we present an overall picture of monetary policy and experiences in Sweden and other countries over the last decade or so. We discuss the questions monetary policy analysis has struggled with and highlight a few areas to which we believe more attention will have to be paid in the future. As we do this, we will indicate areas in which the analytical framework that became dominant during the Great Moderation need to be complemented. This framework often involved a heavily simplified view of how the financial system works, of the role of central banks and of what should be included in the concept of monetary policy. In addition, it was primarily developed to understand short-term fluctuations in economic development, where more long-term structural phenomena could not be analysed as easily. And fiscal policy was not usually included, meaning that its effects on economic development gained too little attention. More in-depth analyses are needed of these three areas.

The primary aim of this article is not to make any new assessment of *monetary policy* but to describe some of the challenges facing *monetary policy analysis*.[5] One common view, both in Sweden and abroad, is that central banks and monetary policy have been misled by imperfect models of the macro economy. Careful studies, however, suggest that this criticism is misplaced.[6] Even so, as having been responsible for monetary policy analysis we have reason to be self-critical and, in light of the experiences gained, to draw a few conclusions about areas in which analysis needs to be improved. This article is just input in a discussion. In order for concrete progress to be made deeper analyses will be required.

In the next section we continue by describing the development of inflation and monetary policy in Sweden, the United States and the euro area over the last decade or so. This account aids us in illustrating some of the areas in which we believe that the simple analytical framework for inflation targeting needs to be expanded.

2 Low inflation despite low interest rates and good average growth

Figure 1 shows the development of the rate of inflation in Sweden, the euro area and United States from 2000 to 2017.[7] For Sweden, this refers to the CPIF, which was not yet our target variable in this period, but which became increasingly important as guidance for interest rate decisions as it became more and more clear that the direct effects on the CPI of interest rate adjustments were obscuring the general trend of inflation.[8] For the euro area and the United States the official targeted inflation indices are used, HICP for the euro area and the price index for personal consumption expenditures (PCE) for the United States. Neither of these are directly affected by interest rate adjustments in the way that Swedish CPI is. The figure shows that there are differences in the development – inflation was lower in Sweden between 2004–2007 and 2011–2013 – but also clear shared traits. The rate of inflation peaked in 2008, before the financial crisis erupted in earnest. After this, there followed several years with a downward trend in the rate of inflation. Particularly in 2014 and 2015, inflation in all of these currency areas became unexpectedly and undesirably low. Since then, however, inflation has risen again.

The downward trend in the rate of inflation would be easier to understand if it had coincided with unusually weak growth and falling resource utilisation. But, as can be seen from Figure 2, GDP growth was comparatively good a few years after the financial crisis. Average

5 For evaluations of monetary policy in Sweden, see Goodhart and Rochet (2011), Bryant et al. (2012) and Goodfriend and King (2016).

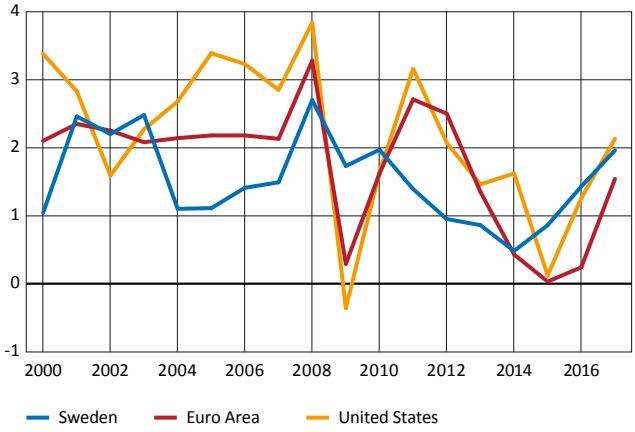
6 For Swedish studies, see Iversen et al. (2016), who show that the Riksbank's model forecasts have been more accurate than the published forecasts. An earlier study by Adolfson et al. (2007) reached similar conclusions. Lindé and Reslow (2017) show that the Riksbank's published forecasts over the medium term are mostly based on assessments, rather than model forecasts.

7 Together, the euro area and United States account for just over half of Sweden's international trade.

8 Until September 2017, the CPI was the official target variable. However, as the CPI has been affected so mechanically and strongly by the last decade's major interest rate fluctuations, in practice, monetary policy has been guided by the CPIF. See Sveriges Riksbank (2016).

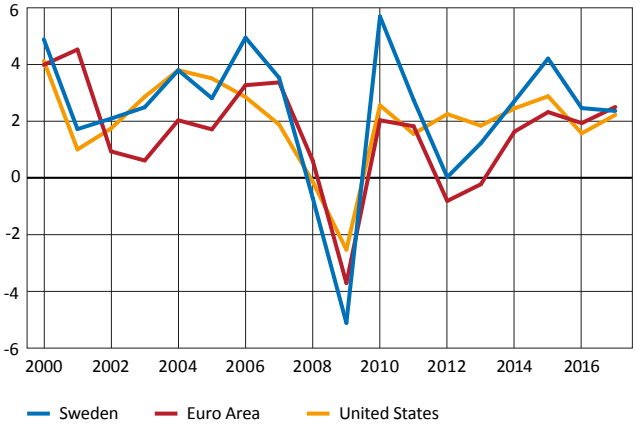
growth in the period 2014–2015 was about 3.5 per cent in Sweden, just over 2.5 per cent in the United States and about 2 per cent in the euro area. Resource utilisation was lower than normal during 2014–2015 according to for example the assessment made by the OECD, but was improving after a weak period in 2012–2013.

Figure 1. Rate of inflation 2000–2017
Per cent



Note. For Sweden, this means the CPIF, for the euro area it is the HICP and for the United States it is the deflator for private consumption.
Sources: Bureau of Economic Analysis, Eurostat and Statistics Sweden

Figure 2. GDP-growth 2000–2017
Annual percentage change, calendar-adjusted data

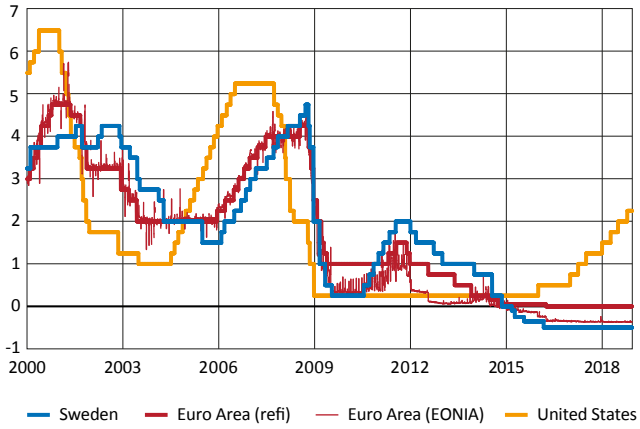


Sources: Bureau of Economic Analysis, Eurostat and Statistics Sweden

The downward trend in the rate of inflation has also been unexpected considering the highly expansionary monetary policy that has been conducted since the financial crisis. Figure 3 shows the development of policy rates in Sweden, the euro area and the United States. Once again, there are similarities in this development. During the economic upswing prior to the financial crisis, policy rates were gradually raised for a few years before peaking in the range 3–5 per cent. Policy rates were then cut heavily in 2008–2009, after which they have remained at historically low levels. In the United States, the Federal Reserve held the policy rate at 0.25 per cent for almost 7 years, from December 2008 until the end of 2015, after which cautious policy rate increases were initiated. The Riksbank and (to a lesser extent) the ECB raised their policy rates in 2010–2011 before then cutting them again as the sovereign debt crisis in the euro area worsened. When inflation continued to fall in 2014 and 2015, both the Riksbank and ECB cut their policy rates to below zero. Since 2015, due to its negative rate, the Riksbank has had a lower policy rate than the Federal Reserve, although it has been at about the same level as the ECB's.

However, to obtain a more comprehensive view of monetary policy and the degree of monetary policy stimulus, we need to observe three more conditions.

Figure 3. Central bank policy rates 2000–2018
Per cent

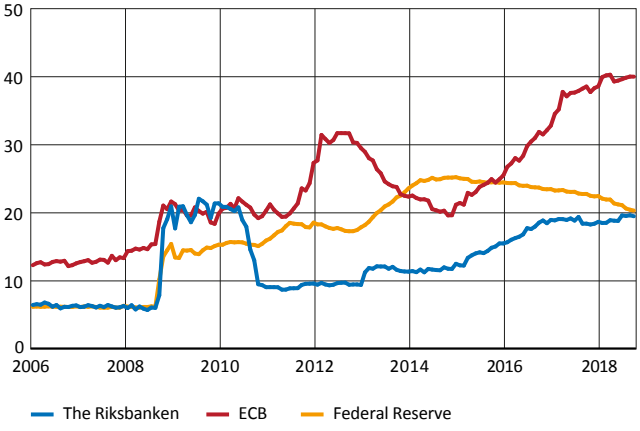


Note. For Sweden, this refers to the repo rate, for the euro area to the refi rate and EONIA since the latter since 2009 has been below the refi rate, and for the United States to the ceiling of the range for the Fed Funds Target Rate.
Sources: Macrobond and national central banks

2.1. There are more monetary policy instruments than the policy rate

Firstly – monetary policy is not just changes in the policy rate. During the financial crisis, several central banks started conducting monetary policy via various measures that led to growing balance sheets. Figure 4 shows central bank balance sheet totals as a percentage of GDP in the three currency areas studied. The Riksbank, ECB and Federal Reserve heavily increased the size of their balance sheets at the end of 2008, initially primarily via various kinds of lending programmes aimed at banks. The Federal Reserve also lent to other financial intermediaries and bought government bonds and government-guaranteed mortgage-backed securities. The Federal Reserve's balance sheet has remained at high levels and has even increased further in recent years as the result of continued asset purchases. The Riksbank's balance sheet total fell in the autumn of 2010 when the large one-year fixed-rate loans to the banks were repaid. An equivalent development can be seen in the ECB's balance sheet in 2013 and 2014, when large loans to European commercial banks were repaid. However, since the start of 2015, the balance sheets of the Riksbank and ECB have expanded again due to large-scale purchases of government bonds.

Figure 4. Central bank balance sheet totals
Per cent of GDP



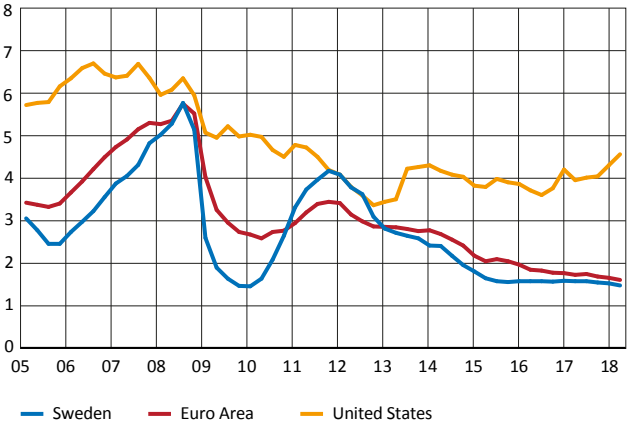
Sources: ECB, Federal Reserve and the Riksbank

2.2 A given level of the policy rate can have different effects

Secondly – to describe the monetary policy being conducted and the effects the monetary policy can reasonably be expected to have on the economy, we also have to examine how final interest rates to companies and households have developed and how lending has been. During the financial crisis, it became particularly clear that a certain given level of the policy rate could be linked with different levels of final interest rate and credit growth. Of course, this was not a new phenomenon, but it became particularly clear during the financial crisis.

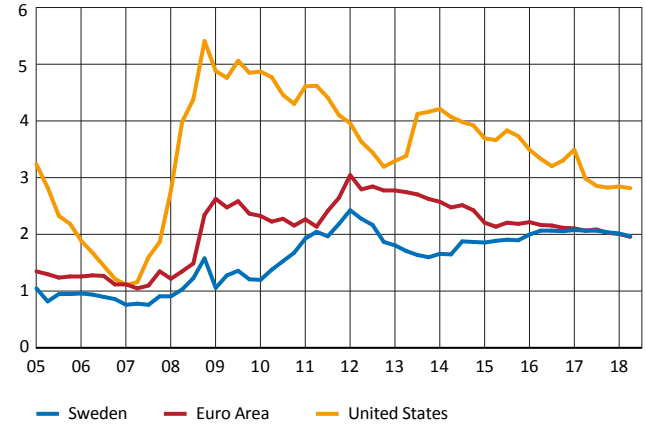
An illustration of this is given in Figure 5, which shows the development of the interest rates faced by households in the three currency areas, Figure 6 which shows the difference between these rates and central bank policy rates, and Figure 7 which shows how lending to the household sector has developed. Looking first at household rates in Figure 5, it can be seen that these are higher than central bank policy rates and that the difference between them internationally does not resemble the difference between policy rates. Figure 6 illustrates this in another way in the form of the difference between household rates and policy rates. These spreads increased rapidly during the acute phase of the financial crisis, 2008–2009, especially in the United States. In the euro area and in Sweden they continued to rise in the years after, partly due to the European sovereign debt crisis. Since then spreads have decreased – among other reasons due to central bank measures – but not back to the levels that prevailed in 2007. Finally, the growth rate of lending to households, shown in Figure 7, dropped during 2008 and 2009, in particular in the United States and the euro area. But whilst it has since rebounded in the US, household credit growth has been very slow in the euro area. In Sweden household credit growth has been much more stable, with growth rates between 5–10 per cent yearly.

Figure 5. Lending rates to households, new mortgage loans with short maturities
Per cent



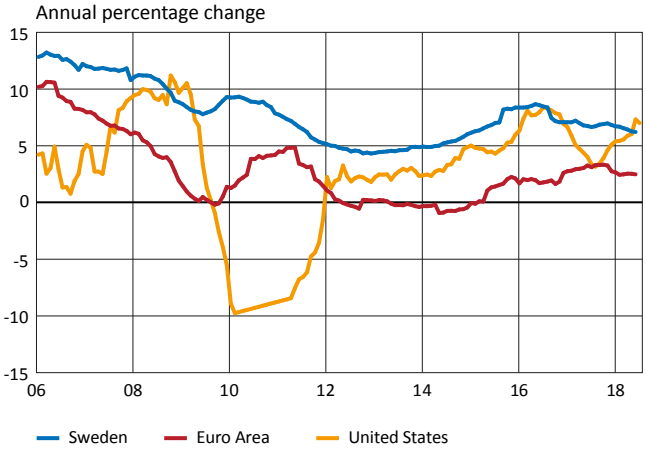
Sources: Macrobond and the Riksbank

Figure 6. Difference between household rates and central bank policy rate
Percentage points



Note. Difference between rates on mortgages with short maturities and central bank policy rate.

Figure 7. Lending to households
Annual percentage change



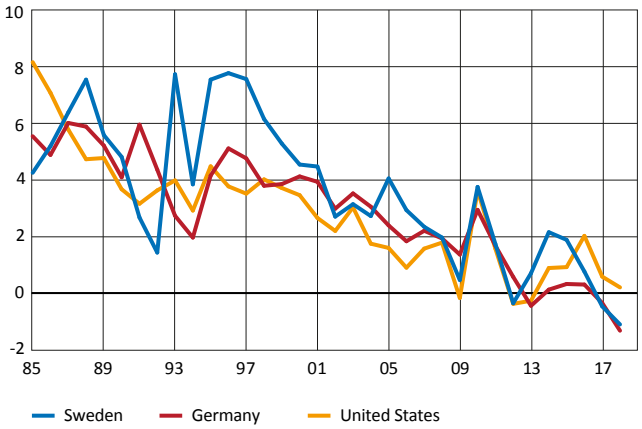
Note. Households' debt to banks and other monetary financial institutes.
Sources: Macrobond and the Riksbank

What these figures illustrate is that the transmission mechanism and degree of monetary policy stimulus (or its opposite) cannot be described solely by the level of central bank policy rates. One example concerns lending volumes and lending rates to households 2013–2015 in Sweden and the euro area. Despite a higher policy rate in Sweden, lending rates to Swedish households were lower and lending grew faster than in the euro area. Credit growth is affected both by demand for credit, which is affected by economic activity and monetary policy, and by the supply of credit, which can be affected by monetary policy. Weak economic activity in the euro area may form part of the explanation for the weak credit growth, but supply probably also plays an important part. The transmission mechanism is thus strongly affected by factors that affect banks' rate-setting for loans and for their lending, over and above the central bank policy rate. These may include various risk premiums demanded by investors, as well as the state of banks and other financial intermediaries, and we will return to these issues in Section 3.

2.3 The general level of interest rates has fallen in the past decades

Thirdly – a discussion of the monetary policy stance and how contractionary or expansive it is, also needs to consider the downward trend in global real interest rates in the past decades. The international level of interest rates has shown a falling trend for several decades, which has also affected the level of interest rates in Sweden, see Figure 8. From levels of around 5–7 per cent during the 1980's, real rates on government bonds with long maturities have fallen to around 2 per cent before the financial crisis, and after that down to zero per cent or even lower. Falling interest rates result from the supply of savings exceeding demand. A growing body of research in recent years has studied in detail different factors that affect supply and demand, for example falling productivity, ageing populations, rising income inequality and a lack of safe assets (see, for example, Del Negro et al. 2017 and Ingves 2017). For a small open economy such as Sweden it is of particular interest that the international comovements in real interest rates seem to have become more synchronized, with developments in the US becoming increasingly important (see Del Negro et al. 2018). Global real interest rates have thus been falling a few decades, but it was not until after the financial crisis that broad attention has been drawn to this development in a policy context, and as a main reason for central bank policy rates being so low and, in recent years, even negative.

Figure 8. Real rates on government bonds
Per cent



Note. 10-year nominal government bonds yields deflated with CPI.
Sources: Bank of England, Federal Reserve, Macrobond and the Riksbank

2.4 What have we learnt from developments during the past decade?

What can we learn from developments over the last decade or so? An initial observation takes its starting point in the development of inflation, which has become considerably lower than there has been reason to expect in light of the highly expansionary monetary policy implemented in Sweden and the major economies during most of the past decade. As monetary policy affects inflation primarily via demand, it is reasonable to see the unexpectedly weak inflationary pressures as an effect of different changes to the economy's supply side. Phenomena like digitalisation and globalisation have often been discussed as conceivable explanations but, in the absence of clear research findings in the area, it has been difficult to discuss the mechanisms other than in general terms. There is, however, new research in the area and this will be important for central banks to follow it.[9]

9 See for example the papers presented at Jackson Hole 2018 (see Federal Reserve Bank of Kansas City 2018).

Another observation – that we have already mentioned – concerns the impact of monetary policy, which is to say how changes in the policy rate and other central bank measures spread throughout the financial system and ultimately affect the interest rates that matter for economic development. The financial crisis and the measures adopted because of it have made it clear that the monetary policy transmission mechanism cannot be expected to be stable. In order to properly account for this in the day-to-day analysis in monetary policy, this requires a focus on how financial assets and risk are priced, how banks and other financial intermediaries act and the implications of various financial frictions. By the latter we mean for example asymmetric information or agency costs, see Adrian and Liang (2018) or Finocchiaro and Grodecka (2018) for a discussion. As we return to below, most macro models and rules of thumb used for practical monetary policy analysis feature a heavily simplified description of financial markets and, most often, no explicit role for financial intermediaries. It can be said that these models assume that financial markets are 'perfect' and thus financial frictions do not need to be modelled. However, developments over the last decade show that this simplification needs to be abandoned if the effects of things such as changed relationships between policy rates and final interest rates or effects of central banks' purchases of government securities are to be analysed.[10] Furthermore, in a forecast evaluation of the models used at the Federal Reserve Bank of New York, Cai et al. (2018) show that models that include financial frictions perform better than models that do not.

A third observation: a fundamental difficulty when studying macroeconomic developments is that of distinguishing between temporary ('cyclical') shocks and those of a more permanent ('structural') nature. The downward trend in global real interest rates that we discussed above is one example of a long-term structural change that has made short-term analyses more complicated, but there are others. Technological changes, increased international trade and increased mobility for capital and labour across national borders in recent decades have contributed towards increased competition and a 'globalisation' that has affected inflation, wage formation and financial markets in addition to the mechanisms and short-term fluctuations associated with normal economic cycles. The models developed for monetary policy analysis during the Great Moderation are based on research aimed primarily at understanding economic fluctuations, which is to say variations in data around these trends. In other words, these models are not intended for studying breaks in trends or other more permanent structural changes.

Fourthly: the links between monetary policy and fiscal policy also belong to this list of areas that need to be emphasized more in order to improve our understanding of the effects of monetary policy. We noted above that the monetary policy framework in Sweden was reformed at approximately the same time as fiscal policy reforms. In the same way as a more sustainable fiscal policy, in terms of public finances, may have contributed towards restraining inflation when the reforms were implemented, it may also have contributed towards the low inflation of recent years. However, when both policy areas were reformed in the 1990s, issues concerning the links between monetary policy and fiscal policy were not prioritised. Experiences of active stabilisation policies in the 1970s and 1980s were mainly negative. The ambition was to design new regulations for each area individually. An inflation target was introduced, the task of maintaining price stability was confirmed by law and the Riksbank was given increased independence. In the area of fiscal policy, a new law for the government budget (the Swedish Budget Act), a municipal balanced-budget requirement and, slightly later, a surplus target for public finances were introduced. The inflation target and the surplus target were both seen as ambitious but also as independent of each other. The Riksbank's independence and prohibition against instructions have led politicians

10 The assumption of sticky prices and wages – a 'friction' in economic language – is a central assumption in neo-Keynesian models and is a reason that monetary policy is assumed to have real effects. It should be just as natural to explicitly include frictions in the financial markets (to the extent that they are deemed to be significant). See also, for example, Woodford (2012).

to refrain from expressing opinions on monetary policy and neither has the Riksbank commented on fiscal policy. These clear boundaries between monetary and fiscal policy may turn out to be harder to maintain going forward, both in Sweden and in other countries. For example, the 'unconventional' measures of central banks start to look more like fiscal policy if increased credit risk is taken on, and questions on the distributional effects of monetary policy are raised increasingly often. At the same time, it seems reasonable for the scope for countercyclical fiscal policy to increase as public finances become more robust. In addition, the lower level of global interest rates means that policy rates set by the Riksbank and other central banks will in the future more often reach the effective lower bound. Even if there are other monetary policy instruments, this means that going forward countercyclical fiscal policy can become more important for stabilising the economy.

It is thus possible to identify a number of development areas for monetary policy analysis that we believe should be prioritised. In the next section we discuss some of them in more detail.

3 Lessons for monetary policy analysis – which issues need more focus in the period ahead?

3.1 More in-depth understanding of the financial sector and its role in the monetary policy transmission mechanism

Standard models used for monetary policy analysis with an inflation-targeting regime are often based on a simplified way of looking at how monetary policy affects inflation and economic development in general. The central bank sets its policy rate and this then influences the decisions taken by households and companies. The relationships between the central bank's policy rate and the interest rates that more directly guide households and companies' behaviour (such as banks' deposit and lending rates and rates for various bonds) are assumed to be stable. Short-term market rates are assumed to be closely linked to the central bank's policy rate and long-term rates are connected to short-term ones according to the so-called expectation hypothesis: long-term rates quite simply equal the average of future expected short-term rates. Central bank measures can thereby be described in terms of a single variable, the policy rate, and, according to these assumptions, other measures than changes to this do not need to be adopted.

As was noted in the introductory description of macroeconomic developments in Section 2, the difference between the central bank's policy rate and lending rates to households and companies varies both over time and between countries. The so-called transmission mechanism is not stable but is affected by factors such as different premiums in financial markets, how risk is priced, how robust the banking system is or is perceived to be. As mentioned above, this means that the level of the policy rate is not the only relevant measure of 'how expansionary' monetary policy is and neither is it the only instrument with which the central bank can influence the economy. This became particularly clear during the run-up to the financial crisis of 2007–2008 and, as far as Sweden is concerned, when the Swedish Government, Riksbank and Swedish National Debt Office were forced to intervene in 2008 and 2009. But even later, during the slow recovery, when the level of the policy rates of the Riksbank and other central banks had come close to their lower bounds and other measures such as bond purchases had been implemented, it became clear that monetary policy is about more than just determining the level of a short-term policy rate. Other factors connected to the central bank as 'the banks' bank' also have effects on financial conditions and are thereby monetary policy instruments. Examples of these are: which financial institutions may borrow from or invest funds in the central bank? On which terms, regarding,

for example, maturity, collateral for loans and other demands for the institution? In which other ways can the central bank's balance sheet be used to influence interest rates and credit volumes in the economy? For example, how can a central bank's purchases of government bonds or other financial assets affect market rates and thereby be seen as a complement to or substitute for policy rate changes?

All of these questions are very important for a central bank, not just in a financial crisis or when one is approaching, but also under normal circumstances. The fact that the level of interest rates has shown a falling trend in recent decades and that central banks thereby risk increasingly often hitting the lower bound of the policy rate emphasises the need to also incorporate monetary policy measures such as bond purchases in the standard model for monetary policy analysis (see Nessén 2016 for a discussion and further references). But even when the policy rate is at an adequate distance from its lower bound, the central bank, via purchases and sales of financial assets (which also affects the amount of reserves in the financial system), affects the general credit conditions in the economy and thereby inflation and economic activity. This is an old insight in macroeconomic research that is associated, among other things, with contributions to the research literature by the Nobel laureate James Tobin, but it seems to have partly been lost during the Great Moderation.[11]

Some consequences for practical monetary policy analysis

Once the concept is accepted that there are different types of frictions in the financial system and that these influence the transmission and effects of monetary policy, several important conclusions for practical monetary policy analysis then follow.

Firstly, the fact that the presence and importance of financial frictions can vary over time means that the central bank continually needs to follow how the transmission mechanism develops (see, for example, Woodford 2010). Thus, the day-to-day monetary policy analysis needs to include, for example, monitoring and analysing the evolution of different premiums associated with different types of risk, how funding- and financing costs for banks and firms change over time, and how the availability of credit develops. This is needed so as to be able to determine whether a certain level of the policy rate or the balance sheet (or its composition) can be assumed to have the same consequences for inflation and economic activity as previously. It could even be the case that changes in the transmission mechanism – for example in the form of changed interest rate spreads – call for new monetary policy measures, even if the macro conditions in general have not changed.[12]

Secondly, there is reason to believe that the size and composition of the central bank's balance sheet is of significance for inflation and economic activity (see, for example, Gertler and Karadi 2013 and Greenwood et al. 2016). If the central bank, for example, purchases government bonds, this will lower market rates for government bonds, but it will also spread to interest rates for households and companies. If the central bank purchases assets other than government securities, this can be expected to have even greater effects on the financial markets and the macroeconomy, but, as the central bank in this case takes on more risk, this may be considered to lie outside what is normally considered to be monetary policy. At any rate, the occurrence of financial frictions suggests that asset purchases (and sales) may thus be a complement to or substitute for changes in the more short-term central bank policy rates. In recent years, much work has been conducted in both central banks and by academic economists in estimating the effects of central banks' asset purchases.[13] But

11 In conjunction with a speech the chairman of the Board of Governors of the Federal Reserve at the time, Ben Bernanke, said that quantitative easing 'works in practice, but it doesn't work in theory' (see Brookings Institution 2014). As discussed in, for example, Dell'Ariccia et al. (2018) this applies only to theoretical models without financial frictions.

12 See Adrian and Liang (2018) for suggestions of the type of analyses that could be part of such a process. Vredin (2015) links such suggestions to an inflation targeting strategy. Gertler and Gilchrist (2018) summarize recent research on the role of financial factors in 'the Great Recession'.

13 See Dell'Ariccia et al. (2018) for a summary of empirical studies for the Euro Area, Japan and the United Kingdom, and Kuttner (2018) for the United States. De Rezende (2017) studies the effects of the Riksbank's bond purchases.

this has often been a matter of studies that attempt to capture the effects of central bank decisions as such, without measuring the significance of the size of the asset purchases made.

Thirdly, the presence of frictions in the financial markets can affect the view of what the central bank's tasks, and targets for monetary policy, should be. This is a much-debated question – whether the central bank's monetary policy should take *particular* account of risks of financial instability, *in addition to* the consequences such risks may have for inflation and the stability of the real economy. It now seems to be generally accepted that the degree of financial stability affects the monetary policy transmission mechanism, even if such effects remain difficult to explicitly incorporate into the day-to day monetary policy analysis. The degree of financial stability is thus something that the central bank should consider when monetary policy decisions are taken. But the question is whether it is sufficient to consider the effects that the degree of financial stability has on forecast deviations from the inflation target and any possible target for output or employment, or whether financial stability should be a further target for monetary policy *in itself*. According to Woodford (2012), the answer to this question is, in principle, yes. Just as price rigidities and a lack of competition on the markets for goods and services create inefficiencies in the economy that the central bank can counteract by stabilising inflation and resource utilisation, frictions in the financial system can give rise to imbalances that monetary policy may need to counteract. However, there can hardly be said to be any consensus on this issue in the literature.[14]

One reason for the absence so far of financial intermediaries, financial frictions and important financial mechanisms from the recurrent monetary policy analyses is that these are difficult to incorporate into the standard models used so far. Leeper and Nason (2015) suggest that it is difficult to understand the importance of financial stability and thereby its implications for monetary policy, if the basis is the simplifying 'representative agent' assumption, which is most often made in macroeconomic models. Costs for financial instability arise to a great degree because the risks are not evenly divided among different individuals in the economy, but this is difficult to analyse if only aggregate data is studied and hence only the development of the average individual is analysed. There are therefore many indications that monetary policy analysis in the future will need to be based to a greater extent on models (both theory and data) in which differences between different households and companies can be observed. More micro data will therefore be needed, both for monetary policy analyses and analyses of financial stability.[15]

Different approaches can be seen among both central bank economists and academic researchers, which may each be internally consistent, but which have different consequences for policy in practice. One approach is to believe that financial frictions are not of such great significance (except, possibly, in crisis situations). In this case, a short-term policy rate is seen as the central bank's only instrument (at least in normal situations), asset purchases are not considered to have such great importance, financial stability is not considered to be a target for monetary policy and, consequently, analyses of monetary policy and financial stability can be essentially be conducted separately within the central bank. An alternative approach is to believe that financial frictions are of particular significance, even in normal situations. It then follows that the policy rate is not the only monetary policy instrument, that asset purchases, for example, are a complement, that a secure and efficient financial system should also be one of the targets for monetary policy and that the basis for central banks' monetary policy decisions should be integrated with their analyses of financial stability. So far, inflation targeting policy has typically been characterised by the first approach. We consider that it is high time we moved towards the second approach. This applies also in countries where

14 For accessible overviews of various arguments, see, for example, Mester (2016), Schnabel (2016) and Svensson (2017, 2018), as well as the proposed new law for Norges Bank, Norwegian official report (2017), Chapter 11 in particular.

15 The so-called Heterogenous Agent New Keynesian (HANK) models are attempts at abandoning the representative agent assumption. See, for example, Kaplan et al. (2018) or Debortoli and Galí (2018).

other authorities than the central bank have the main responsibility of safeguarding financial stability, and have been assigned for example macroprudential tools.

To finish, regardless of whether financial stability should be a separate target for monetary policy or is only important to the transmission mechanism, there are many indications that analyses of financial stability should and can play a much greater role in the drafting of monetary policy decisions than they have done so far. It is not unlikely that a greater awareness of the risks of financial instability could have affected monetary policy internationally and in Sweden prior to the financial crisis and that the crisis would possibly have been less severe.[16] But in any case, knowing *whether* financial stability should affect monetary policy and, if so, *how*, requires careful analyses of financial stability as part of the background material for monetary policy.

3.2 Greater consideration of structural changes

Traditionally, the work on forecasts of inflation, GDP, unemployment, etc., and analyses of appropriate monetary policy (or fiscal policy) responses to such variables have focused strongly on the demand side of the economy. This is true both of the forecasting work and policy analyses performed on the private market, by banks, etc., and of similar analyses carried out at central banks and other authorities. The focus on the demand side is due in turn to macroeconomic analysis drawing a traditional distinction between explanatory models (theories) for short-term cyclical fluctuations and long-term structural phenomena such as different trends. The assumption has been that the short-term changes often in focus are best understood as short-term fluctuations around relatively stable trends and that variations in demand dominate these short-term fluctuations, while supply factors (demography, technology, the functioning of the labour market, incentive effects of the taxation system, competitive conditions) are of greater significance for the long-term trends. This is also how growth in GDP, in a somewhat misleading way, is regularly presented; as caused by changes in demand as reflected in various demand components such as consumption, investment and exports. And changes in unemployment are often presented as a result of changes in the demand for labour – although changes in supply could very well be just as relevant, even in the short term. The dynamic stochastic general equilibrium (DSGE) models that have been in use in central banks the past 10–20 years give a fairly large role for temporary and permanent changes to technology in driving the business cycle.[17] However, they lack several of the factors that are needed for studying the implications of shifts in trends, often associated with the supply side of the economy.

According to Faust and Leeper (2015), the focus on short-term fluctuations around trends is a major weakness in the analyses performed by central banks, finance ministries and other forecasters the world over, as the problems that decision-makers have de facto struggled with have been about changes in trends or other permanent shifts in the economy, and not about cyclical phenomena.

We have already discussed the secular decline in global real interest rates, which is another example of a long-lived shift in the economy. Next we discuss yet another, concerning changes in labour supply.

Changes in labour supply

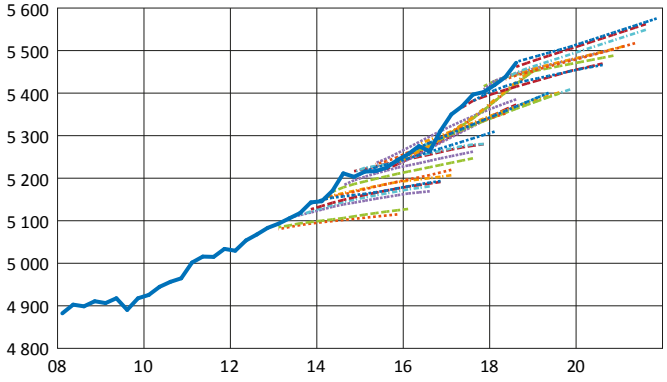
Labour market developments in Sweden provide further examples of changes in trends that forecasters, not just the Riksbank, have found difficult to capture. Figure 9 shows developments in the size of the labour force in Sweden in recent years together with the Riksbank's forecasts from various points in time. As can be seen, the Riksbank has

16 Rajan (2005) made this point, among others, interestingly enough *before* the financial crisis.

17 This type of analysis has however not had much of an impact on practical monetary policy analysis and communication, the latter being dominated by a more demand-oriented narrative.

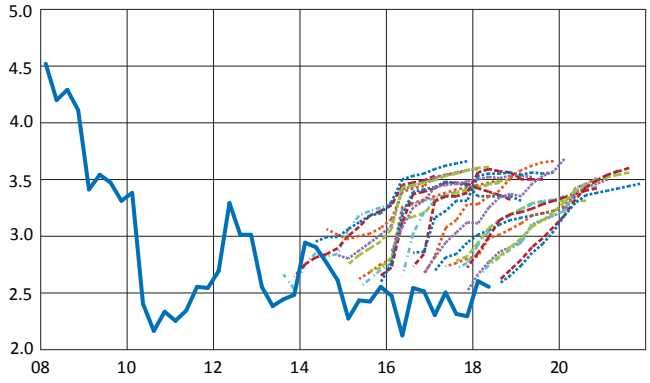
underestimated the increase in the labour force. This is due partly to an underestimation of the population (also in Statistics Sweden's forecasts, on which the Riksbank bases its own forecasts), and partly to a rise in the labour force participation rate as a percentage of the population (see Flodberg and Löf 2017). The reasons for the latter are difficult to identify, but it could be an effect of the various reforms implemented through the years aimed at stimulating labour supply and employment. Added to this is an increased supply of foreign, unregistered labour, for example people working in Sweden on various forms of temporary contracts and who are difficult to capture in the statistics. The fact that the forecasts for wage development have resulted in overestimations – see Figure 10 – at the same time as the labour force and employment have been underestimated (and maybe even more so than official statistics indicate) suggests that the modest wage growth is partly due to increased labour supply. There may in turn be several different explanations for the increased labour supply: migration and other changes to the population, stronger incentives to work due to changes in taxes and pension schemes, other behavioural changes, etc. Such changes are normally not captured by the models used in practical monetary policy analysis.

Figure 9. Labour force participation 2008–2018 and Riksbank forecasts since 2013
Thousands



Sources: SCB and the Riksbank

Figure 10. Wage growth 2008–2018 according to short-term statistics and Riksbank forecasts since 2013
Annual percentage change



Sources: Swedish National Mediation Office and the Riksbank

Jonsson and Theobald (2018) is an example of the kind of analysis that we think should be a more common component of day to day monetary policy analysis. This study tries to identify effects of changes in the labour market. With the aid of a quantified theoretical general equilibrium model, they conclude that there is reason to expect the changes in labour supply and the bargaining power of employees, observed since the financial crisis, to generate lower growth in real wages, nominal wages and the general price level.

If slow wage increases contribute to lower inflation, not because there is a weak demand for labour (which could be associated with weak GDP growth, which we have not seen in Sweden), but because the supply of labour has increased (which could be linked to strong GDP growth, more in line with developments in Sweden), it could be of significance not only for interpretations of the hitherto low inflation and for the forecasts for developments in the period ahead, but also for what is deemed to be a well-balanced monetary policy. However, it is not obvious precisely what the monetary policy implications are. Lower resource utilisation usually justifies a more expansionary monetary policy regardless of whether resource utilisation has decreased because of the fall in demand or because of an increase in resources as a result of an increased supply (due to increased labour supply or increased competition). But, it is reasonable to assume that assessments of the need for monetary policy stimulus is affected by whether one believes that it is mainly consumption that determines output via effects on demand, or whether it is technological development and the supply of labour that steers output and hence consumption. Both mechanisms are surely relevant. The difficulty lies in determining which driving forces are of the greatest significance at various points in time and for different time horizons. But supply side developments need to be given more focus in analysis and forecasting work to make possible these types of questions.

3.3 The links between fiscal and monetary policy

During the late 1990s in Sweden, the perception of monetary policy having the main responsibility for stabilisation policy started to emerge. Fiscal policy was to be focused on creating sustainable public finances prior to forthcoming demographically driven expenditure increases and only be used for stabilisation policy purposes in crisis situations. This view was expressed in, for example, the so-called STEMU inquiry prior to the referendum on the euro in 2003 (Swedish Government Official Reports 2002, p. 35) and more recently for example in Fiscal Policy Council (2018). The underlying analysis is based on the simple Mundell-Flemming model, which predicts that fiscal policy only has small effects on demand in an open economy with a flexible exchange rate. Probably a more important reason for drawing the conclusion that monetary policy is more suited than fiscal policy to stabilisation policy was the bad experience from fiscal policies in the 1970s and 1980s. According to this view the conclusion is that automatic stabilisers of fiscal policy should be allowed to have their full impact, while active fiscal policy should be reserved for periods of exceptional circumstances. Monetary policy should focus on price stability, but take the real economy into consideration whenever possible (so-called flexible inflation targeting). Active monetary policy will then in practice be used more than active fiscal policy to stabilise resource utilisation. However, and despite this, monetary and fiscal policy share responsibility for stabilisation policy, partly because the most important role of monetary policy is to create price stability, and partly because fiscal policy is of considerable significance for economic developments via the automatic stabilisers.

The long trend of falling global real interest rates implies that central bank policy rates risk reaching the so-called effective lower bound more often. Previously, this bound was considered to be at zero per cent as the interest on cash is zero per cent, but experiences from, for example, Sweden, Switzerland, Denmark and the euro area have shown that slightly negative policy rates are possible (see Nessén 2016). Even though it is not possible to cut the policy rate without bound, there are other ways of making monetary policy more expansionary, such as asset purchases and foreign exchange interventions. It is clear, however, that it becomes more difficult to stimulate demand in the economy when the former main policy tool, short interest rates, cannot be utilised to the same extent. This means, in turn, that the role of fiscal policy in stabilising both economic activity and inflation becomes more important.

At the same time, the long period of below-target inflation after the financial crisis in large parts of the world has brought research into what actually determines inflation to the fore. According to the so-called fiscal policy of the price level, the price level, and hence inflation, is determined by the total public sector debt in relation to expected future primary surpluses. Total public sector debt includes both the public's claims on the central bank (cash and the monetary base) and the normal national debt. It is perhaps not so strange that the amount of cash, which is a non-interest-bearing claim on the state, affects inflation in the same way as the state's interest-bearing bonded debt. There are many who are sceptical about a literal interpretation of this theory, see, for instance, Swedish Fiscal Policy Council (2018). On the other hand, it is generally accepted that resource utilisation and inflation are affected by both fiscal and monetary policy. How much each policy area contributes depends on circumstances that can vary over time. Fiscal policy probably has a greater effect in a small economy with a fixed exchange rate than in an economy with an inflation target and a flexible exchange rate, but even with a flexible exchange rate, fiscal policy has a significant effect on economic development. Even if one shares the view of for example Hassler (2017) that the current division of responsibility between fiscal and monetary policy has worked well in Sweden, today's partially new circumstances may lead to different conclusions going forward. Corsetti and Müller (2015) discuss circumstances under which fiscal policy has the greatest effect on demand and when it is appropriate to intervene with active fiscal policy. One of the conclusions they draw is that fiscal policy is particularly effective in stabilising large (negative) shocks if public finances are solid to start with (low national debt) and in situations when monetary policy is constrained by the effective lower bound for the policy rate.

Exactly how the interaction between fiscal and monetary policy determines inflation is still a disputed area of research. The effects of monetary policy on the economy depend on what the fiscal policy rule looks like and vice versa, see, for example, Leeper (2018). Leeper argues that current monetary policy cannot sustainably bring up inflation to the target without the support of an appropriate fiscal policy framework and questions whether the Swedish frameworks for monetary and fiscal policy are mutually compatible. Under the circumstances that prevailed during the Great Moderation, the fiscal policy rule did not decisively affect the capacity of monetary policy to stabilise inflation and fiscal policy had a subordinate role in most of the models used for monetary policy analysis. But experiences from developments after the financial crisis have drawn the attention of economists to the role played by the fiscal policy rule as regards the effects of monetary policy.

At the same time, conducting active fiscal policy to stabilise resource utilisation is associated with significant problems. The risk of so-called deficit bias, that is to say an upward trend in public debt, and the risk that fiscal policy measures take such a long time to implement that, instead of stabilising demand, they amplify cyclical fluctuations, should not be underestimated in light of historical experiences. However, the arguments for active fiscal policy are stronger now than previously due to monetary policy now having less room for manoeuvre when the general level of interest rates is lower. The use of active fiscal policy will probably also be justified under less exceptional circumstances than the prevailing view has been in Sweden and the EU. The challenge is to design ground rules for fiscal policy that facilitate stabilisation policy without eroding the long-term sustainability of public finances. If fiscal policy cannot take a greater responsibility for stabilisation, we may be forced to accept longer periods of low resource utilisation and deviations from the inflation target. This would pose a challenge for central banks to explain and would also influence the design of a well-balanced monetary policy.

Against this background, it is our view that for example the Riksbank's analyses and forecasts will need to consider how fiscal policy is conducted to a greater extent than during the Great Moderation. The model support for fiscal policy analysis will need to be developed. It is a question of gaining a better understanding both of the effects of different types of

fiscal policy measures and of how fiscal policy is typically conducted in Sweden and in other countries. Just as is the case with analysis of financial stability issues, the models required are ones that do not assume a representative agent set-up (see the discussion and references above).

4 Conclusions

The financial crisis and our experiences since then have exposed a number of weaknesses in the monetary policy analysis tools applied under the inflation targeting regime. During the recovery, inflation – in Sweden and in the rest of the world – has often been lower than forecast, despite real economic developments often being stronger than expected. At the Riksbank considerable effort has been put into interpreting the low inflation and interesting results have emerged from these analyses.[18] But these analyses of monetary policy, made both within and outside central banks, and material on which monetary policy decisions are based look largely the same today as they did before the financial crisis. We believe this to be the case both in Sweden and in other countries. One could pointedly say, that it is as if the financial crisis never occurred. In this article, we have highlighted a few areas where we think there is a particular need to improve the analyses, in light of the experience gained over the last ten years.

Firstly, the implications of frictions on the financial markets need to be considered to a greater degree. They influence both the effects of a given monetary policy and the view on how monetary policy should be conducted. If it is considered that the asset purchases and growing balance sheets of central banks have had the intended effects, this conclusion, at least implicitly, is then based on the assumption that financial frictions are important. But this can also imply that stability and efficiency in the financial system should be one of the objectives for monetary policy.

Secondly, structural (long-term) relationships in the economy need to be given greater attention, since inflation and cyclical fluctuations are not only governed by short-run changes in demand. The downward trend in global interest rates is an example of a structural change that has considerable consequences for monetary policy. The consequences of an increased labour supply (broadly speaking, including immigration and changes in the power relations between the social partners) for inflation and monetary policy also needs to be analysed more.

Thirdly, a deeper understanding of the interaction between fiscal and monetary policy is required and probably needs to be considered more explicitly in monetary policy analysis. Depending on the conclusions drawn by this analysis, the frameworks for both these policy areas may require adjustment.

The sought-after analyses will need support in the form of new frameworks, data, and models. The most important role of models in monetary policy analysis is to identify, illustrate and quantify economic mechanisms.[19] They always have limitations, and in order to produce a good basis for decisions and forecasts they need to be used with good judgement and be complemented with assessments. The Riksbank has never used models mechanically to make forecasts and neither will it do so in the future. New models will improve the material underlying monetary policy decisions, but will of course not solve all the problems emanating from an uncertain and changing world.

18 See, for example, the study by Andersson et al. (2015).

19 Refers here to structural economic models. Furthermore, statistical models are used – both now and probably in the future – for short-term forecasts.

References

Adolfson, Malin, Michael Andersson, Jesper Lindé, Mattias Villani and Anders Vredin (2007), 'Modern forecasting models in action: improving macroeconomic analyses at central banks', *International Journal of Central Banking*, vol. 3, no. 4, pp. 111–144.

Adrian, Tobias and Nellie Liang (2018), 'Monetary policy, financial conditions, and financial stability', *International Journal of Central Banking* vol. 14, no. 1, pp. 73–131.

Andersson, Björn, Vesna Corbo and Mårten Löf (2015), 'Why has inflation been so low?', *Sveriges Riksbank Economic Review*, no. 3, pp. 5–46.

Berg, Claes, Pernilla Meyersson and Johan Molin (2018), 'Dramatic years in Sweden and globally: Economic developments 2006–2017' *Sveriges Riksbank Economic Review*, no. 4, pp. 19–34.

Brookings Institution (2014), 'A discussion with Federal Reserve chairman Ben Bernanke on the Fed's 100th anniversary', in *Central banking after the Great Recession: lessons learned and challenges ahead*, January 16, Brookings Institution.

Bryant, Ralph, Dale Henderson and Torbjörn Becker (2012), *Maintaining financial stability in an open economy: Sweden in the global crisis and beyond*, SNS Publications. Stockholm.

Cai, Michael, Marco Del Negro, Marc Giannoni, Abhi Gupta, Pearl Li and Erica Maszkowski (2018), 'DSGE forecasts of the lost recovery', Staff Report no. 844, Federal Reserve Bank of New York.

Corsetti, Giancarlo and Gernot J. Müller (2015), 'Fiscal multipliers: lessons from the great recession for small open economies', background report to the Swedish Fiscal Policy Council, no. 2.

Debortoli, Davide and Jordi Galí (2018), 'Monetary policy with heterogenous agents: insights from TANK models', working paper, Centre de Recerca en Economia International.

Dell'Ariccia, Giovanni, Pau Rabanal and Damiano Sandri (2018), 'Unconventional monetary policies in the Euro area, Japan and the United States', *Journal of Economic Perspectives*, vol. 32, no 4, pp. 147–172.

Del Negro, Marco, Domenico Giannone, Marc Giannoni and Andrea Tambalotti (2017), 'Safety, liquidity and the natural rate of interest', *Brookings Papers on Economic Activity* , Spring, pp. 235–294.

Del Negro, Marco, Domenico Giannone, Marc Giannoni and Andrea Tambalotti (2018), 'Global trends in interest rates', Staff Report no. 866, Federal Reserve Bank of New York.

De Rezende, Rafael B. (2017), 'The interest rate effects of government bond purchases away from the lower bound', *Journal of International Money and Finance,* vol. 74, pp. 165–186.

Faust, Jon and Eric Leeper (2015), 'The myth of normal: the bumpy story of inflation and monetary Policy', in *Inflation Dynamics and Monetary Policy*, Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole 2015.

Federal Reserve Bank of Kansas City (2018), *Changing Market Structures and Implications for Monetary Policy,* Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole 2018.

Fiscal Policy Council (2018), 'Swedish Fiscal Policy 2018', Report of the Fiscal Policy Council 2018.

Finocchiaro, Daria and Anna Grodecka (2018), 'Financial frictions, financial regulation and their impact on the macro economy', *Sveriges Riksbank Economic Review*, no. 1, pp. 47–68.

Flodberg, Caroline and Mårten Löf (2017), 'Labour supply has increased surprisingly rapidly', Staff memo, Sveriges Riksbank.

Galí, Jordi (2018), 'The state of new Keynesian economics: a partial assessment', *Journal of Economic Perspectives,* vol. 32, no. 3, pp. 87–112.

Gertler, Mark and Simon Gilchrist (2018), 'What happened: financial factors in the Great Recession', *Journal of Economic Perspectives* , vol. 32, no. 3, pp. 3–30.

Gertler, Mark and Peter Karadi (2013), 'QE 1 vs. 2 vs. 3. . . : A framework for analyzing large-scale asset purchases as a monetary policy tool', *International Journal of Central Banking* vol. 9, no. 1, pp. 5–52.

Greenwood, Robin, Samuel G. Hanson and Jeremy C. Stein (2016), 'The Federal Reserve's balance sheet as a financial-stability tool', in *Designing Resilient Monetary Policy Frameworks for the Future*, Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole 2016.

Goodhart, Charles and Jean-Charles Rochet (2011), 'Evaluation of the Riksbank's monetary policy and work with financial stability 2005–2010', report from the Riksdag 2010/11:RFR5.

Goodfriend, Marvin and Mervyn King (2016), 'Review of the Riksbank's Monetary Policy 2010–2015', report from the Riksdag 2015/16:RFR6.

Hassler, John (2017), 'Finanspolitik, penningpolitik och sambandet dem emellan' (*Fiscal policy, monetary policy and the relationship between them*), In Swedish only, *Ekonomisk debatt*, vol. 45, no. 4, pp. 41–55.

Ingves, Stefan (2017), 'Monetary policy challenges – weighing today against tomorrow', speech at the Swedish Economics Association, 16 May, Sveriges Riksbank.

Iversen, Jens, Stefan Laséen, Henrik Lundvall and Ulf Söderström (2016), 'Real-time forecasting for monetary policy analysis: the case of Sveriges Riksbank', Working Paper series no. 318, Sveriges Riksbank.

Jonsson, Magnus and Emelie Theobald (2018), 'Arbetsmarknadens effekter på pris- och lönebildningen, Phillipskurvan och Beveridgekurvan' (*Effects of the labour market on price-setting and wage formation, the Phillips curve and the Beveridge curve*), internal draft, Sveriges Riksbank.

Kaplan, Greg, Benjamin Moll and Giovanni L. Violante (2018), 'Monetary policy according to HANK', *American Economic Review*, vol. 108, no. 3, pp. 697–743.

Konjunkturinstitutet (2018), 'The Swedish Economy', June.

Kuttner, Kenneth (2018), 'Outside the box: unconventional monetary policy in the Great Recession and beyond', *Journal of Economic Perspectives* , vol. 32, no. 4, pp. 121–146.

Leeper, Eric and James Nason (2015), 'Bringing financial stability into monetary policy', Working Paper no. 305, Sveriges Riksbank.

Leeper, Eric (2018), 'Sweden's fiscal framework and monetary policy', *Sveriges Riksbank Economic Review*, no. 2, pp. 15–47.

Lindé, Jesper and André Reslow (2017), 'A myth that the Riksbank's forecasts are governed by models', *Sveriges Riksbank Economic Review,* no. 1, pp. 27–48.

Lindé, Jesper (2018), 'DSGE models: still useful in policy analysis?', *Oxford Review of Economic Policy*, vol. 34, no. 1–2, pp. 269–286.

Mester, Loretta (2016), 'Five points about monetary policy and financial stability', *Sveriges Riksbank Economic Review*, no. 3, pp. 39–48.

Nessén, Marianne (2016), 'Comments on Marvin Goodfriend', in *Designing Resilient Monetary Policy Frameworks for the Future*, Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole 2016.

Norwegian official report (2017), 'New Central Bank Act. The Act relating to Norges Bank and the Monetary System and the organisation of Norges Bank and the management of the Government Pension Fund Global', NOU 2017:13.

Rajan, Raghuram (2005), 'Has financial development made the world riskier?' in *The Greenspan Era: Lessons for the Future*, Federal Reserve Bank of Kansas City Economic Policy Symposium at Jackson Hole 2005.

Schnabel, Isabel (2016), 'What role for central banks in safeguarding financial stability', *Sveriges Riksbank Economic Review*, no. 3, pp. 49–54.

Swedish Government Official Reports (2002), 'Stabilisation policy in the monetary union', The Committee on Stabilisation Policy for Full Employment if Sweden joins the Monetary Union, final report, SOU 2002:16.

Svensson, Lars E.O. (2017), 'The costs and benefits of leaning against the wind', *Journal of Monetary Economics,* vol. 90, pp. 193–213.

Svensson, Lars E.O. (2018), 'Monetary policy and macroprudential policy: different and separate?' *Canadian Journal of Economics,* vol. 51, no. 3, pp. 802–827.

Sveriges Riksbank (2016), '*The Riksbank's inflation target – target variable and interval*', Riksbank Studies, September.

Vredin, Anders (2015), 'Inflation targeting and financial stability: providing policymakers with relevant information', Working Papers no. 503, Bank for International Settlements.

Woodford, Michael (2010), 'Financial intermediation and macroeconomic analysis', *Journal of Economic Perspectives*, vol. 24, no. 4, pp. 21–44.

Woodford, Michael (2012), 'Inflation targeting and financial stability', *Sveriges Riksbank Economic Review*, no. 1, pp. 7–32.