

# 30 years of inflation targeting: from simple to complex

Magnus Jonsson and Anders Vredin\*

Magnus Jonsson is an advisor at the Monetary Policy Department and Anders Vredin is a senior advisor at the Monetary Policy Department.

---

The inflation targeting framework has enjoyed considerable success in achieving price stability since it was first introduced in the 1990s. At that time, the framework appeared simple. A short-term interest rate was the principal policy instrument and the primary transmission of monetary policy was through the interest rate channel. Thirty years later, inflation targeting is more complex. The precipitating factor was the outbreak of the Global Financial Crisis in 2008. However, deeper structural changes had been mounting in the background: a larger and riskier financial system, increasing financial stability risks, less national policy autonomy, supply side shocks becoming more important, rapidly developing new financial technologies, and a reconsideration of fiscal policy's role for monetary policy. Among other things, this has led to more attention being given to frictions in financial markets and to the implications for monetary policy of transmission channels through credit and risk taking. Policies such as asset purchases and lending programmes that affect the size and structure of the central bank's balance sheet are now part of the toolkit.

---

## 1 Introduction

After the turbulent macroeconomic periods of the 1970s, 1980s and early 1990s, a period with more credible economic policies, moderate business cycle fluctuations, and low and stable inflation followed. This period is often referred to as the Great Moderation.<sup>29</sup> Some of the factors behind this benign development were a new monetary policy framework that focused on price stability – so-called inflation

---

\* This paper builds on earlier work with Stefan Ingves during his time as Governor of the Riksbank. His important input is gratefully acknowledged. We are also grateful to Claudio Borio and Martin Ellison for many useful comments, criticism and advice in early stages of the project. Finally, we thank Hanna Armelius, Aino Bunge, Carl Andreas Claussen, Daniel Hansson, Jens Iversen, Martin Kornejew, Anders Lindström, Stefan Laséen, Jesper Lindé, Marianne Nessén, Charlie Nilsson, Johan Schmalholz and Ulf Söderström for valuable comments, suggestions and other input. The opinions expressed in this article are the sole responsibility of the authors and should not be interpreted as reflecting the views of Sveriges Riksbank.

<sup>29</sup> The Great Moderation is typically interpreted as a period in the US broadly defined from the middle of the 1980s until the start of the Global Financial Crisis in 2008. We use the term to reflect the period from the mid-1990s to 2008, partly because inflation targeting was introduced in many countries in the 1990s. Furthermore, Europe did not experience any great moderation until the mid-1990s.

targeting – along with fiscal and other economic reforms. An additional factor was, in all likelihood, the absence of large macroeconomic shocks.

During the Great Moderation, the inflation targeting framework worked with ease and monetary policy appeared relatively simple. A short-term interest rate was the principal policy instrument and the main transmission of monetary policy was the interest rate channel, see for example Clarida et al. (1999).<sup>30</sup>

After some years with increasing financial imbalances and disturbances, the Great Moderation came to an abrupt end in September 2008 when the investment bank Lehman Brothers collapsed and the Global Financial Crisis broke out. The recession that followed was the most significant economic downturn since the Great Depression. From a central bank perspective, this gave rise to a debate about how monetary policy should take financial stability risks into account. It also gave rise to new regulations of the financial system to mitigate the negative effects of different frictions and risks in the financial system.

In the aftermath of the financial crisis more than a decade followed characterised by persistently low inflation and real interest rates. This led many central banks to lower their policy rate to levels near the effective lower bound, in some cases even to negative rates, and to undertake other ‘unconventional’ measures such as large-scale asset purchases. When the pandemic broke out in early 2020, new large-scale asset purchases were yet again undertaken.

The liberalisation of financial and capital markets in the 1980s and 1990s facilitated a rapid globalisation of financial services. In addition, increased wealth among households and firms led to higher demand for financial services. These factors contributed to a rapid growth of the financial system. In advanced economies the financial system approximately doubled its size from the mid-1990s to the early 2020s. At the same time, the risks in the financial system increased, partly because financial institutions attempted to circumvent new and old regulations, see Rajan (2005). New financial instruments, new forms of financial intermediation and international integration of financial markets thus contributed to more risk-taking. A growing importance of non-bank financial intermediaries gave central banks reasons to rethink the use of their instruments and their choice of counterparties, see for example Buiters et al. (2023).

A rapid process of financial integration across countries has led to less national policy autonomy, which affects both monetary and financial market policies. A greater international cooperation between central banks is one way to meet these challenges. It has also been noted that while the role of aggregate demand for inflation and monetary policy is often carefully analysed by central banks, changes in the conditions on the economy’s supply side have not received the same attention. Systematic surprises of low or high inflation suggest that supply conditions deserve more

---

<sup>30</sup> The interest rate channel works by monetary policy influencing real interest rates that in turn affects aggregate demand and inflation. Other channels have been analysed in the macroeconomic literature on monetary policy, but not given the same importance in models of inflation targeting.

analysis.<sup>31</sup> In addition, new payment technologies have emerged that could streamline and make the payment system more efficient. However, the new technologies may also threaten central banks' control over the supply of money and liquidity.

A characteristic feature of the inflation targeting framework is the separation of monetary and fiscal policy decisions. The principal reason for this was the negative experiences of the stabilisation policies in the 1970s and 1980s. However, the experiences after the Global Financial Crisis have led to new discussions about the links between monetary and fiscal policy. Low interest rates and large central bank balance sheets are associated with new risks, possibly also for fiscal policy. At the same time, the level of interest rates and inflation are not purely 'monetary phenomena' but also affected by the design of fiscal policy. A complete separation of monetary and fiscal policy can therefore be questioned.

These observations suggest that the economic environment related to central banks' operations in many ways is different today compared to thirty years ago when inflation targeting was first introduced.<sup>32</sup> We argue in this article that inflation targeting has become more complex than it was perceived when introduced. For example, more attention is given to the role of frictions on financial markets and to transmission channels such as the credit and risk-taking channels. Policies such as asset purchases and lending programmes that affect the size and structure of the central bank's balance sheet are also part of the toolkit.

The paper is organised as follows. In the next section we discuss inflation targeting under the Great Moderation through the lens of the New Keynesian model. We make the point that inflation targeting appeared relatively simple in this period, especially according to the proposed theoretical framework, but also in the practical implementation. In section 3, we discuss inflation targeting after the Global Financial Crisis and factors we think have made inflation targeting more complex. Finally, section 4 concludes with eight takeaways based on our discussions.<sup>33</sup>

## 2 Inflation targeting under the Great Moderation

The Great Moderation was a period of relatively high macroeconomic stability in most advanced economies. Inflation was generally low and stable, and economic growth was reasonably strong. One factor behind this benign development was the introduction of an inflation targeting framework. Other factors also played a role. There were no large global shocks similar to the oil price shocks of the 1970s, and

---

<sup>31</sup> This is reflected for example in the reviews by de Brouwer et al. (2023) and Bernanke (2024), see section 3.1.

<sup>32</sup> There are also other changes in the economic environment – that are not discussed in this paper – that make inflation targeting more complex today than 30 years ago, for example, climate change, geopolitics, income and wealth developments, and increasing debt levels.

<sup>33</sup> We do not claim to present any new or original ideas. We provide many references to the literature, where the important ideas and sources can be found.

governments undertook fiscal and other economic reforms that increased economic efficiency.

The key features of inflation targeting were a focus on price stability and a high degree of independence for the central bank. The details of the inflation targeting framework differ slightly between countries, but the overall purpose is to establish a high level of credibility for low and stable inflation. A noticeable characteristic is a quantified target for inflation. But inflation targeting does not necessarily mean that the central bank only cares about inflation. Most central banks conduct what is known as ‘flexible’ inflation targeting, which means that in addition to stabilising inflation, some weight is assigned to stabilise output and employment, see Rogoff (1985) and Svensson (1997, 1998).

Central bank independence means, among other things, that monetary policy decisions should be taken without interference from the government or parliament. This increases the public’s confidence in the inflation target and contributes to the central bank’s credibility. However, with independence follows a stronger need to hold the central bank accountable for its decisions and assessments. Central bank transparency and openness are therefore important.<sup>34</sup> Transparency may also increase the effectiveness of monetary policy since the central bank’s communication about future policy affects market interest rates already today, the so-called expectations and signalling channels.

During the Great Moderation, the key instrument considered necessary to keep inflation low and stable was a short-term interest rate controlled by the central bank, often called the policy rate. The key transmission channel of monetary policy was the interest rate channel. This view was reflected in early versions of the so-called New Keynesian model, see for example Clarida et al. (1999) and Galí (2015).

Many of the policy implications from the New Keynesian model guided monetary policy decisions during this period. If inflation was too high, the policy rate should be sufficiently raised to increase the real interest in order to contract demand, and vice versa if inflation was too low. In the case of demand shocks, the simple versions of the model predicted that there would be a ‘divine coincidence’, that is the interest rate changes needed to stabilise inflation would also stabilise real economic activity, see Blanchard and Galí (2007). If supply shocks appeared, however, they may give rise to a short-run trade-off between inflation and output stabilisation. The central bank should also be aiming at pushing inflation gradually back to the inflation target, since more drastic policy changes could lead to excessive output fluctuations. Finally, the credibility of future policy intentions played a key role. For example, if the central bank needed to reduce inflation and had a high degree of credibility, it could signal its intention to keep inflation low in the future and this signal would by itself reduce today’s inflation with less output loss.

In this New Keynesian model, the central bank is by assumption exceptionally powerful in stabilising inflation and output. By identifying economic shocks to supply

---

<sup>34</sup> For comparisons of the degrees of central bank independence and transparency in different countries, see Dincer and Eichengreen (2014) and Dincer et al. (2022).

and demand, the central bank can fully stabilise both inflation and output in the case of demand shocks and there is, as mentioned, a trade-off in the case of supply shocks.

Even if these policy recommendations have had a large impact on actual monetary, especially during the Great Moderation, but also afterwards, the underlying model is very simple and can under certain conditions be misleading. For example, the policy rate is not the central bank's only instrument. The central bank's balance sheet offers many other instruments that can be used, if needed.<sup>35</sup> The transmission mechanism in the New Keynesian model (the interest rate channel) is simple and stable because frictions on financial markets are typically ignored. Experience shows, however, that frictions may force central banks to use a wide set of instruments. The framework has also led to a strong focus on demand shocks in the policy work, although experience suggests that supply shocks often are very important for understanding the development of inflation. Finally, the implications of the simple New Keynesian framework for inflation targeting are often discussed in a closed economy context, and the implications for an open economy may be different due to for example effects from changes in the exchange rate.

### 3 Inflation targeting after the Global Financial Crisis

In this section, we discuss some of the key structural changes in the economic environment that have become apparent after the Global Financial Crisis and that in our view have contributed to make inflation targeting more complex.

#### 3.1 A greater role for supply side conditions

Economists often make a distinction between short-term cyclical fluctuations and long-term structural phenomena. Short-term variations are viewed as fluctuations around a more stable trend, and these variations are often best understood as reflecting changes in demand.<sup>36</sup> Supply factors such as demography, technology, the functioning of the labour market, incentive effects of the taxation system, competitive conditions, etcetera, are assumed to explain the long-term trends. The role of monetary policy is assumed to be mainly about stabilisation of the short-term variations. Much of the discussions and analyses of monetary policy have therefore focused on demand factors, while the role of supply factors has not been given the same attention.

This is unfortunate. Many of the challenges that central banks have dealt with during the last decades have been related to changes in supply conditions, and not just to temporary, cyclical phenomena on the demand side of the economy, see Faust and Leeper (2015). Changes in regulations, a rapid technological progress and globalisation have led to various structural changes during the last decades. For example, liberalisations of trade and increased labour mobility have led to an increase

---

<sup>35</sup> A useful starting point to understand the central banks' instruments is the balance sheet, see Buiter (2024), Cecchetti and Hilscher (2024) and Bindseil (2018).

<sup>36</sup> In the so-called real business cycle models this interpretation was questioned, see for example Cooley (1995).

in the global labour supply that has contributed to low levels of global inflation. The strong focus on cyclical demand factors in forecasting and policy analysis can, against this background, lead to misleading conclusions for both forecasts and monetary policy. For example, changes in GDP and unemployment may be interpreted as caused entirely by changes in various demand components, although changes in supply could be just as important. The important role of supply factors became evident during the pandemic, the war in Ukraine, and the rapid increase in inflation during 2021–2022.<sup>37</sup> But changes in supply conditions have presumably been important for inflation also earlier.

The increasing use of larger-scale New Keynesian models with more frictions and a role for temporary and permanent changes in supply factors should in principle have mitigated the focus on demand side factors. However, even though these models have been widely used in internal analyses their impact on central banks' forecasts, policy and communication remains unclear. One explanation is probably that also these models have had limitations in the unusual crises central banks have had to deal with during the last fifteen years.

One indication of this is that many central banks overestimated the inflationary pressure after the Global Financial Crisis. In Figures 1 and 2 we show the Riksbank's forecast errors, but other central banks that publish their forecasts have had the same experience, see Filardo and Hofmann (2014). The need to raise the policy rate in the future was systematically overestimated (until 2022), as indicated by the Riksbank's own forecasts of the policy rate (dotted lines in Figure 2). One likely reason was that the inflationary pressure was overestimated (Figure 1).<sup>38</sup>

Starting from the New Keynesian model some potential explanations for these forecast errors naturally arise. A common explanation is that the so-called natural interest rate was overestimated, which gave rise to tighter monetary policy than planned. The natural rate is not observable and thus difficult to measure and forecast.<sup>39</sup> When estimating the natural rate, the global trend in the interest rate is often used as an input. As Figure 3 shows, global interest rates were trending downwards for a couple of decades. Presumably, this made it particularly difficult to estimate the natural rate during this period. There are also analyses which suggest that at least parts of the declining trend was due to supply conditions, for example lower global growth expectations, see Rachel and Smith (2017).

Another explanation is more directly related to supply conditions. Globalisation and the forces giving rise to it, led to increased competition and difficulties for firms to raise their prices. In terms of the New Keynesian model, this could have been interpreted as a series of positive supply shocks, but this message does not seem to have been sufficiently incorporated in the policy analyses and forecasts. Furthermore, the underestimation of inflation during 2021 and especially 2022 are probably related

---

<sup>37</sup> Guerrieri et al. (2023) discuss the roles of various factors behind the increase in inflation, including differences between the inflation processes in the US and Europe.

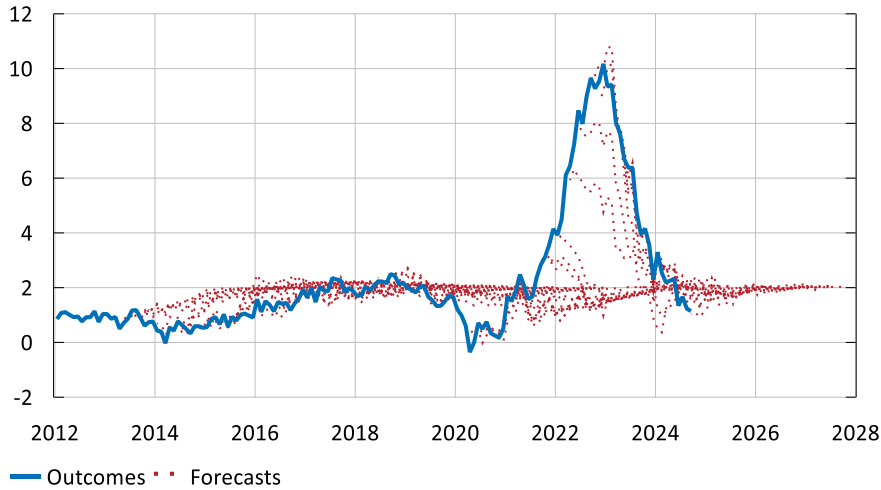
<sup>38</sup> See Sveriges Riksbank (2017a and 2017b) for an evaluation of the Riksbank's forecasts.

<sup>39</sup> There is a large literature on this subject. For a recent contribution and further references, see Buncic (2024).

to similar factors, but with opposite signs, that is, negative supply shocks, see Guerrieri et al. (2023).

**Figure 1. CPIF-inflation and forecasts**

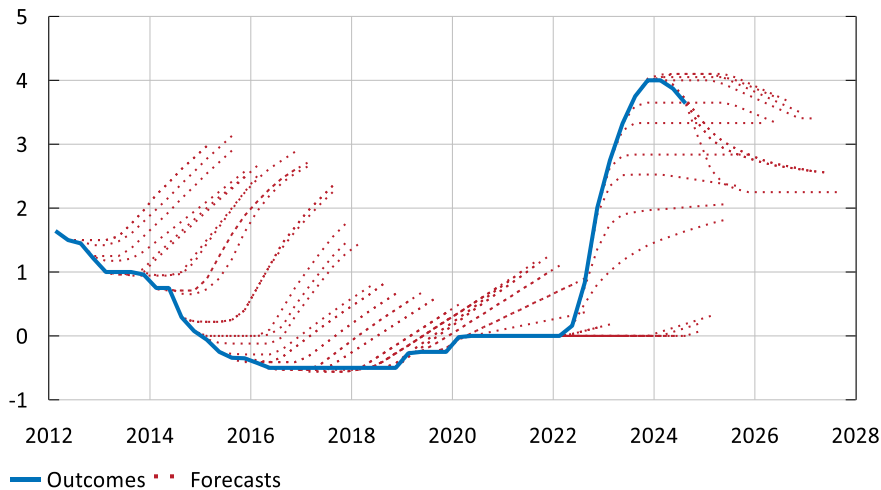
Annual percentage change



Sources: Statistics Sweden and Sveriges Riksbank.

**Figure 2. Policy rate and forecasts**

Per cent



Source: Sveriges Riksbank.

The need for a greater role for supply conditions in monetary policy analyses has been raised by several economists. The review of the Reserve Bank of Australia claims that supply side conditions (and fiscal policy) should play a larger role in the analysis, see de Brouwer et al. (2023).<sup>40</sup> In a review of the Bank of England’s forecasting process,

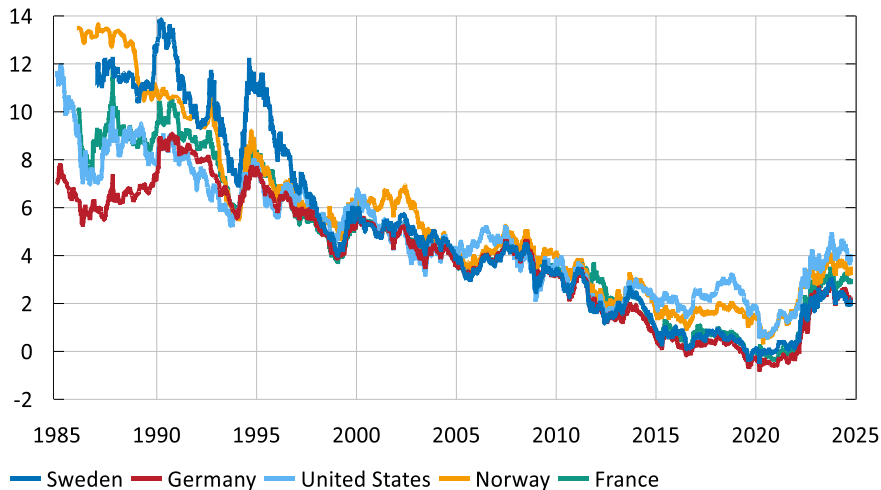
<sup>40</sup> For example, recommendation 9.3 says that ‘The RBA should increase its forecasting and macroeconomic modelling capability, for example around the supply side of the economy and fiscal policy’.

Bernanke (2024) also discusses the importance of supply factors.<sup>41</sup> Similar arguments as in these reviews have been made for Sveriges Riksbank, see Hansson et al. (2018).<sup>42</sup> Based on the Riksbank's forecast revisions 1993–2022, Bylund et al. (2024) conclude that supply shocks have been dominating one third of the time. This is a larger role than supply side conditions seem to have played in the Monetary Policy Reports over the years, which means that the recommendations to the Reserve Bank of Australia and Bank of England are relevant also for Sveriges Riksbank.

Despite the pedagogical advantages of the early versions of the New Keynesian models for monetary policy, and the framework's usefulness during the early stages of inflation targeting, some of its limitations thus became apparent in the aftermath of the Global Financial Crisis.

**Figure 3. 10-year government bond yields**

Per cent



Note. Benchmark rates.

Sources: Norges Bank, Macrobond Financial AB and the US Department of Treasury.

### 3.2 A growing and riskier financial system

The financial system in the US and other advanced economies was heavily regulated in the period after the Second World War. This led to a stable financial system with small risks for disturbances both within and across countries. From the 1980s, deregulations and technological advances gave incentives to a rapid globalisation and a closer integration of the financial systems across the world. The financial systems grew fast and became more efficient, while financial risks were mounting in the background, see Rajan (2005). In advanced economies, the financial system

<sup>41</sup> Bernanke's (2023) recommendation 4e proposes 'greater attention to, and ongoing review of, supply-side elements and their role in the determination of inflation and growth. ... Notably, analyses of inflation should consider supply-side factors as well as the state of aggregate demand.'

<sup>42</sup> See also Jonsson and Theobald (2019) who study the implications of structural changes on the labour market for inflation and other macroeconomic outcomes.



approximately doubled its size from around 300 per cent of GDP in the mid-1990s to around 600 per cent in the early 2020s, see Tables 1 and 2.

**Table 1. Domestic financial corporations' financial assets**

Share of GDP in per cent

	Sweden (1995)	Sweden (2021)	EU 27 (1995)	EU 27 (2021)	US (1995)	US (2021)
MFI (bank, etc.)	177	278	207	280	80	138
Insurance, pension	51	175	38	96	122	182
Investment funds	11	123	18	129	29	137
Other fin. corp.	20	85	33	159	79	110
Total	259	661	296	663	310	567

Note. Assets of foreign financial corporations, central bank and general government are not included. Note also that we compare the size of the financial sector, a stock variable, to the level of income and production, a flow variable. The financial sector's contribution to the value of production has not grown as fast as the stock of total assets. For a discussion of the development of the financial sector's share of the value of production, see Philippon and Reshef (2013).

Source: Eurostat.

If we look at the asset holdings of households and non-financial firms, the shares of risky assets have increased significantly. In the US, this is reflected in an increase of the holdings of listed shares in firms, while such shares are held more indirectly ('other equity'), through for example investment funds, in the EU and Sweden. The growth of investment funds and other non-bank financial intermediaries has been particularly rapid in Europe. Banks dominated in Europe in the 1990s, but non-bank financial intermediaries have in later decades become more important, as they have been in the US for a long time. The increased roles of non-bank financial intermediaries and risky assets reflect a growing importance of a market-based finance system compared to a bank-based financial system. It seems reasonable to conjecture that the increase to a large extent has been driven by higher demand for financial services due to an increase in private wealth, but changes in regulations have also mattered, see Acharya et al. (2024).<sup>43</sup> These structural changes in the financial system imply new risks that central banks should help mitigating. Central banks can for example supply liquidity also to non-bank financial intermediaries through loans or asset purchases.<sup>44</sup>

<sup>43</sup> See also the paper by Scharfstein (2018) that emphasises the role of pension systems for the development of the financial system. Waldenström (2022) provides historical data on wealth in Sweden.

<sup>44</sup> See for example the speeches by Hauser (2022) and Breeden (2022) about the Bank of England, and Buiter et al. (2023) about the central bank as a lender and market maker of last resort more generally.

**Table 2. Households' and non-financial corporations' financial assets**

Share of GDP in per cent

	Sweden (1995)	Sweden (2021)	EU 27 (1995)	EU 27 (2021)	US (1995)	US (2021)
Currency, deposits	42	83	70	106	45	88
Debt securities	17	7	22	6	30	16
Loans	22	84	17	44	7	7
Listed shares	21	77	16	28	58	157
Fund units	9	42	13	29	25	76
Other equity	54	346	49	164	62	107
Insurance, pensions	40	136	35	76	113	160
Other	60	38	41	51	45	77
<b>Total</b>	<b>264</b>	<b>813</b>	<b>264</b>	<b>503</b>	<b>385</b>	<b>687</b>

Note. Assets of foreign financial corporations, central bank and general government are not included. Note also that we compare the size of the financial sector, a stock variable, to the level of income and production, a flow variable. The financial sector's contribution to the value of production has not grown as fast as the stock of total assets. For a discussion of the development of the financial sector's share of the value of production, see Philippon and Reshef (2013).

Source: Eurostat.

### 3.2.1 Central banks' balance sheets reflect risks in the financial system

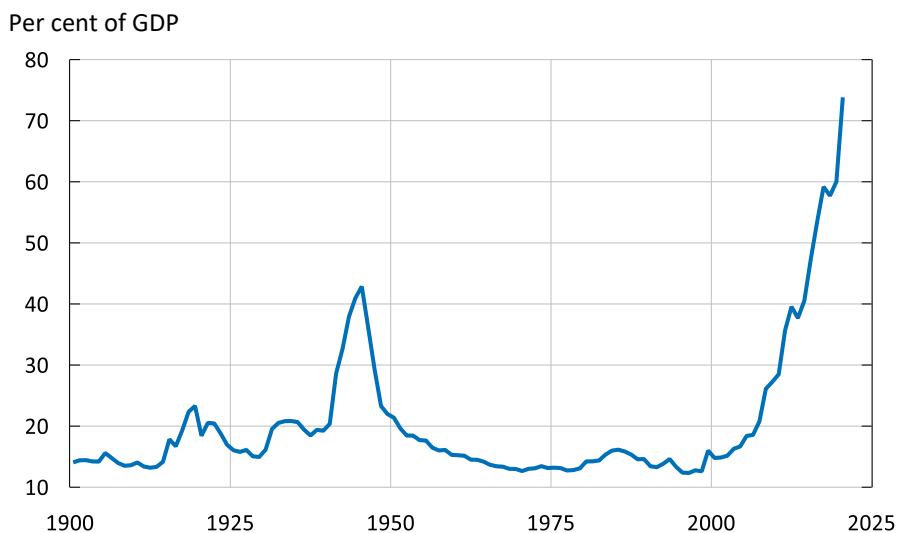
A central bank's activities largely reflect the properties of the financial system, see Capie et al. (1996). Still, over a longer period of time, the central banks' balance sheets have not, unlike the financial system as whole, shown an increasing trend. During the whole 1900s they were relatively stable in relation to GDP and were fluctuating at around 10 to 20 per cent as a share of GDP, see Figure 4. Ferguson et al. (2015) discuss four kinds of events where large expansions of central banks' balance sheets typically take place: a foreign exchange crisis (like in Sweden 1992), government financing (for example financing of wars), lender-of-last-resort operations, and demand stabilisation (the Global Financial Crisis is an example of both). These events are related to the historical reasons why central banks were created in the first place. They are examples of circumstances when the financial system is not sufficiently stable and efficient without the support of a central bank, that is, various frictions and imperfections need to be counteracted by central banks.<sup>45 46</sup> The growth of central banks' balance sheets therefore partly reflects crisis

<sup>45</sup> See Capie et al. (1996). In his essay on 'Why do Banks Need a Central Bank?', Goodhart (1987) refers to the seminal and later Nobel-prize awarded contributions by Diamond and Dybvig (1984) and Bernanke (1983). For a survey of the central bank's role as liquidity provider, and further references to the academic literature, see Bertsch and Molin (2016).

<sup>46</sup> In addition, as stressed by Capie et al. (1996), central banks have been important as the government's bank. Ferguson et al. (2015) note that there is a strong positive correlation between large changes in central banks' balance sheets and in public debt. They interpret this as a sign of coordination of monetary and fiscal policy in crisis situations. Hall and Sargent (2022) present three case studies from US history.

measures that are reversed, in line with earlier historical experiences, but it may also reflect persistent structural changes in the financial system.

**Figure 4. Average international central bank balance sheet size**



Source: See Ferguson et al. (2023) for data sources and countries included.

Ferguson et al. (2015, p. 13) suggest that ‘the recent expansion of central bank balance sheets appears more like a return to previous, potentially safer levels of the ratio of central bank money to financial sector assets’. It should be noted, though, that this assertion was made already in 2014, and that central banks’ balance sheets increased further later on. The growth of the financial system had a ‘thin foundation of liquidity’, see Ferguson et al. (2015, p. 3–4). All in all, experience shows that in situations with large disturbances to the macroeconomy and the financial system, the central bank cannot fine tune financial conditions, inflation or the economic activity by simply adjusting a short term interest rate, as in the simplest New Keynesian models of monetary policy. Other instruments are necessary, such as asset purchases and loans to banks, including in foreign currency.<sup>47</sup>

### 3.3 A greater focus on financial stability risks

The discussion of monetary policy’s role in contributing to financial stability before the Global Financial Crisis was mainly about whether monetary policy should ‘lean’ against signs of an asset price bubble *ex ante*, or just ‘clean up’ the effects of the bubble bursting *ex post*, see for example Cecchetti et al. (2000). The consensus was – but not without some disagreement – that stabilisation of asset prices should not be seen as an objective of central banking. After the financial crisis, the discussion was broadened to the question whether or not the central bank should have financial

<sup>47</sup> Buiter et al. (2023) suggest that the central bank should act as a lender and market maker of last resort to a wide set of counterparties and with a broad category of accepted collateral. But they do not argue that central banks’ balance sheets should be large in normal times. See also Kolasa et al. (2025) for the effects of asset purchases.

stability as a separate objective for monetary policy in addition to price and output stability.<sup>48</sup>

A stable financial system is one of the prerequisites for central banks being able to conduct effective monetary policy. The financial markets and the way they function are critical for the transmission of monetary policy to market interest rates and other financial variables. In addition, the economic consequences of a financial crisis directly affects inflation and the economy more generally. The central bank may therefore, in its monetary policy, have reasons to take financial stability risks into account, not only because the degree of financial stability affects the transmission channels of monetary policy, but also because it affects overall welfare, see Woodford (2012).<sup>49</sup> Moreover, if the central bank needs to use monetary policy to promote financial stability, it has many instruments at its disposal. These insights are not new – see the review by Capie et al. (1996) – but they had no large impact on discussions of monetary policy during the Great Moderation.

The primary effect of monetary policy is on financial markets, but the effects go in both directions. The degree of financial stability has consequences for the effectiveness of monetary policy. The vulnerabilities of the financial system often accumulate during economic expansions due to higher credit volumes and more risk-taking. These vulnerabilities are affected by monetary policy, but the extent of the effect depends on the financial frictions. As mentioned above, the links between monetary policy and financial stability were little discussed prior to the Global Financial Crisis, with Borio and Lowe (2002) and Rajan (2005) being two notable exceptions. Still, it is clear that, in practice, at least part of central banks' frameworks for monetary policy – for example the standing facilities and the open market operations – have been designed not only for the purposes of price and business cycle stabilisation, but also with the objective of financial stability in mind, see Bindseil (2016).<sup>50</sup>

The early versions of the New Keynesian model deliberately lacked a realistic modelling of the financial system. This became apparent when the Global Financial Crisis broke out in 2008. The model could not be used to understand the implications of the financial crisis or how to handle it. Neither was it possible to study how the financial markets – that were considered dysfunctional – affected the transmission of monetary policy.

Today, however, there exists a variety of models in the New Keynesian tradition with financial frictions.<sup>51</sup> These models emphasise transmission channels of monetary

---

<sup>48</sup> See IMF (2015), Smets (2018), and Kockerols and Kok (2021) for analyses and summaries of contributions to this literature. An early contribution is Borio and Lowe (2002) who argued that monetary policy should take financial stability risks (and not only asset price bubbles) into account.

<sup>49</sup> Persson and Tabellini (2024) also argue that it may be desirable to expand inflation-targeting central bank mandates to encompass financial stability.

<sup>50</sup> The operational frameworks for implementation of monetary policy include rules about eligible counterparties, collateral requirements, etc. Such rules reflect financial stability considerations.

<sup>51</sup> See Gertler and Karadi (2013) for an early analysis of large scale asset purchases in an economy with financial frictions. See also Woodford (2012) and Sims et al. (2023) for two examples of simple New

policy such as the credit and risk-taking channels.<sup>52</sup> They also make a case for new monetary policy instruments in addition to the policy rate. Asset purchases (quantitative easing) can be used to counter credit market disturbances and to mitigate the effects of restrictions on the policy rate, for example the effective lower bound. In principle, the new models with financial frictions suggest that monetary policy should be used to counter financial market imperfections, not only when there is a financial crisis or when policy rates are constrained by a lower bound. This is neither surprising nor a completely new insight. The new models are in line with much of the historical experiences of central banking, as outlined by for example Capie et al. (1996). Frictions in financial markets are one important reason why central banks are needed.

There are thus reasons for central banks to lean against the wind, but there are also arguments against. The dominating view seems to be that monetary policy should not be the first line of defence against financial instability if micro- and macro-prudential instruments can be used instead.<sup>53 54</sup> Other common arguments are often based on mechanisms that are important but seldom incorporated in formal analyses of monetary policy. One such argument refers to political-economy aspects. Given that it is desirable, for monetary policy purposes, to have a high degree of central bank independence, it may be necessary to limit both the numbers of objectives that the central bank should strive for and the set of instruments it can use. This argument has been presented by Acharya (2015) and Archer (2016). Another argument against the use of monetary policy to counter financial imbalances in normal times is that this may give rise to moral hazard problems. Risk-taking in the financial sector may increase if monetary policy makers are too willing to counter-act the negative effects of financial imbalances.<sup>55</sup> One further argument against the use of asset purchases as a standard instrument also in normal times is that such measures make the central bank more exposed to financial risk. Recent experiences show that the central bank's financial situation cannot be ignored in policy making, partly because a weak capital position may lead to lower independence.<sup>56</sup>

---

Keynesian models illustrating the importance for monetary policy of including financial frictions. These two models are special cases of more general mechanisms discussed by Ajello et al. (2022).

<sup>52</sup> The credit channel amplifies the effects of the interest rate channel through different financial frictions. In particular, the leverage in the financial system is an important factor. The risk-taking channel emphasises that changes in the return on safe assets may encourage or discourage investors to 'reach for yield' through higher risk-taking. This affects the vulnerability of the financial system.

<sup>53</sup> See for example the comments on Woodford (2012) by Svensson (2012). Smets (2013) provides an overview of the arguments presented soon after the Global Financial Crisis.

<sup>54</sup> This argument sometimes seem to be based on a 'one target, one instrument' principle associated with work by Jan Tinbergen, but the relevance of that principle for the question at hand has been questioned by Bryant et al. (2012).

<sup>55</sup> Buiter et al. (2023) emphasise the moral hazard argument in their discussion of the central bank as a lender and market maker of last resort.

<sup>56</sup> Broeders et al. (2024) offer analyses of the roles of the central bank's capital, from many different perspectives. Persson and Tabellini (2024) note that the financial risks implied by quantitative easing may call for more coordination between fiscal and monetary policy.

### 3.3.1 Monetary policy and financial stability in different central banks

In light of the experiences after the Global Financial Crisis, many central banks have reviewed their monetary policy process and frameworks. The implications are not always entirely clear, though, as somewhat different conclusions have been reached in different countries. **Norges Bank** explicitly stated in their Monetary Policy Report in March 2012 that the interest rate decision took the risk of financial imbalances into account over and above the outlook for inflation and resource utilisation. In other words, monetary policy was leaning against the wind. In 2013 the name of Norges Bank's reports on monetary policy was changed to 'Monetary Policy Report with financial stability assessment', but this change was reversed in 2023. In a new central bank law from 2020, Norges Bank was given a triple mandate with financial stability ranked above real stability.<sup>57</sup> The report still declares that 'Inflation targeting shall be forward-looking and flexible so that it can contribute to high and stable output and employment and to countering the build-up of financial imbalances'.<sup>58</sup>

After a review of its monetary policy strategy, the **Federal Reserve** in August 2020 declared that the FOMC is firmly committed to fulfilling its statutory mandate from the US Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. It was recognised that sustainably achieving maximum employment and price stability depends on a stable financial system. Therefore, the FOMC's decisions reflect its longer-run goals, its medium-term outlook, and its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the FOMC's goals.

An overview of the **European Central Bank's** monetary policy strategy was published in July 2021. This led to the declaration that financial stability is a precondition for price stability and vice versa. In-depth assessments of the interaction between monetary policy and financial stability are to be conducted at regular intervals and considered at the monetary policy meetings. The ECB stressed that it would not be systematically neither 'leaning' nor 'cleaning'. On the other hand, the ECB's 'medium term orientation' was considered to provide flexibility for monetary policy to take both employment and financial stability into account.<sup>59</sup>

Following a review of the **Bank of Canada's** monetary policy, the bank and the government published a joint statement in December 2021 which declared that monetary policy should continue to focus on price stability. It was acknowledged that a low interest rate environment can be more prone to financial imbalances, but that

---

<sup>57</sup> The mandate according to the law is: '(1) The purpose of the central banking activities is to maintain monetary stability and to promote the stability of the financial system and an efficient and secure payment system. (2) The central bank shall contribute to high and stable output and employment.'

<sup>58</sup> In her presentation at the Riksbank conference on 23 May 2024, Norges Bank's Governor Ida Wolden Bache presented the bank's 'holistic view' on monetary policy and financial stability. See [The quest for nominal stability: Lessons from three decades with inflation targeting 23–24 May 2024 | Sveriges Riksbank](#).

<sup>59</sup> At the Riksbank conference on 23 May 2024, Frank Smets gave an updated description of his earlier (Smets 2013) categorisation of different strategies, and presented the relations between ECB's strategy, the Tinbergen principle ('Jackson Hole consensus') and leaning against the wind. See [The quest for nominal stability: Lessons from three decades with inflation targeting 23–24 May 2024 | Sveriges Riksbank](#).

this risk should be handled by the government through financial regulation and supervision.

In a review of the **Reserve Bank of Australia** (RBA) de Brouwer et al. (2023) pointed out that the bank's responsibility for financial stability should be clarified in new legislation. There should be a dual objective for monetary policy – price stability and full employment – and flexible inflation targeting was considered to remain the best operational framework. The RBA should be required to explain how it is using its flexibility, including if and how financial vulnerabilities have been taken into account. The review recognised that the RBA contributes to financial stability through liquidity support and responsibilities for payments. The RBA's assessments of financial stability risks should feed directly into macroprudential decisions by the Australian Prudential Regulation Authority, and there should be close cooperation between the authorities.

At the **Reserve Bank of New Zealand** (RBNZ), decisions on monetary policy are taken by a Monetary Policy Committee (previously by the governor) from 2019 and onwards. The MPC's operational objectives are given by a remit and include an inflation target and to support maximum sustainable employment. In pursuing the operational objectives, the MPC shall (i) have regard to the importance of protecting and promoting the stability of the financial system, and (ii) seek to avoid unnecessary instability in output, interest rates and the exchange rate. RBNZ has a separate remit for financial stability.

In a new law which came into effect in 2023, **Sveriges Riksbank's** monetary and financial stability policy are deliberately separated in different chapters. The primary objective for monetary policy is to maintain low and stable inflation. Without prejudice to the price stability objective, the Riksbank shall also contribute to balanced development of production and employment. Financial stability is not a similar objective for monetary policy, but regulated in a separate chapter. On the other hand, in the preparatory work for the new law, the government concluded that financial imbalances may affect the speed with which monetary policy aims to achieve the inflation target.

In conclusion, among these central banks, Norges Bank is the central bank that most explicitly has declared that it is willing to lean against the wind. Bank of Canada seems to be furthest away from leaning, and the other central banks fall somewhere in between. ECB argues that they are not leaning, but seem willing to let their flexibility take both employment and financial stability into account, which is not very different from the approach of Norges Bank.

### 3.4 Reduced policy autonomy

The limits of monetary policy in an open economy are often discussed in terms of the classic monetary policy trilemma, based on work by Marcus Fleming and Robert Mundell in the 1960s, see Fleming (1962) and Mundell (1963). The trilemma postulates that an open economy can maintain at most two of the following three objectives: free cross-border capital movement, a fixed exchange rate, and monetary policy autonomy. Under the assumption of free capital movements, a small open

economy that wishes to use monetary policy to manage the domestic economy thus cannot have a fixed exchange rate. This reflects the belief that movements of interest rates and exchange rates are tied together by an equilibrium condition, the so-called uncovered interest parity condition, which among other things assumes that bonds from different countries are perfect substitutes. This implies that a flexible exchange rate is necessary for a small open economy to have some degree of monetary policy autonomy to respond to foreign shocks.

In an influential article, Rey (2016) challenged many of the assumptions underlying the trilemma. For example, domestic and foreign investors do not only have a single security denominated in each currency to allocate their savings in, but a whole range of different financial assets with different liquidity, expected returns and risk characteristics. Bonds from different countries are not generally perfect substitutes as the trilemma assumes. In principle, this could provide some autonomy for monetary policy even in a fixed exchange rate regime. However, Rey also makes the fundamental point that in an era of financial globalisation, a small open economy with free capital movement will inevitably be affected by the so-called global financial cycle, that is, financial conditions are becoming more synchronised among countries regardless of the exchange rate regime.<sup>60</sup> There are many examples of this. Long-term interest rates are strongly correlated also between countries with floating exchange rates, see Figure 3. The returns on risky assets such as mortgage bonds and stocks are correlated. Moreover, a weaker exchange rate is usually assumed to provide stimulus to aggregate demand by strengthening exports, but Rey points out that when domestic households and firms have debt denominated in foreign currency, a weaker exchange rate does not only have positive effects on aggregate demand.

The conclusion from Rey's paper is that it is difficult to combine national monetary policy with free movement of capital even with a floating exchange rate. If the financial conditions are largely determined by the outside world, the choice boils down to national monetary policy or free capital movements. The trilemma is in fact a dilemma.<sup>61</sup>

In the EU, most member countries have chosen to give up national monetary autonomy. How large the actual degree of monetary autonomy is in the EU-countries which have chosen to stay outside the euro system is an open question. Rangvid (2024) stresses that the macroeconomic development in Finland, Denmark, and Sweden (and also Norway, which is not a member of the EU) has been rather similar, despite differences in monetary policy regimes. Bylund et al. (2024) also note that the macroeconomic development in Denmark, with a pegged exchange rate vis-à-vis the

---

<sup>60</sup> Borio (2014) also stressed the importance of the global financial cycle.

<sup>61</sup> If we consider the implications of international mobility not only of financial capital, but also of real capital and labour, the room of manoeuvre for domestic economic policy may be even smaller. It is well known, from international trade theory that, in principle, real returns to labour and capital can be equalised across countries already through trade in goods and services. If production factors are also mobile across countries, which they have become to an increasing degree, it is even harder to maintain cross-country differences in real wages and real interest rates. This question is very important for the possibility of national autonomy in monetary policy, but goes beyond the scope of the present paper (which presumes that it is meaningful to have stabilisation policy objectives for a national central bank).



euro, and Sweden, with a floating exchange rate and inflation targeting, has been similar.

A less discussed trilemma is the financial stability policy trilemma, which emphasises the limits of national financial policy, see for example Farelus et al. (2020) and the references therein. According to this trilemma, having objectives for national financial policy, cross-border financial integration, and financial stability is not possible, as only two of these three objectives can be achieved at the same time. For example, if the objectives are financial integration across borders and a stable financial system, financial policy cannot be national. In essence, when financial integration increases in a region, the incentives among national supervisors to act in a way that preserves financial stability in the region as a whole decreases. If the benefits of stability oriented policies spread to the region as a whole, the willingness of national supervisors to bear the cost of these policies decline.

Greater financial integration and large-scale capital flows between countries are thus likely to lead to less policy autonomy. This could, for example, lead to greater cooperation between central banks as well as between national supervisors. This has been the case in the area of supervision and regulation, manifested in the formation of organisations such as the Basel Committee on Banking Supervision, the Financial Stability Board and the European Systemic Risk Board. Although there are links between financial stability and monetary policy, as argued above, international cooperation in monetary policy is much less common – the common currency in the euro area being an important exception. Occasionally there has been some coordination related to monetary policy in crisis situations, such as currency swap agreements and coordinated interest rate decisions. But, at least officially, most countries have opted for monetary autonomy and flexible exchange rates. Ilzetzki et al. (2023) argue that many countries still place a large implicit weight on the exchange rate, in violation of the theoretical models of the floating exchange rate/inflation targeting strategy. Some inflation targeting central banks have indeed officially intervened to stabilise the value of their currencies, which shows that there are limits to how much they are willing to let their monetary development deviate from that in other countries.

### **3.5 New financial technologies pose a risk to central banks' control over liquidity**

Both the theoretical literature and the practical implementation of inflation targeting have largely adopted a rather narrow – in an historical perspective – interpretation of monetary policy, the central bank's role in the financial system and the transmission mechanisms. If we consider the roles of the financial system and money in a broader context, it becomes apparent that the nature of the payment system matters for monetary policy.

The financial system has three main functions: providing a payment system, matching savers (lenders) with borrowers (investors), and making it possible for households and firms to handle risks through insurance and diversification. Money plays a critical role in these functions as a unit of account, a medium of exchange, and a store of value.

Ohanian (2001) shows how these different roles of money – depending on the kind of frictions that characterise asset and product markets – affect the transmission of monetary policy. In the New Keynesian model, with its focus on price and wage rigidities in product markets, it is the unit of account role that is critical for the transmission of monetary policy, while money’s role as a medium of exchange is downplayed compared to more traditional macroeconomic models.

In today’s financial system money is created by central banks as well as commercial banks. Central banks create two types of money: cash and so-called reserves, which are digital balances that financial institutions have on accounts at the central bank. One role of reserves is to facilitate settlement of payments between commercial banks. This money thus serves as a medium of exchange and store of value for commercial banks, but in addition to these roles it also together with cash determines the unit of account. Note that commercial bank money existed long before central banks became common in the 1800s. Hence, systems with only private money can exist, but these systems were not stable enough when the economy and the financial system grew, see Roberds and Velde (2016) and Capie et al. (1996).

Today, the use of central bank money in the form of cash is declining in many countries. Money used on a daily basis is mostly created by commercial banks. This money takes the form of bank deposits, from which payments are facilitated by for example debit cards connected to VISA or Mastercard. A key task for central banks is to stabilise the value of central bank money, but this also creates confidence in commercial bank money. Cash has played an important role for creating confidence in commercial bank money by providing a ‘nominal anchor’ for private money. A Swedish krona deposited in a commercial bank can be exchanged for a krona in the form of cash, and a krona deposited in one commercial bank is usually worth a krona in another bank. Confidence in commercial bank money has thus been reinforced by a high degree of substitutability between central and commercial bank money, but also by various regulations such as legal tender status, deposit guarantees, and supervision.

Central bank money used today is mostly in the form of reserves. Ohanian (2001) and Brunnermeier et al. (2019) argue that there is no strong reason to believe that monetary policy should be negatively affected if the public’s use of cash disappears, as long as the unit of account function of central bank money remains. This is reflected in the New Keynesian model, where the unit of account is the principal role of money. The unit of account role of central bank money may be preserved if cash disappears since reserves are still used by commercial banks in their settlements between each other. However, if the use of reserves as a medium of exchange between commercial banks were to disappear, the unit of account function of central bank money would be threatened.

### **3.5.1 New forms of money**

New financial technologies in the form of private digital assets such as Bitcoin and Ethereum, may, in principle, challenge the function of central bank money as a medium of exchange, but also as a unit of account. In their current state, however,

these currencies suffer from a number of problems. Bitcoin is not backed by anything and has no intrinsic value and as a result its value in terms of for example US dollar is very volatile. It also suffers from scalability issues, which prevents it from being an efficient medium of exchange and much less a unit of account.

Other cryptoassets, such as stablecoins, are supposed to maintain a stable value relative to a central bank currency, a basket of currencies or other safe assets. Stablecoins may have a better chance to be a viable medium of exchange, but they are not without problems. Like private money issued in the past – commercial banknotes of the 19th century, uninsured demand deposits, and money market mutual funds – stablecoins may be subject to destabilising runs if left unregulated, see Bertsch (2023) and Gorton and Zhang (2021, 2024). Fundamentally, stablecoins lack backing from the state and are therefore less credible than central bank money. Regulators arguably need to modernise the regulatory framework that handles various forms of cryptocurrencies to maintain confidence in the financial system, not least to avoid fraud.<sup>62</sup>

BigTech companies such as Apple, Google or Facebook are potential new entrants into the cryptocurrency market. These companies can challenge both commercial bank money and current cryptocurrencies as a medium of exchange, and by extension central bank money as a unit of account, see Brunnermeier et al. (2019). BigTech companies have the ability to create their own ‘digital currency areas’ where they use their own digital platform for peer-to-peer exchange without any third party involvement, for example commercial banks. In addition to payment services, they may include other functions that are attractive to users, for example social network services. Even if the techniques are different, this resembles the situation when the payment system was dominated by private actors before the development of modern central banking in the late 1800s and early 1900s. In this system, monetary policy had no ambition to stabilise inflation and economic activity like today. Focus was on stabilising the value of the currency vis-à-vis gold (and thereby vis-à-vis other countries’ currencies).

A financial system that is concentrated around BigTech digital platform-based ecosystems could diminish the role of commercial bank money and impair the monetary policy transmission channel that goes through money’s role as a medium of exchange in the banking system. However, if most financial contracts are written in the unit of account of BigTech companies and/or other cryptocurrencies, and if the relative prices of such digital currencies are free to float, the values of the contracts would vary with the perceived safety and credibility of the private monies. This would be a step back towards the inefficiencies of the private payment system that existed before central banks were created, see Gorton and Zhang (2024). It would also threaten the unit of account of central bank money and the transmission of monetary policy.

---

<sup>62</sup> Bertsch (2023) also stresses that the demand for stablecoins is endogenous and may be affected by monetary policy. A lower level of nominal interest rates increases the demand for stablecoins in relation to bank deposits. This is also a mechanism whereby monetary policy can affect the degree of financial stability.

### 3.5.2 Introducing a central bank digital currency

Central banks are currently in the process of examining the pros and cons of introducing so-called central bank digital currencies (CBDCs). One reason for this is arguably to ensure the unit of account role of central bank money, see Armelius et al. (2020). The CBDC would be a digital complement to commercial bank money and in this role it would help to ensure that the substitutability and competition between private digital currencies and central bank money is maintained. It would thus ensure a fixed relative price between central bank money and at least some private substitutes and contribute to the preservation of a central bank controlled money as a unit of account, as well as a medium of exchange and a store of value. This is comparable to when central banks received monopoly on note issuance in the late 1800s, see Grodecka-Messi and Zhang (2023). Other reasons for introducing CBDC include financial inclusion, maintaining a high degree of resilience in the payment system, and encouraging competition in the payment market, see Ingves (2020), Ingves et al. (2022,) and Bertsch (2023). Note also that a CBDC can be used to facilitate cross-border transactions. This may, however, require that national CBDCs will be developed in cooperation between different countries, giving rise to new issues about policy autonomy, in addition to those mentioned in the previous section.

There is yet no widely accepted definition of CBDC, much less any available practical solution, see for example Armelius et al. (2020) and Bossu et al. (2020). The intention is that it will be a liability of the central bank that could serve as a unit of account in the national currency, a medium of exchange and a store of value in the same way as cash and reserves. It would also be the safest type of digital money available to the public.

The economic literature is inconclusive on how the introduction of a CBDC could affect commercial banks' business model and by extension monetary policy and financial stability risks, see Grodecka-Messi and Zhang (2023) and the references therein. One reason for the inconclusiveness is that the effects on monetary policy and financial stability risks depend on how the CBDC will be implemented, which is yet not clear. If the CBDC would carry an interest rate there could be large shifts of money from private bank deposits to central bank money.<sup>63</sup> The CBDC could, in principle, be so attractive that it crowds out a large part of the commercial banks' deposit funding. Lower demand for other low-risk assets like money market mutual funds and Treasury bills may further impact the structure of financial intermediation and potentially reduce the availability of credit. In this scenario, the central bank would become the most important financial intermediary, which indeed was something commercial banks feared when central banks got monopoly on note issue around one hundred years ago. If so, the borrowing and transaction costs for households and firms are likely to increase.

---

<sup>63</sup> This could also happen if the CBDC carries a zero interest rate and private banks set a negative interest rate on their deposits, but this is economically similar to people buffering cash in a scenario with negative interest rates on deposits.

The risks of these negative effects can be mitigated. The CBDC could for example be non-interest bearing or the amount a user can have on its account could be limited.<sup>64</sup> This is in a way similar to cash, which is an imperfect substitute to commercial bank money. The design of the CBDC will imply some trade-offs, though. The CBDC should not be ‘too successful’ so that it significantly reduces the funding of commercial banks or increases the risk of bank runs, see Bindseil et al. (2024). At the same time, the CBDC should be ‘successful enough’ so that households and firms use it as a convenient payment instrument. This will contribute to maintaining the confidence and unit of account of central bank money, and thereby the transmission of monetary policy and the confidence of private money and the financial system more generally.

### **3.6 Fiscal policy’s role for monetary policy**

The 1970s and 1980s were characterised by high levels of inflation, often due to high government spending combined with accommodative monetary policy. Governments were generally unwilling to face the short-term output loss of disinflation. The design of monetary policy was shaped by the lack of confidence in the governments’ and central banks’ anti-inflationary ambitions. When implementing the new inflation targeting framework, there was a more or less explicit assumption that monetary and fiscal policy henceforth should function independently of each other. However, the two policy areas should still be consistent to achieve the society’s objectives of low inflation and stable public debt, see Leeper (1991).

In practice, the new framework meant that the fiscal authority should focus on stabilising government debt and the budget deficit, while the central bank should have a high degree of independence and little or no interaction with the fiscal authority, to create credibility for price stability. Fiscal policy could still have a stabilising effect on the economy through various automatic stabilisers – for example income taxes and unemployment insurance – but fiscal policy activism should be avoided, in order to promote the credibility for stable debt and to minimise the risk of policy mistakes.<sup>65</sup>

#### **3.6.1 The links and interactions between monetary and fiscal policies**

A useful way to illustrate the links between monetary and fiscal policies is the consolidated budget constraint of the public sector, since it shows how the government’s incomes and expenses are affected by the central bank and the fiscal authority. Central banks affects the government’s income and expenses in different ways. The government’s cost of borrowing is affected by the interest rate cost, which the central bank influences via changes in the policy rate. The profits of the central

---

<sup>64</sup> In the Commission's proposal for a regulation on the digital euro, it is for example proposed that the European Central Bank should have the right to set limits on digital euro accounts, see <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52023PC0369>.

<sup>65</sup> A good summary of this view is given by Corsetti et al. (2023) for example on p. 8: ‘To anchor expectations, government credibility was based on the explicit separation of the monetary, fiscal, and regulatory policy arms under the premise that the lack of coordination among them would ensure their independence. The monetary policy mandate focuses on price stabilisation, the fiscal policy mandate on anti-cyclical stabilisation and debt sustainability, and regulatory policies focus on the trade-off between financial stability and competition.’

bank are partly distributed to the government, or in the case of losses, the government may have to re-capitalise the central bank. The composition of government debt – government bonds and central bank liabilities (cash and reserves) – is another link. The government's financing is affected when the central bank buys government bonds by 'printing' new reserves. Monetary policy also has indirect effects on the government's budget via its effect on inflation, output and financial stability.

Many of the government's policies have implications for monetary policy. Taxation and government spending affect aggregate demand and thus inflation.<sup>66</sup> The government's budget deficit or surplus, and the associated development of government debt, have implications for interest rates and private wealth. The government's choice of financing between debt or taxes thus has consequences for inflation and real economic activity. According to the fiscal theory of the price level, under certain conditions prices adjust so that the real value of nominal government debt equals the present value of taxes less spending, see for example Cochrane (2023). Historically, there are many examples when fiscal policy has led to disruptions in the financial system with consequences for monetary policy. Episodes of hyperinflation are extreme examples, but there are examples from milder crises, for example, the euro zone's experiences during the European sovereign debt crisis in 2009–10 and the UK 2022 when Liz Truss's plans to raise fiscal spending and cut taxes were revealed.

The separation of monetary and fiscal policies is implicitly reflected in the New Keynesian model. The government's budget is typically assumed to be balanced each period through lump-sum taxes and government debt is assumed away, as pointed out by for example Leeper and Leith (2016) and Cochrane (2023). This assumption in the analytical framework may, together with the deliberate separation for more political reasons, over time have contributed to a situation where important links between monetary and fiscal policy have been overlooked in practical policy work.

The persistently low inflation after the Global Financial Crisis led many central banks to lower their policy rates to near the effective lower bound. The limited ability to stimulate the economy by further rate cuts initiated a discussion of fiscal policy's role in stimulating the economy. In Sweden the discussions have primarily been concerned with specific aspects of the fiscal policy framework.<sup>67</sup> However, it has also been argued that an excessively tight fiscal policy contributed to the Riksbank's difficulties to bring inflation back to target in the period after the Great Moderation, see Leeper (2018).<sup>68</sup> It has also been noted that the policy mix – low interest rates and declining government debt – has led to a structural change in the composition of national debt. The decline in public debt has been associated with an increase in private debt. Given the marked changes in public versus private debt, the policy mix may also have had implications for financial stability.

---

<sup>66</sup> It has been argued that the sharp rise in inflation in the US in 2021 largely could be attributed to fiscal policy, see for example Anderson and Leeper (2023), Cochrane (2022), and Guerrieri et al. (2023).

<sup>67</sup> See Jansson (2021) for comments on the Swedish discussion.

<sup>68</sup> Bianchi et al. (2023) also emphasise the importance of the policy mix between monetary and fiscal policy.

Some form of coordination or at least exchange of information between monetary and fiscal policy is arguably desirable. This is the message in a recent review of the Reserve Bank of Australia, which recommends ‘increased joint work between the Treasury and the RBA on the relative roles of fiscal and monetary policy’, see de Brouwer et al. (2023). There are different ways monetary and fiscal policy could be coordinated, while ensuring central bank independence, see for example Thedéen (2023). For example, central banks can publish scenarios to illustrate the effects on inflation and economic activity of fiscal policy, and the implications for monetary policy. More generally, it may be fruitful for the central bank and the government to have a dialogue about their respective views on the state of the economy. Each decision maker could clarify which assumptions and forecasts their decisions are based upon. Although this may seem like a natural recommendation for discussions without coordination, it would presumably involve more serious analysis of the interactions between monetary and fiscal policy than during previous decades of inflation targeting, at least in some countries, including Sweden.

## 4 Concluding remarks

A key factor behind the success of inflation targeting, not the least in stabilising inflation expectations and achieve price stability, has probably been its flexibility adapting to new economic circumstances. Inflation targeting central banks have – in response to large shocks and structural changes – been able to adapt their policies to promote price stability and stable economic growth in line with their mandates. Some lessons can still be learned from 30 years of inflation targeting. Here we suggest eight takeaways based on our discussions:

1. Central banks are important because the financial system is inherently fragile and the costs of financial crises and high and volatile inflation are very high. This means that financial stability risks have to be taken into account in the monetary policy analysis – in addition to price and output stability.
2. Incorporating models in the monetary policy analysis that better take into account frictions in the financial system should be given higher priority. This would improve our general understanding of the transmission channels of monetary policy, but could also lead to new recommendations for policy.
3. Central banks’ operational frameworks for monetary policy typically take financial stability risks into account. Policies such as asset purchases and loans that affect the size and structure of the central bank’s balance sheet should also be part of the standard toolkit. But more attention should be given to the transmission channels of such instruments and their implications for financial stability, for example via the credit and risk-taking channels.
4. High and growing debt levels are characteristic features of a modern financial system. But this gives rise to challenges for monetary policy and can, for example, create a trade-off between price and financial stability. This trade-off could in principle be handled similarly as the trade-off between price and output stability, unless sufficient financial stability can be achieved through other instruments than monetary policy.

5. While the role of aggregate demand for inflation and monetary policy has been much discussed, the conditions on the economy's supply side have not received the same attention. Systematic surprises of low or high inflation suggest that supply conditions deserve more analysis.
6. The links between monetary and fiscal policy are often overlooked by making too simplified fiscal policy assumptions. A greater role for models with a richer description of fiscal policy is needed in the monetary policy analysis in order to promote consistency between monetary and fiscal policies, given their different objectives.
7. Greater financial integration between countries has led to less national policy autonomy. This affects both monetary and financial market policies. To meet these challenges, greater international cooperation between central banks is necessary. This is well recognised in the areas of regulation and supervision, but a better understanding is needed of the implications of international integration also for monetary policy.
8. The unit of account role of central bank money is essential for monetary policy effectiveness, but new financial technologies may potentially threaten this role. The introduction of a CBDC may be one measure to mitigate the risks. Not only the consequences of a CBDC for efficiency and stability of the financial system need further study, but also the consequences for monetary policy.

We have discussed how structural changes in the economic environment have affected the central bank's main operations – monetary policy, financial stability risks and payments – and the links to fiscal policy. In the practical implementation of its operations, the central bank must create an organisation with separate functions: departments for monetary policy, financial stability, payments, asset management, etcetera. The central bank may also choose or be instructed to have separate decision making bodies for the different areas, and to communicate about them through different channels, for example, monetary policy reports, financial stability reports, etcetera. Regardless, if the different parts of the central bank's organisation, or the theories used to analyse or evaluate its activities, do not recognise the financial market imperfections and the links between the different operations, the central bank may in the end not fulfil its objectives to a satisfying extent. The nature of imperfections in financial markets determine the desired interventions by the central bank, not only in the form of normal monetary policy, but also the bank's measures to improve financial stability or the payment system.



## References

- Acharya, Viral (2015), 'Financial stability in the broader mandate for central banks: A political economy perspective', Working Paper no. 11, Hutchins Center on Fiscal and Monetary Policy.
- Acharya, Viral, Nicola Cetorelli and Bruce Tuckman (2024), 'Where do banks end and NBFIs begin?', Working Paper no. 32316, National Bureau of Economic Research.
- Ajello, Andrea, Nina Boyarchenko, Francois Gourio and Andrea Tambalotti (2022), 'Financial stability considerations for monetary policy: Theoretical mechanisms', Finance and Economics Discussion Series no. 2022-005, Federal Reserve Board.
- Anderson, Joe and Eric M. Leeper, (2023), 'A fiscal accounting of COVID inflation', Mercatus Special Study, Mercatus Center at George Mason University.
- Archer, David (2016), 'A coming crisis of legitimacy?', *Sveriges Riksbank Economic Review*, no. 3, pp. 86–95.
- Armelius, Hanna, Carl Andreas Claussen and Scott Hendry (2020), 'Is central bank currency fundamental to the monetary system?', *Sveriges Riksbank Economic Review*, no. 2, pp. 19–32.
- Armelius Hanna, Gabriela Guibourg, Stig Johansson, and Johan Schmalholz (2020), 'E-krona design models: pros, cons and trade-offs', *Sveriges Riksbank Economic Review*, no. 2, pp. 80–96.
- Bernanke, Ben S. (1983), 'Non-monetary effects of the financial crisis in the propagation of the Great Depression', *American Economic Review*, vol. 73, pp. 257–276.
- Bernanke, Ben S. (2024), 'Forecasting for monetary policy making and communication at the Bank of England: A review', Bank of England, 12 April 2024.
- Bertsch, Christoph (2023), 'Stablecoins: Adoption and fragility', Working Paper no. 423, Sveriges Riksbank.
- Bertsch, Christoph and Johan Molin (2016), 'Revisiting the role of central banks as liquidity providers – old and new challenges', *Sveriges Riksbank Economic Review*, no. 2, pp. 89–158.
- Bianchi, Francesco, Renato Faccini and Leonardo Melosi (2023), 'A fiscal theory of persistent inflation', *The Quarterly Journal of Economics*, vol. 138, pp. 2127–2179.
- Bindseil, Ulrich (2016), 'Evaluating monetary policy operational frameworks', in *Designing Resilient Monetary Policy Frameworks for the Future*, Proceedings from the Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City, pp. 179–277.
- Bindseil, Ulrich (2018), 'An introduction to central banking – lecture notes', mimeo.

Bindseil, Ulrich, Marco Marrazzo and Stephan Sauer (2024), 'The impact of central bank digital currency on central bank profitability, risk taking and capital', in *Central Bank Capital in Turbulent Times, Central Bank Capital in Turbulent Times*, edited by Dirk Broeders, Aerd Houben and Matteo Bonetti, Springer.

Blanchard, Olivier and Jordi Galí (2007), 'Real wage rigidities and the New Keynesian model', *Journal of Money, Credit and Banking*, vol. 39, pp. 35–65.

Borio, Claudio (2014), 'The financial cycle and macroeconomics: What have we learned?', *Journal of Banking and Finance*, vol. 45, pp. 182–198.

Borio, Claudio and Philip W. Lowe (2002), 'Financial and monetary stability: Exploring the nexus', Working Paper no. 114, Bank for International Settlements.

Bossu Wouter, Masaru Itatani, Catalina Margulis, Arthur Rossi, Hans Weenink, and Akihiro Yoshinaga (2020), 'Legal aspects of central bank digital currency: Central bank and monetary law considerations', Working Paper no. WP/20/254, International Monetary Fund.

Breeden, Sarah (2022), 'Risks from leverage: How did a small corner of the pensions industry threaten financial stability?', speech, 7 November 2022, Bank of England.

Broeders, Dirk, Aerd Houben and Matteo Bonetti (2024), *Central Bank Capital in Turbulent Times*, Springer.

Brunnermeier, Markus, Harold James and Jean-Pierre Landau (2019), 'The digitalization of money', Working Paper no. 941, Bank for International Settlements.

Bryant, Ralph C., Dale W. Henderson and Torbjörn Becker (2012), *Maintaining Financial Stability in an Open Economy: Sweden in the Global Crisis and Beyond*, SNS Förlag.

Buiter, Willem H. (2024), 'Central bank capital adequacy: the simple analytics and complex politics', in *Central Bank Capital in Turbulent Times, Central Bank Capital in Turbulent Times*, edited by Dirk Broeders, Aerd Houben and Matteo Bonetti, Springer.

Buiter, Willem, Stephen Cecchetti, Kathryn Dominguez and Antonio Sánchez Serrano (2023), 'Stabilising financial markets: lending and market making as a last resort', Reports of the Advisory Scientific Committee, no. 13, European Systemic Risk Board.

Buncic, Daniel (2024), 'Econometric issues in the estimation of the natural rate of interest', *Economic Modelling*, vol. 132, pp. 1–18.

Bylund, Emma, Jens Iversen and Anders Vredin (2024), 'Monetary policy in Sweden after the end of Bretton Woods', *Comparative Economic Studies*, vol. 66, pp. 535–590.

Capie, Forrest, Charles Goodhart and Norbert Schnadt (1996), 'The development of central banking', in *The Future of Central Banking: The Tercentenary Symposium of the*

*Bank of England*, edited by Forrest Capie, Stanley Fischer, Charles Goodhart and Norbert Schnadt, Cambridge University Press, pp. 1–261.

Cecchetti, Stephen G., Hans Genberg, John Lipsky and Sushil Wadhvani (2000), 'Asset prices and central bank policy', Geneva Reports on the World Economy, no. 2, International Center for Monetary and Banking Studies and Centre for Economic Policy Research.

Cecchetti, Stephen G. and Jens Hilscher (2024), 'Fiscal consequences of central bank losses', in *Central Bank Capital in Turbulent Times, Central Bank Capital in Turbulent Times*, edited by Dirk Broeders, Aerdt Houben and Matteo Bonetti, Springer.

Clarida, Richard, Jordi Galí, and Mark Gertler (1999), 'The science of monetary policy: A New Keynesian perspective', *Journal of Economic Literature*, vol. 37, pp. 1661–1707.

Cochrane, John (2022), 'Fiscal histories', *Journal of Economic Perspectives*, vol. 36, pp. 125–146.

Cochrane, John (2023), *The Fiscal Theory of the Price Level*, Princeton University Press.

Cooley, Thomas F. (1995), *Frontiers of Business Cycle Research*, Princeton University Press.

Corsetti, Giancarlo, Barry Eichengreen, Xavier Vives and Jeromin Zettelmeyer (2023), 'The international economic and financial order after the pandemic and war', *The Future of Banking 5*, Centre for Economic Policy Research.

de Brouwer, Gordon, Renee Fry-McKibbin and Carolyn Wilkins (2023), 'An RBA fit for the future', *Review of the Reserve Bank of Australia*, Australian Government, March 2023.

Diamond, Douglas W. and Philip H. Dybvig (1984), 'Bank runs, deposit insurance, and liquidity', *Journal of Political Economy*, vol. 91, pp. 689–721.

Dincer, N. Nergiz and Barry Eichengreen (2014), 'Central bank transparency and independence: Updates and new measures', *International Journal of Central Banking*, vol. 10, pp. 189–253.

Dincer, N. Nergiz, Barry Eichengreen and Petra Geraats (2022), 'Trends in monetary policy transparency: Further updates', *International Journal of Central Banking*, vol. 18, pp. 3331–348.

Farelius, David, Stefan Ingves, and Magnus Jonsson (2020), 'Financial integration in the Nordic-Baltic region vis-à-vis the EU: A Swedish perspective', Policy note no. 189, SUERF.

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

- Ferguson, Niall, Andreas Schaab and Moritz Schularick (2015), 'Central bank balance sheets: Expansion and reduction since 1900', Discussion Paper no. 10635, Centre for Economic Policy Research.
- Ferguson, Niall, Paul Schmelzing, Martin Kornejew and Moritz Schularick (2023), 'The safety net: Central bank balance sheets and financial crises, 1587-2020', Discussion Paper no. 17858, Centre for Economic Policy Research.
- Filardo, Andrew and Boris Hofmann (2014), 'Forward guidance at the zero lower bound', *BIS Quarterly Review*, March 2014, pp. 37–53.
- Fleming, Marcus (1962), 'Domestic financial policies under fixed and floating exchange rates', *IMF Staff Papers*, vol. 9, pp. 369–379.
- Galí, Jordi, (2015), *Monetary Policy, Inflation, and the Business Cycle*, Princeton University Press.
- 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, pp. 5–53.
- Goodhart, Charles A.E. (1987), 'Why do banks need a central bank?', *Oxford Economic Papers*, vol. 39, pp. 75–89.
- Gorton Gary B. and Jeffery Y. Zhang (2021), 'Taming wildcat stablecoins', *The University of Chicago Law Review*, vol. 90:2, pp. 909–971.
- Gorton, Gary B. and Jeffery Y. Zhang (2024), 'Protecting the sovereign's money monopoly', *Alabama Law Review*, vol. 75:4, pp. 955–1007.
- Grodecka-Messi, Anna and Xin Zhang (2023), 'Private bank money vs central bank money: A historical lesson for CBDC introduction', *Journal of Economic Dynamics and Control*, vol. 154, pp. 1–19.
- Guerrieri, Veronica, Michala Marcussen, Lucrezia Reichlin and Silvana Tenreyro (2023), 'The art and science of patience: Relative prices and inflation', Geneva Reports on the World Economy 26, Centre for Economic Policy Research.
- Hall, George J. and Thomas J. Sargent (2022), 'Three world wars: Fiscal-monetary consequences', *Proceedings of the National Academy of Sciences*, vol. 119.
- Hansson, Jesper, Marianne Nessén and Anders Vredin (2018), 'The storm after the calm – lessons for monetary policy analysis', *Sveriges Riksbank Economic Review*, no. 4, pp. 69–88.
- Hauser, Andrew (2022), 'Thirteen days in October: How central bank balance sheets can support monetary and financial stability', speech, 4 November 2022, Bank of England.

- Ilzetzki, Ethan, Carmen M. Reinhart and Kenneth S. Rogoff (2019), 'Exchange rate arrangements entering the twenty-first century: Which anchor will hold?', *Quarterly Journal of Economics*, vol. 134, pp. 599–646.
- IMF (2015), 'Monetary policy and financial stability', Staff Report, September 2015.
- Ingves, Stefan (2020), 'Future money and payments', *Economic Commentaries* no. 9, Sveriges Riksbank.
- Ingves, Stefan, Eva Julin, Stefan Lindskog, Gabriel Söderberg and David Vestin (2022), 'What is money and what is the role of the state in the payments market', *Sveriges Riksbank Economic Review*, no. 2, pp. 6–25.
- Jansson, Per (2021), 'Is it time to review the division of roles in macroeconomic policy?', speech, 8 December 2021, Sveriges Riksbank.
- Jonsson, Magnus and Emelie Theobald (2019), 'Changed labour market – effects on prices and wages, the Phillips curve and the Beveridge curve', *Sveriges Riksbank Economic Review*, no. 1, pp. 30–50.
- Kolasa, Marcin, Stefan Laséen, and Jesper Lindé (2025), 'Unconventional monetary policy in a small open economy', manuscript, Sveriges Riksbank.
- Kockerols, Thore and Christoffer Klok (2021), "'Leaning against the wind", macroprudential policy, and the financial cycle', *International Journal of Central Banking*, vol. 17, pp. 177–235.
- Leeper, Eric M. (1991), 'Equilibria under "active" and "passive" monetary and fiscal policies', *Journal of Monetary Economics*, vol. 27, pp. 129–147.
- Leeper, Eric M. (2018), 'Sweden's fiscal framework and monetary policy', *Sveriges Riksbank Economic Review*, no. 2, pp. 16–48.
- Leeper, Eric M. and Campbell Leith (2016), 'Understanding inflation as a Joint monetary-fiscal phenomenon', in *Handbook of Macroeconomics*, vol. 2B, edited by John Taylor and Harald Uhlig, Elsevier.
- Mundell, Robert (1963), 'Capital mobility and stabilization policy under fixed and flexible exchange rates', *Canadian Journal of Economics and Political Science*, vol. 29, pp. 475–485.
- Ohanian, Lee E. (2001), 'Shrinking money and the effectiveness of monetary policy', in *Challenges for Central Banking*, edited by Anthony Santomero, Staffan Viotti and Anders Vredin, Kluwer Academic Publishers, pp. 229–245.
- Persson, Torsten and Guido Tabellini (2024), 'Optimal contracts and inflation targets revisited', Working Paper no. 436, Sveriges Riksbank.
- Philippon, Thomas and Ariell Reshef (2013), 'An international look at the growth of modern finance', *Journal of Economic Perspectives*, vol. 27, pp. 73–96.

- Rachel, Lukasz and Thomas D. Smith (2017), 'Are low real interest rates here to stay', *International Journal of Central Banking*, vol. 13, pp. 1–42.
- Rajan, Raghuram G. (2005), 'Has financial development made the world riskier?', in *The Greenspan Era: Lessons for the Future*, Proceedings from the Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas City, pp. 313–369.
- Rangvid, Jesper (2024), 'Does the choice of monetary policy regime matter? Evidence from the Nordics', in *Economic Policy beyond the Pandemic in the Nordic countries*, Nordregio report 2024:12.
- Rey, H el ene (2016), 'International channels of transmission of monetary policy and the Mundellian trilemma', *IMF Economic Review*, vol. 64, pp. 6–35.
- Roberds, William and Francois R. Velde (2016), 'The descent of central banks (1400 – 1815)', in *Central Banks at a Crossroads*, edited by Michael Bordo,  yvind Eitrheim, Marc Flandreau and Jan Qvigstad, Cambridge University Press, pp. 18–61.
- Rogoff, Kenneth (1985), 'The optimal degree of commitment to a monetary target', *Quarterly Journal of Economics*, vol. 100, pp. 1169–1190.
- Scharfstein, David S. (2018), 'Presidential address: Pension policy and the financial system', *Journal of Finance*, vol. LXXIII, pp. 1463–1512.
- Smets, Frank (2013), 'Financial stability and monetary policy: How closely linked?', *Sveriges Riksbank Economic Review*, no. 3, pp.121–160. Also available in *International Journal of Central Banking*, June 2014, pp. 263–300.
- Sims, Eric, Jing Cynthia Wu and Ji Zhang (2023), 'The four-equation New Keynesian model', *Review of Economics and Statistics*, vol. 105, pp. 931–947.
- Svensson, Lars E.O. (1997), 'Inflation forecast targeting: Implementing and monitoring inflation targets', *European Economic Review*, vol. 41, pp. 1111–1146.
- Svensson, Lars E.O. (1998), 'Inflation targeting in an open economy: Strict or flexible inflation targeting?', *Victoria Economic Commentaries* 15-1, March 1998.
- Svensson, Lars E.O. (2012), 'Comment on Michael Woodford, "Inflation targeting and financial stability"', *Sveriges Riksbank Economic Review*, no. 1, pp. 33–39.
- Sveriges Riksbank (2017a), 'Evaluation of the Riksbank's forecasts', Riksbank Studies, May 2017.
- Sveriges Riksbank (2017b), 'The Riksbank's experiences of publishing repo rate forecasts', Riksbank Studies, June 2017.
- Thed en, Erik (2023), 'The links between monetary policy, financial stability and fiscal policy', speech at Swedish Economic Association, 23 May 2023, Sveriges Riksbank.
- Waldenstr om, Daniel (2022), 'The national wealth of Sweden, 1810 – 2020', in *Banking, Bonds, National Wealth, and Stockholm House Prices, 1420–2020*, edited by

Rodney Edvinsson, Tor Jacobson and Daniel Waldenström, Sveriges Riksbank/Ekerlids Förlag, pp. 353–448.

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