"A Fed for Our Times, a review essay on Twentieth Century Monetary Policy by Ben Bernanke" [working title]

Lucrezia Reichlin[1]

Abstract

This essay reviews *21st Century Monetary Policy* by Ben Bernanke, a fascinating account of the evolution of the Fed since the 1950s, and a stalwart defense of the status quo: of the Fed's remit, its independence, and the tools and practices it now uses to pursue its mandate. The essay supports many of Bernanke's key points and brings the experience of the ECB to illuminate them by contrast. However, it argues that the book understates the significance of the changes in institutional architecture that have emerged since the crisis. Questions that we thought had been settled are going to have to be addressed anew, albeit in slightly different guises. This will have implications for all aspects of economic governance.

Introduction[2]

Emerging from the multiple crises of the last fifteen years, central banking has changed beyond recognition, in the US as well as in other jurisdictions. The balance sheet of the Federal Reserve is now over 8 trillion US dollars, almost ten times what it was in 2007; the tools of both monetary and financial stability policy have changed and proliferated; and the Fed's role has expanded, as it has today broader responsibilities for financial supervision.

How did we get here? And is this the new normal? *21st Century Monetary Policy* by Ben Bernanke tells the story. Its author was at the center of the action during much of this extraordinary era and had the privileged and unusual perspective of being both a leading academic in monetary economics and the world's most powerful central banker during the Global Financial Crisis. Overall, it is a sober account from an academic whose wisdom reflects both his practical experience and his understanding of economic history. It is a fascinating read.

The book's central thesis is that the changes the Fed has seen since the 1950s, no matter how radical they have been, are for the most part the result of economic developments rather than changes in economic theories or in the Fed's formal powers. Lessons were learned but the Fed's monetary policy is still based on a modernized form of Keynesian economics, driven by the objective of leaning against the wind, and its financial stability policy is still rooted in the lender of last resort function. These foundations have not changed since the 1950s.

The book stresses the importance, in guiding or constraining the Fed's actions, of changes in the broader political and social consensus. In that sense, a strict interpretation of independence has never applied. Rather, the Fed has always needed to engage with the Administration and in particular with Congress, although facing different degrees of constraint, depending on the circumstances. Again, continuity,

[1] London Business School and CEPR

[2] I would like to thank David Romer, editor of the JEL, Mark Gertler, and Kinda Hachem for their helpful comments on the first draft of this review essay.

rather than radical change, has characterized the Fed's relationship with the legislative and executive powers.

I will suggest that, while the bulk of the evidence supports Bernanke's view that Volcker's response to the great inflation was a reassertion of the stabilization role that the Fed had successfully played in the 1950s and early 1960s, changes in the operational framework introduced during and after the Global Financial Crisis, and strengthened during the pandemic, embody a more radical shift in the role of the Federal Reserve in the market and in government than acknowledged in the book.

I will argue that this has not been due to a change in the interpretation of independence or in the Fed's relationship with Congress and the Administration, but rather a change in the role that the Fed has acquired in the market as guarantor of liquidity and market maker of last resort. I will agree with the analysis of the book that this role was critical in successfully dealing with both the 2007-2009 financial crisis and the pandemic and that it is likely to remain, as it should, a permanent feature of the operational framework, but with radical consequences for the fiscal footprint of monetary policy and the architecture regulating financial markets and monetary policy.

Bernanke identifies himself as an economic historian and says that he sees no alternative to the 'historical lens' for understanding how the Fed's tools, strategies and communications have evolved. Accordingly, I will start with some thoughts on his historical narrative. I will then consider what light the experience of the European Central Bank can shed on the issues Bernanke raises. I focus on the ECB in particular because the experience of a central bank fighting crises without a fiscal counterpart illuminates, by contrast, some of the issues which Bernanke discusses: in relation to the tension between liquidity and solvency, coordination between monetary and fiscal policy, the ample reserves operational model, and independence.

In the final section, I will discuss Bernanke's main arguments in relation to three core themes: (1) the operational framework and the Fed's balance sheet, (2) the Fed's fiscal footprint, and (3) central bank independence.

Section 1: The Historical Lens

The narrative of the seventy years covered by the book is detailed, clear and pragmatic. Whether he is recording events in which he was directly involved, or events which took place well before or after, there is no sense of partisanship or ideology: the central characters, whatever their political affiliations, are written as sensible people trying to do their best for the institution and the country. Of course, mistakes were made, from time to time, but these were mainly due to exigencies of circumstance. The book is therefore, in the best sense, an insider's view – well informed, but fundamentally pre-disposed in favor of the inherited tenets and ethos of the Fed.

Bernanke covers the ground more or less evenly from the early 1950s up to the pandemic – stopping immediately short of the renewed take-off of inflation in 2021 – but two big episodes dominate: the great inflation of the 1970s and the Global Financial Crisis of 2007-2009 together with the recession which followed. The challenges that the Fed faced in those circumstances were different and mistakes were made but, with the exception of the period of Burns' chairmanship (to which in any case Bernanke gives a nuanced judgement), the system proved to be robust and flexible enough to adapt. Its history is a demonstration of the power of monetary policy as a macroeconomic stabilization tool and the importance of the role of government in stabilizing financial markets.

20th Century: The Rise and Fall of Inflation

Bernanke's narrative takes the Federal Reserve Accord of 1951 as its starting point, reflecting his view, shared with other historians of the Fed, that the independence then gained and the shift in focus from supporting government finance to economic stabilization mark this point as the beginning of modern central banking. The Accord was reached between the Fed and the Treasury after a series of clashes over the maintenance of the 'peg' – a policy whereby the Fed held interest rates on government debt. Although the Accord did not formally codify its independence and a definition of its mandate was not clearly stated, with the end of the peg the Fed acquired the freedom to exercise a role in stabilizing inflation and implementing counter-cyclical policies. That it should play such a role was very much in tune both with the new political consensus and with the new intellectual paradigm – a Keynesian belief that the government had both the ability and the duty to intervene to stabilize the economy.

In the 1950s, Fed Chairman William McChesney Martin Jr successfully implemented policies which leaned against cyclical winds and pre-emptively struck against inflation when needed. The central question of the first part of the book is why the Fed then lost control of inflation in the late 1960s and through the 1970s

In line with other historical accounts (see, for example, Blinder 2022), Bernanke describes Martin as being caught in a "game of chicken" with the Treasury which forced him to react to stimulative fiscal policy. Martin was firm enough to tighten in May 1965 and to continue tightening in 1966 against the background of expansionary fiscal policy but he reversed course when the Administration introduced a temporary increase in income tax. Notwithstanding a semi-formal framework of monetary-fiscal coordination which involved regular meetings of the 'Quadriad', a group comprising the Fed chair, the Treasury Secretary, the White House budget Director and the Chair of the Council of Economic Advisors, coordination did not work. The result was that in 1967 and 1968 both monetary and fiscal policies were excessively loose. When Arthur Burns took office as Chairman of the Fed in January 1970, inflation was 6%. Was the Fed to blame? Bernanke's judgement is that "the inflation of the latter half of the 1960s was mostly the result of guns-and-butter fiscal policies", albeit that the natural rate of unemployment was also underestimated, by the Fed among others. But poor coordination with Treasury is also key, according to his narrative.

More controversial is Bernanke's account of Burns's chairmanship. In textbook accounts, that period is often given as an example of the dangers of insufficient independence but the explanation is more complex. The Fed's reluctance to act has also been attributed to Burns' belief that monetary policy was not an effective instrument in fighting inflation (e.g., De Long, 1997), or to the idea that the existence of a long-run Phillips curve could not be exploited for monetary policy, or else to imperfect knowledge and learning (see Romer and Romer, 2002, and Sargent, 1999 for alternative views). Rotemberg, 2013, in reviewing this debate, provides a skeptical assessment and describes changes in the Fed's stance and operational procedures through history as reaction to mistakes ("a form of penitence in response to poor outcomes"). The response, according to Rotemberg, is not the result of learning but can be rather described as a two-state system in which the Fed oscillates from one state to another in a process devoid of historical memory.

Bernanke's discussion does attribute more importance than Rotemberg to the role of academic development in influencing the course of monetary policy. In particular, the combination of the natural rate theory and the importance of credibility is recognized to have affected the course of Fed thinking.

However, Bernanke's account can be seen as consistent with that suggested by Binder and Spindel (2017), which is a kind of political economy version of Rotemberg's 2 state narrative. As a result of changes in economic circumstances, societal consensus on what really matters also changes, and the Fed cannot ignore it. Burns's reluctance to act firmly against inflation is explained by the fact that the consensus in Congress at the time was that unemployment had to be the priority. Pressure from President Nixon, and the Keynesian economic orthodoxy of the time do not explain everything. As Bernanke writes: "*Action to fight inflation would have to wait for both a new political consensus, driven by the growing popular conviction that inflation was the nation's greatest economic challenge, and a new perspective and personality at the Fed*." (page. 30).

In line with this logic, Volcker's conquest of inflation is explained not only by his leadership and independence from politics but at least in part by a change of mood and an appreciation by politicians that inflation had become a major problem. As support for this hypothesis, it should be noted that the Fed's poor performance in the 1970s led to the Federal Reserve Reform Act of 1977 which increased Federal Reserve's accountability and formalized the dual mandate, establishing the inflation objective as well as that of maximum employment.[3].

At the end, Bernanke's lessons from the Volcker era are that central banks can keep inflation low if they are credible and persistent (the "credibility bonus") and that this is only possible with a reasonable degree of independence. Congress, once inflation became its top priority, did give Volcker sufficient independence, and so did the Carter and Reagan Administrations.

Volcker's tenure, in the interpretation of the book, did not represent the victory of monetarism (the monetary targeting operational framework was discontinued after a brief experiment), but rather an adjustment of the existing policy framework to new economic circumstances. It put an end to the expansionary bias of 1960s policy, but not to the "leaning against the wind" principle of monetary policy which Martin had ushered in in the 1950s. It rather transformed that principle into a "leaning against the wind with credibility" framework by adding the constraint that, in order for monetary policy to be effective, bond markets must believe that leaning against the wind will maintain trend inflation at a low, unchanged rate (Hetzel, 2008). This was later formulated in different forms of inflation targeting, which Bernanke supports in its flexible version. Indeed, the formal introduction of a numerical inflation target in 2012 is part of Bernanke's legacy, and the Flexible Average Inflation Targeting (FAIT) adopted by the Fed in 2020 is a reformulation consistent with those principles.

---

[3] The 1977 Reform Act directs the Federal Reserve to, "maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote the goals of maximum employment, stable prices, and moderate long-term interest rates." This is known as the dual mandate since long-term interest rates can remain low only in a stable macroeconomic environment, which makes that objective redundant.

The first part of the book concludes with an account of the Greenspan era and the period of the 'great moderation'. With inflation conquered and credibility secured, Greenspan faced different challenges: a series of financial crises and two mild recessions, caused by financial factors. Greenspan skillfully dealt with the 1987 crash. Later, in response to the 1990 oil shock, triggered by the Iraqi invasion of Kuwait, he let inflation briefly spike up but then achieved a soft landing, most likely thanks to the credibility bonus gained in the Volcker era.

The new millennium saw the decline of global inflation and of nominal and real long term interest rates as the result of international factors which required new adaptation and innovation in monetary policy. Bernanke's narrative for those years stresses that it was a period of active cooperation with Treasury which effectively ensured the coherence of monetary and fiscal policies and that that cooperation was key in addressing the financial crises, including the international ones. On those occasions the Fed acted as international lender of last resort via swap agreements with other central banks, measures that were used again in the crises of the 21st century.

Again, the book emphasizes continuity rather than radical change. The innovations of the Greenspan era – the use of pre-emptive strikes against inflation, the risk management approach to monetary policy, the introduction of an early form of forward guidance – were improvements to the existing framework. Greenspan's success was not the success of a new theory but the result partly of luck and partly of skill and flexibility.

Bernanke does acknowledge that insufficient attention was paid during this period to the development of financial fragilities – in particular in shadow banking – but the idea that monetary policy, by keeping interest rates low for too long, could have been the cause of the excessive leverage and the root of the Global Financial Crisis, is rejected. This is not a surprise: Bernanke has written extensively on the international and structural causes of low interest rates and has attributed the financial fragilities that built up in this period to poor regulation rather than to monetary policy – a view that is reasserted here.

In the late 1980s and 1990s financial instability problems became more frequent and the Fed – under both Volcker and Greenspan – stepped in several times to deal with financial crises, a feature that gained larger proportions in the following decade and one that the author recognizes as one of the challenges of the 21st century. I will return to the implications of this point in the last section.

21st Century: The Global Financial Crisis and the Great Recession

The Fed's response to the Global Financial Crisis was characterized by great innovation in the operation of monetary policy and by intense cooperation with the Treasury. It resulted in a significant expansion of the role the Fed played in financial markets. The Fed became not only the 'lender of last resort' but also the central intermediary in the interbank money market and market maker for securities transactions.

However, at the risk of simplification, Bernanke's diagnosis of the crisis can be summarized as *'This Time Was Not Different'*. He writes: "The 2007-2008 crisis was an old-style financial panic in new clothes where the novelty was that the fragile core was the shadow banking system rather than regulated banks" (p. 119).

The response was nevertheless quite different; the Fed experimented and improvised with a new set of tools, in the process establishing a new operational framework. These new tools can conveniently be classified according to whether they were aimed at stabilizing the economy or the financial markets, although this is clearly a simplification because the two functions are complementary.

In its monetary policy rôle the Fed responded by designing policies that acted as a substitute for the normal practice of steering the short-term interest rate, which was constrained by the zero lower bound. The principal instruments were asset purchases (quantitative easing, QE) and the enhancement of forward guidance. These innovations are Bernanke's particular legacy.

QE and forward guidance affect inflation and output via their effect on the long end of the yield curve: the increase in the central bank's balance sheet is the consequence of these policies but has no macroeconomic significance. Understood in this way, asset purchases can be explained in terms of the traditional monetary policy framework: steering the (long term) interest rate to lean against the wind.

Economists have long debated whether these policies are effective when markets are not disrupted but Bernanke argues, as he did in his American Economic Association Presidential Address, that they are, drawing on the Fed's empirical research (Bernanke, 2020). By implication, assuming that downward structural pressures on the natural rate will continue, these policies are here to stay and to be used when needed.

In common with many complex empirical problems in economics, the debate on the empirical evidence for the effectiveness of QE is not likely to be settled any time soon. On balance, empirical results show that QE helps for both financial stability and macroeconomic stability, especially when financial markets are disrupted. In normal times, the evidence on the macroeconomic effect of QE is less clear. From the third quarter of 2009 the US economy entered the longest recovery in the post war period, but the rate of growth was dismal. It is not clear to what extent this can be attributed to the ineffectiveness of QE, to the lack of sufficient support from fiscal policy, or to structural factors affecting potential output. Even acknowledging this uncertainty, there would be no reason not to keep QE in the toolbox, as a substitute for steering the short-term interest rate if circumstances require it, unless there were large and unmanageable risks associated with it. How should we understand these risks?

Acharya, Rajan, Chahuan and Steffen, 2022, have suggested that QE carries the seeds of financial instability as it leads to an increase in banks' (flighty) wholesale deposits and creates an "addiction" to central bank liquidity. However, while it is true that the total volume of bank reserves sets a maximum for the total volume of bank deposits, whether bank deposits are at that maximum may depend on market demand, or on commercial banks' management decisions, or on other regulatory constraints. As for any other tool of monetary policy, QE has implications for financial prices, and may therefore affect demand for deposits, but does not necessarily alter banks' liquidity demand. With this in mind, Bernanke's judgment that QE should remain in the central banks' toolbox seems reasonable.

It is less easy to argue that the balance sheet policies introduced to stabilize markets represent continuity, since they imply a radical extension of the traditional lender of last resort function to market making. This extension of the Fed's role, which goes well beyond Bagehot, has profound implications as I will stress below.

The Fed had to deal with an initial liquidity crisis in the wholesale market that led to deleveraging and panic. Acting directly in transactions with market participants, the Fed effectively substituted itself in place of the interbank market. Whereas before the crisis banks raised funds from the interbank market by selling securities while the Fed was lending to the dealers against collateral, now the Fed lent to banks that could not fund themselves in the market and financed those loans by selling securities to the banks which had formerly been lenders. As a result, its balance sheet expanded. Unlike the ECB (see next section), which already had the operational framework to do this, the Fed had to put in place various facilities to perform this function, dealing with each of the shortcomings of the existing system: the stigma attached to going to the discount window, the narrow eligibility criteria for the use of the deposit facilities at the Fed, and the narrow criteria for the collateral requirements of its lending facilities.

In addition to this, in October 2008[4] the Fed started paying interest on required and excess reserves, adopting a practice that was already in use at the ECB. Since then, it has run a system of "ample reserves" whose permanent adoption was announced in January 2019. This system had been advocated by Woodford (2000) and Goodfriend (2002) as an application of the "Friedman rule" with respect to bank reserves[5]: the central bank should provide reserves up to the point of satiating banks' demand. This new approach has two main advantages with respect to the previous system of scarce reserves: it makes it easier to increase interest rates without first shrinking the balance sheet when exiting from a period of asset purchases, and it cushions banks against liquidity stress.

This system has financial stability benefits and, contrary to fears expressed in the popular press, is not inflationary since the supply and demand for reserves are exactly matched. However, it centralizes functions in the money creation system – the creation and transmission of liquidity through interbank trading – which were previously decentralized.

The change in the operational framework also has a bearing on the argument about the Fed's mandate. Although I agree with Bernanke that there are good reasons to resist the idea of broadening the Fed's mandate to include financial stability, the new operational framework does imply greater overlap in the goals of monetary policy and regulation and this, as argued by Stein (2013), may be a good thing as it is likely to be the only way to achieve an effective macroprudential approach to financial stability.

The Fed also had to deal with the insolvency of single financial institutions. The story of those months and of the response that the Fed and Treasury made in cooperation, although dramatic, corresponds to a more familiar narrative of the role of government in financial crises.

The book focuses on whether the role the Fed played in dealing with single institutions was legitimate and the big question of why Lehman was not saved. Bernanke observes, as others have, that in 2008 the Fed's role went beyond cooperation with the Treasury in bailing out banks. By using a special legislative power designed for exceptional circumstances, it went as far as becoming an investor in a failing institution. As David Wessel put it, the legal licence to do "whatever it takes" was an undefined phrase in a 1932 federal law that had atrophied through lack of use: Section 13(3) of the Federal

[4] The Fed's authority to pay interest on reserve balances had been granted by Congress some time earlier but was not due to come into effect until 2011. In the circumstances the Fed successfully lobbied for the effective date to be brought forward to October 2008.

[5] The 'Friedman rule' states that the opportunity cost of holding the social means of payment (i.e., cash) should be zero, since the marginal cost of producing cash is approximately zero. Satiation of reserves is, therefore, the Friedman rule applied to reserves.

Reserve Act (Wessel, 2009). It started with the loan to Bear Stearns (which made possible the JP Morgan acquisition) and the AIG deal. Yet, Lehman was not saved, and the systemic banking crisis not avoided. Why then was Lehman not saved?

Bernanke makes two comments. First, Lehman could not have been saved because it was "deeply insolvent" and therefore neither the Treasury nor the Fed had the authority to do it.[6] Second, even if it had been saved, the meltdown would still not have been avoided since what was needed to avoid it was a large fiscal commitment that only Congress could grant. Eventually Congress did just that by approving the $ 700 billion Troubled Asset Relief Program (TARP), but it took time. According to Bernanke, the fact that the proposal was rejected at first proves the point that, in September 2008, the political commitment was not yet there.

This conclusion on the limits of central bank action when fiscal backing is not assured is supported by the analysis of ECB policies during the financial crisis, as I will argue in Section 2.

21st Century: From Liftoff to the COVID-19 Pandemic

In 2014-2016 the Fed was confronted with new problems. With Yellen (and then with Powell) two issues had to be addressed. First, as the economy recovered, how to calibrate monetary policy tightening by using different instruments. The Fed had to face delicate trade-offs between monetary policy and financial stability: with tightening, the macro and financial stabilization functions of balance sheet policies were potentially in conflict. Tightening started only in December 2016 and the balance sheet began to shrink in 2017. As Bernanke describes, a problem was that the FOMC gave no explicit guidance about when the balance sheet would stop shrinking. In his discussion, he formulates the problem the FOMC was facing as one of achieving the double objective of controlling the short-term interest rate and the size of the balance sheet.

The second issue confronting Yellen and Powell was how to characterize the "new normal" (post crisis) monetary policy operational framework. As Bernanke says: *"The new exit principles did not specify the final size of the balance sheet. But in a nod to QE critics, both internal and external, the principles [set out in minutes of the June 2011 FOMC meeting] said that, in the long run, the Fed would hold no more securities than those needed to implement monetary policy "efficiently and effectively". Exactly what that phrase meant would be debated by the Committee for some time"* (page 206). Indeed, in the new ample reserves system, the size of the balance sheet depends on demand for reserves, which is hard to predict and volatile. The turmoil in the repo market, which materialized in December 2019, illustrates this point. A shortage of reserves caused a liquidity crisis and the Fed, realizing that balance sheet shrinkage had gone too far, reversed course and expanded the balance sheet. Although, as the Fed explained, this need not have monetary policy implications, the event illustrates the difficulty of determining the 'normal' size of the balance sheet when facing uncertain and volatile demand for reserves

The narrative of the period 2016-2019 highlights a lack of clarity by the Fed on how to conduct monetary policy – specifically tightening – with the new operational framework. In principle, with the ample reserve system, the interaction between interest rate and balance sheet size should not have been a preoccupation since the two are disconnected.

[6] Bernanke's argument has been disputed, in particular by Laurence Ball, "The Fed and Lehman Brothers: Setting the Record Straight on a Financial Disaster", 2018.

As for determining the normal size of the balance sheet in a demand driven framework, the Fed had to proceed by 'trial and error'. I suspect that this will continue since the demand for reserves is influenced by many factors, including financial regulations.

The last part of the chapter is dedicated to the response to Covid. When Covid struck, the Fed acted massively both as lender of last resort and to stabilize the economy, as it had done during the financial crisis although the Fed's COVID-19 response stands apart in its magnitude. The logic was the same as that guiding action in 2007-09 but this time around the Fed had the advantage of having learned lessons from that experience. Many of the special facilities that had been implemented during the Global Financial Crisis were reinstated and the Fed's emergency lending authority under Section 13(3) of the Federal Reserve Act was invoked, as it had been in 2008-09.

This time the Fed went further, both in its financial intermediation role and in implementing quasi-fiscal policies. The Main Street lending programs were particularly notable. Under the CARES Act, the Fed participated directly in loans to non-financial firms originated by eligible commercial banks (the Main Street lending program) and the Treasury provided a $75 billion backstop to cover losses. This was fiscal policy implemented by the central bank.

Why was this role delegated to the Fed and what does this mean for the future? Both benevolent and malevolent explanations are possible. The benevolent one is that the Fed may have more expertise in operating such programs and can act in a timelier way. The malevolent one is that the "off budget" nature of the Fed's operations may obscure the facilities' cost from taxpayers, although the true cost to taxpayers is the same as if the programs were operated by the Treasury (see, for example, the comment in Congressional Research Service, 2021). This raises the question of whether the present separation of tasks between the Fed and Treasury is effective and suggests that the possibility that, in future crises, the central bank might permanently be given increased responsibilities for crisis management. But, given the distributional consequences of lending programs, it is not clear how, even with a commitment from Congress of fiscal resources via a backstop, this would not prompt further challenges to the Fed's independence. This will be a key issue for 21st century central banking and suggests the possibility of more radical changes in the future than the book acknowledges, as I will argue in Section 3.

Section 2: A European Perspective

Comparing the Fed's experience in tackling the crises of the 21st century with that of the ECB may help to illuminate some of the points that Bernanke discusses in relation both to the operational model of the central bank and to its relationship with the fiscal authority. While a lot has been written about the ECB having been slow to react to the Global Financial Crisis, the story is more complex. In fact one can say that, when the immediate issue was liquidity, the ECB was better prepared and able to act faster than the Fed, but when a liquidity crisis led to a solvency crisis, the ECB was at a critical disadvantage, and the flexibility of the Fed's relationship with the Treasury – and, indeed, with Congress – proved crucial to its more successful performance.

We can draw a number of specific lessons from the experience of the ECB during this period, each of which is consistent with the lessons that Bernanke draws from the experience of the Fed. First, the operational framework allowing the central bank to respond to a generalized liquidity crisis must be able to accommodate spikes in demand for reserves and deal with a broad set of counterparties without stigmatizing those institutions who apply for funds. It is a core function of the central bank to respond to liquidity crises by supplying abundant liquidity. Second, as liquidity and solvency issues are not easily distinguishable in the heat of a crisis, it is important that there should be sufficient cooperation between the monetary and fiscal authorities for solvency cases to be dealt with in a timely and effective way. Third, clarity of fiscal backing is a necessary condition for the success of the central bank's operations, irrespective of the particular governance framework.

To explain the difference in performance between the two central banks, we should start with the fundamental characteristic which distinguishes the ECB from the Fed: it is a central bank without a state. The ECB lacks an area-wide fiscal counterpart akin to the Treasury in the US. For this reason, the original framework for monetary union set out in the Maastricht Treaty embodied a number of elements that were designed to limit the scope for the ECB to indulge in "quasi-fiscal policy". This was an attempt to protect the ECB from pressures from member states with different interests or persuasions. Several principles in the Maastricht Treaty are relevant in this context: financial independence; a single (narrow) mandate to achieve price stability; prohibition of monetary financing – which imposes legal restrictions on the ability of national central banks to assume or finance fiscal functions[7]; and proportionality, which implies that the ECB's actions should not go beyond what is necessary to achieve those objectives.

Over the years, these principles have been subject to different interpretations. For example, they were initially interpreted as ruling out quantitative easing, but then the legal interpretation changed without any modification to the Treaty. However, these provisions, combined with the practical difficulty the ECB had in coordinating with multiple fiscal authorities and financial regulators during the financial crisis, limited the combined capability of the monetary and fiscal authorities. This proved critical when tackling a crisis of solvency.

The response to the liquidity crisis: central banks as guarantors of liquidity

The ECB's operational framework was better equipped to respond to the crisis than that of the Fed. In many respects the changes the Fed had to make in the heat of the crisis, including the introduction of new facilities, can be understood as an attempt to mimic the possibilities for central bank intermediation and refinancing offered by the ECB's regular operations.

Contrary to some narratives, the ECB was quick to recognize the systematic nature of the liquidity squeeze and effective in its response. This was mainly because its operational framework was well designed for such eventualities, being capable of absorbing generalized liquidity shocks via open market operations, while it also had a facility to provide emergency liquidity to individual institutions, the so-called Emergency Liquidity Assistance (ELA), which was the ECB's lender of last resort tool (Lenza et al 2010, and Pill & Reichlin 2015).

---

[7] More generally, the Treaty clearly assigns fiscal sovereignty to the national governments in the Euro area and, via the 'no bail out' clause, attempts to ensure that cross-country sharing of fiscal risks within the euro area is heavily circumscribed.

There are three important features in the ECB's operational framework that made it ready for this kind of crisis. First, the ECB's balance sheet was larger (relative to GDP) than that of either the Federal Reserve or the Bank of England. As the ECB already had a policy of paying interest on reserves it was possible to have a higher level of required reserves and this constituted a large 'buffer' to absorb liquidity shocks in the face of the liquidity stresses that emerged.

Second, as a consequence of the need to encompass the diverse set of collateral that had been accepted by the national central banks prior to monetary union, the ECB had always accepted a broad range of instruments in its monetary policy operations (crucially including a broad swathe of asset backed securities (ABS), the main market that seized up in August 2007).

Third, the ECB transacted with a broad set of counterparties in its regular operations; in essence, any euro area credit institution could have access to its facilities. As a consequence, the ECB could more easily play the role of 'central counterparty' for a web of interbank transactions that had previously been conducted in the money market, since it naturally formed a hub with spokes to a large number of banks.

A more fundamental reason for the ECB's readiness to respond was that the task of responding to liquidity tensions was well within the mandate given to the ECB by the Treaty, so acting in that capacity did not raise tensions between different constituencies on the Governing Council. Although the ECB did not implement asset purchases until much later, its balance sheet did increase substantially as a consequence of its intervention to ensure liquidity in the money market – specifically, through the adoption of the fixed rate / full allotment (FRFA) tender procedure in its regular monetary policy operations in 2008. By providing certainty on the availability of central bank liquidity (with regard to both quantity and price), this measure helped to stabilise the banking sector at a time of high stress. As in the US, this adoption of an 'ample reserves' policy was effective in tackling the generalized liquidity crisis of that phase.

If we froze time in mid-2009 we would probably judge that the ECB had been successful in managing the deep disruption in financial markets and in easing financial conditions. By the third quarter of 2009 the euro area economy was out of recession, money market spreads had narrowed and loans were recovering. Furthermore, this was taking place without there having been any form of quantitative easing in the sense that it subsequently became known – i.e., purchasing longer-maturity bonds, in order to bear down on longer-term interest rates.

From liquidity to solvency

As in the US, liquidity problems led to insolvency for some financial institutions in Europe. When the crisis exposed banks' fragilities, national governments acted by committing considerable resources for bail-outs, guarantees or direct capital injections. From 2008 to 2010 resources in support of the financial sector amounted to 4.9% of euro area GDP (Maurer & Grussenmeyer, 2015).

In the US, where there has been a widespread view that large quantities of public resources were committed to "save the banks", the percentage of those resources in relation to GDP was actually much smaller than in Europe, as was the eventual loss for taxpayers. This is partly because the weight of banks in the financial sector is smaller in the US than in the euro area but, most importantly, because the approach adopted was different. What eventually saved the day, as Bernanke says, was the commitment by

Congress of $700 billion of fiscal resources via the establishment of the TARP. The key was the commitment, rather than the funds themselves. The program never disbursed more than $430 billion. In the end it amounted to a small cost to taxpayers (estimated at $22 billion net) and was considered to be a success even by its critics. Alan Blinder, who had criticized its design writes: "Despite many missteps, and a terrible image, it is hard not to count the TARP as a smashing success" (Blinder, 2013, page 206).

TARP was crucial in stabilizing the financial sector and, as Bernanke explains, the imposition of stress tests – developed by the Treasury in collaboration with the Fed – were also critical in restoring confidence in the banks and hence in bringing them back to health.

The European story was a stark contrast. In the euro area each government pursued an ad-hoc solution. The euro area's governance had not been designed to solve solvency problems at the federal level; it would not have been possible to enact an equivalent of TARP without major changes in the Treaty. Moreover, there was no powerful regulator able to impose credible stress tests as there was in the US (the European Banking Authority's stress tests came much later). National governments in the Euro area sought to promote their own financial institutions and markets in competition with one another. National central banks, and in general national supervisory authorities, were prisoners of that competition and in general were inhibited by stressed fiscal authorities. In this situation it was convenient to hide the problem of insolvent financial institutions under the carpet and to be tolerant of ECB policies.

If we jump from 2009 to late 2011 the consequences of "delegating" to the ECB the solution of the banking sector problem became clear. By late 2011 (as Mario Draghi replaced Jean-Claude Trichet as President of the ECB) the threat of a banking crisis loomed. By then the euro area was in the middle of its second recession. Without wanting to underplay the role of two interest rate increases in April and July 2011, the evidence points to the fact that the second recession in the euro area was due to the poor handling of the banking crisis and of the crisis in the sovereign market (Reichlin 2014).

In the absence of any euro area-wide fiscal tool to deal with the banks, the ECB was left to deal with the problem alone. President Draghi announced in December 2011 a set of refinancing operations with an exceptionally long 3-year maturity and FRFA tenders. These were similar to the shorter-term operations introduced by the Trichet ECB following the failure of Lehman (the introduction of ample reserves), but the new operations were at longer maturities more relevant for banks' funding and not just for their liquidity management.

Moreover, through these operations the ECB used the banking system as a conduit for supporting the sovereigns themselves. Banks could engage in a 'carry trade' by borrowing at the ECB's 3-year facility to buy domestic sovereign bonds which (in the stressed peripheral countries) yielded much more. Not only did this improve the profitability and thus capital position of the banks, it also substantially eased the financing difficulties being faced by Italy and Spain.

By these means, an immediate bank funding crisis in early 2012 was avoided but the underlying issues were left untreated. In particular, the new facilities served to intensify the interconnectedness between bank and sovereign balance sheets that had been an underlying cause of tension (the so-called 'doom loop'). And the cheap funding allowed banks to continue to evergreen their outstanding loan portfolios (including loans of questionable quality) rather than being forced to undergo the clean-up and strengthening of their balance sheets that the deleveraging process in the US (triggered by the TARP and Federal Reserve stress tests) had achieved.

It was a way of gaining time but it could not prevent a collapse of lending and a recession. Indeed, conditional on the dynamics of real activity, the collapse in lending was even more pronounced than in 2008-2009 (see Colangelo et al. 2017).

Fiscal backing

The Greek crisis had struck in 2010. The Maastricht Treaty was clear in prohibiting bail-outs and monetary financing. The alternative option of debt restructuring, however, was seen as destabilizing given the European banks' exposure to Greek debt. This left the alternative of letting Greece leave the monetary union, an option that could have jeopardized the credibility of the single currency by encouraging expectations that other countries might also leave. The fear of contagion to other countries was considerable: if Greece were to default and/or exit, then this possibility would be entertained for other peripheral Euro area economies (such as Ireland, which faced significant fiscal costs for restructuring its financial sector after the housing bubble burst, and Portugal, which was uncompetitive and was burdened with a large and growing external debt). Banks in core countries had significant exposures to Greek sovereign debt, implying a direct financial contagion in an already fragile financial environment.

Acting alone, the ECB was not equipped to address the solvency problem that threatened Greece. It had not been endowed with the necessary instruments and was subject to institutional constraints that were expressly designed to protect it from pressure to deliver quasi-fiscal support to address solvency problems.

This was the ECB's Lehman moment. Initially, the ECB adopted a pragmatic middle way. In May 2010, it announced the Securities Markets Programme (SMP), which entailed making outright purchases of Greek (and other peripheral) sovereign debt. This was part of a broader set of measures which included the establishment of the European Financial Stabilization Mechanism (EFSM) and the European Financial Stability Facility (EFSF) which collectively had € 750 of backing, including € 250 billion from the IMF and € 500 billion from euro area member countries. The sovereign purchases made by the ECB under the SMP were crucial in avoiding a hard Greek default and supporting immediate funding of the Greek state while (what became) the Troika program was put in place. But the SMP did not prevent the sovereign crisis from spreading, nor the eventual restructuring of Greek debt. In the end a total of €223 billion was spent under the SMP programme but the effects were limited.

The sovereign crisis was eventually tamed in 2012 with the announcement by Mario Draghi of the Outright Monetary Transactions (OMT) program, which entailed a conditional promise of potentially unlimited purchases of sovereign debt, conditional on the recipient entering a program of domestic economic measures. Draghi's speech in July 2012, pledging to do 'whatever it takes' to save the euro has become a classic example of the power of words. But why did the OMT succeed where the SMP had failed?

Lacking strong fiscal backing, the SMP was designed as a limited and temporary program which subordinated private holders of stressed-country sovereign debt; consequently, it lacked credibility. By contrast, the creation of the European Financial Stability Mechanism, and the greater control over fiscal dynamics provided via conditionality, gave the OMT more credibility. Crucially, it was seen as having fiscal backing because credit risk was to be taken onto fiscal balance sheets in the first instance (Reichlin 2019, Pill & Reichlin 2015).

What does the comparison between the SMP and the OMT programs add as a perspective on Bernanke's arguments? More, perhaps, than for any other public sector institution, the actions of central banks depend for their effectiveness on credibility. The markets have to believe that the central bank has the resources to do what it says it will do. Ultimately, that requires fiscal backing from the state. Draghi was able to give his 'whatever it takes' commitment in 2012 because he had the (informal) backing of the German chancellor, Angela Merkel, who apparently gave her support as part of an endorsement for a wider package including the establishment of a banking union and other reforms.

A central bank with strong and clear backing will be better placed to accept the credit risk (and the losses which may follow) associated with the type of unconventional actions which are required during a crisis. If the backing of the fiscal authorities is weak or ambiguous, the central bank may not be able to act and, even when it does, its actions may not convince the market. So, the institutional framework matters; it is not enough to legislate the central bank's decision-making independence and its mandate.

As the US history shows, a divided government may make the central bank apparently more powerful, but this does not last. The point is not only a matter of principle ("central banks should not address solvency problems") but also one of process. In practice, solvency and liquidity issues are not easily distinguishable so it is important to have a system which, while establishing a separation of tasks in principle, allows for flexible cooperation between the central bank and the fiscal authority.

Bernanke's account shows clearly that when it became necessary to commit resources, cooperation with the Treasury and support from Congress proved to be the key determinants of the Fed's success in responding to the financial crisis. By contrast, the excessive separation between monetary and fiscal policy, and the absence of a consensus about how to handle the crisis among the national governments of the euro area, were at the root of the ECB's poor handling of the crisis from 2009 onwards.

Section 3: Lessons for the Future

Bernanke's book is a stalwart defense of the status quo. But by casting the argument as he does, Bernanke tends to obscure the extent to which the Fed has expanded its remit, and extended its operations, so that it now plays a far more pervasive role in financial markets and in the management of the economy than it did 20 years ago. This expansion in the Fed's scope raises many questions – about its balance sheet, its operating model, the fiscal implications of its actions and, indeed, its independence – to which neither Bernanke nor anyone else has yet given a definitive answer. I will discuss this in relation to three aspects of central banking which recur in Bernanke's discussion: (1) the monetary policy operating model, and the central bank's balance sheet, (2) the Fed's fiscal footprint, and (3) central bank independence itself.

The Fed's Balance Sheet and the Monetary Policy Operating Model

At the end of the chapter in which he describes the turmoil that erupted in the repo markets in September 2019, Bernanke comments that the Fed's response calmed markets but brought an end to its balance sheet reduction program. In the process of asserting control over short-term interest rates, the Fed, he says, "also established a new normal for the size of its balance sheet" (page 252). That seems optimistic. The fact is that two intertwined but separate policy innovations had caused the Fed's balance sheet to balloon: quantitative easing (QE) and the move to an 'ample reserves' monetary policy operating model. If QE had come to an end, the ample reserves regime had not.

Bernanke says relatively little about it but the move to 'ample reserves', initiated in 2008 as a crisis measure and confirmed as permanent in 2019, may turn out to be his most significant legacy.

As Bernanke explains in his narrative of the crisis, the Fed faced a problem in 2008 that the imperative to supply reserves to the market for financial stability reasons was interfering with its ability to steer the Fed funds rate. In fact, the interbank money market had frozen and the Fed needed to respond by providing liquidity direct to each market participant – thereby substituting its balance sheet for the market. The ECB faced the same problem and took the same action.

Both central banks also solved the problem of separating monetary policy from the provision of reserves in the same way: by paying interest on reserves. Whereas previously the Fed had used market operations to increase or reduce the volume of reserves in the banking system, and thereby to steer its target rate (the effective Fed funds rate), under the new regime it used the interest rate that it paid on reserve balances (the IORB) to steer the effective Fed funds rate. This made it possible simultaneously to provide reserves – to the point of satiation – for financial stability reasons. As noted above, the adoption of the ample reserves approach entailed an immediate and large increase in the size of the Fed's balance sheet.

Under the ample reserves system, the size of the Fed's balance sheet depends on the market's demand for liquidity – which, as noted above, has proved to be variable and unpredictable. It may be that its variability in the period since the global financial crisis has been a reflection of extraordinary times, first the crisis and its aftermath and then the pandemic, in which banks have not reverted to 'normal' patterns of liquidity management. It may also be that the interbank money market has not reverted to its pre-crisis health *because* of the Fed's new ample reserves policy; the market has effectively been crowded out. Of course, the fact that the size of the Fed's balance sheet is variable and hard to predict – that there may be no 'new normal' – does not matter from the point of view of monetary policy. Indeed, the size of the balance sheet and the policy rate are disconnected.

What does matter is that the changes in the monetary policy operating model that were implemented during and since the crisis have given the Fed (and the ECB) a much more central role in the system of money creation, as its balance sheet has now permanently been substituted for a large part of the interbank market, thereby centralizing functions in the financial system which were previously decentralized.

Bernanke discusses the possibility of central bank digital currencies briefly at the end of the book, and is cautious in his evaluation. However, he does not link that discussion with the adoption of the ample reserves regime. One cannot help wonder whether, in retrospect, the adoption of ample reserves will not be seen as having been a big step towards a central bank digital currency and the further centralization of financial functions that it entails.

The Fed's Fiscal Footprint

As the Fed's balance sheet has expanded and the composition of its assets has become riskier (both credit and market risk have increased), the fiscal impact of the Fed's actions has grown. One aspect of this is that the fluctuations in the Fed's net income and in the size of the dividends that it remits to the Treasury have become larger. Inevitably, we have now reached the point where, after many years in which the Fed regularly remitted large dividends to the Treasury, the Fed has actually recorded a period of negative income.

The payment of interest on reserves reduces substantially the spread on which the central bank earns seignorage, albeit that diversification in the composition of the Fed's assets also increases their overall yield somewhat. At the same time, the increase in the size of the Fed's balance sheet increases the volume of assets on which it earns this seignorage margin. The net effect on the Fed's income will depend most on the (varying) size of the balance sheet but, in any case, this income will be more volatile.

Does this matter? In a unitary system, such as the US or UK, the implication is only a redistribution of risk between two parts of government – the central bank and the Treasury. But these institutions are independent and have separate budget constraints. The fluctuations in the Fed's net income have consequences for the Treasury and might even necessitate recapitalization of the central bank.

In the euro area, given the distributional consequences of ECB balance sheet policies as between different countries, this problem has been the subject of much discussion and has led to complex risk sharing arrangements between national central banks. Institutional frictions are also likely to arise in unitary systems, with the potential not only to threaten central bank independence but also the credibility of monetary policy. Financial independence was seen as an important underpinning for the ECB's operational independence by the framers of the Maastricht Treaty. In the US, the Fed's financial independence was perhaps taken for granted. Suffice to say that the changes in the size of the central bank's balance sheet and in its operating framework are likely, sooner or later, to put the spotlight on the institutional relationship between the central bank and the Treasury, making it all the more important that there is clarity in relation to central bank capital (by what process new capital is subscribed when necessary) and dividend distribution policy.

The interplay between monetary and fiscal policy has become more complex in other ways too. As I argued in section 2 above, the key to understanding the lack of success of the ECB's Securities Market Programme in 2010, its first attempt at quantitative easing, was the lack of clarity about the fiscal backing for the ECB's operation. We can contrast this with the CARES Act in the US in 2020, in which the Fed was given a dedicated fiscal backstop to absorb potential losses on loans made under this program.

The CARES Act was a temporary, crisis response, and Congress deliberately refused to extend it, perhaps because, as Bernanke suggests, it pushed the politically sensitive boundary between monetary and fiscal policy. Nevertheless, this is an example of a successful adjustment to the institutional architecture – fiscal policy being effectively implemented by the central bank – which we may well see again.

Independence

In a way, all of the issues discussed in Bernanke's book – the policy debates, the operational innovations, the institutional conflicts – serve to elaborate the theme of central bank independence: what it means, why it matters, and how to protect it. While I share Bernanke's view that independence has generally served us well, it seems to me that he understates the significance of the change in institutional architecture that has been set in train since the crisis. And although Bernanke does tackle the argument for independence head on, for much of the time he takes independence as though it were an end in itself. We should be clear about what independence means and why we want it.

The Fed's independence, which has evolved since the Treasury-Fed Accord of 1951, has been the gift of Congress, reflecting a belief that this approach to economic management has, as Bernanke says, both political and economic benefits. The experience of the great inflation in the 1970s strengthened the idea that independence was necessary to provide a bulwark against the temptation of politicians to overstimulate the economy. Without independence there could be no "credibility bonus". But even in the period of very low inflation that followed the Global Financial Crisis, politicians recognized the need for monetary policy to be set by an institution capable of taking a long-term view. Bernanke concludes that the case for insulating monetary policy from politics seems even stronger now than in the past.

As a point of comparison, it is worth pointing out that central bank independence – and hence a regime of 'monetary dominance' – was an essential pre-requisite for the creation of the euro. Without agreement on strict independence, to be enshrined in the Maastricht Treaty, the European nation states would not have been able to agree on the creation of the common currency. By contrast the Fed's independence has evolved, needing periodically to be justified and defended.

Bernanke implicitly acknowledges that independence comes at a cost in terms of democratic accountability for important decisions that affect millions of Americans. He concludes that the answer is for the Fed to redouble its efforts to improve transparency and communications (as he did) and to "wear out the carpets" in Congress (as Powell has done). He is "modestly optimistic" that the Fed will be able to defend its policy independence, while remaining accountable.

I am not convinced that this perspective does justice to the changes in the Fed's role and practices that have taken place over the past 15 years, and the way that those changes may have shifted the independence cost/benefit equation. Fischer argued that an independent central bank should have "instrument" independence but not "goal" independence (Debelle & Fischer, 1994). From that perspective he concluded that the Fed's dual mandate was unsatisfactory – that it needed a "less vague mandate". Fischer might be more concerned today. Notwithstanding the fact that the Fed's formal mandate has not changed, the scope of the Fed's activities and responsibilities has increased significantly, and with it the challenge of holding the Fed to account.

In the period since the Global Financial Crisis central banks around the world, the Fed among them, have played a more active role in fighting deflationary risks, stepping into the breach when national governments lacked the fiscal capacity or the political will to adopt expansionary policies. At the same time, financial stabilization and the prevention of future crises have become much more politically salient. Although Bernanke resists the idea that the Fed should be recognized as having a triple mandate, the Fed is increasingly often called upon to act as lender of last resort for banks and use its balance sheet in the pursuit of financial stability when regulation fails. On occasion the Fed has also been drawn into the implementation of fiscal policy – see my comments above in relation to the CARES Act. Taken together, these factors make the Fed's accountability to Congress both more important and potentially more difficult.

At the same time, the Fed's exercise of its independence has ebbed and flowed. A recurrent theme in Bernanke's narrative is the importance of effective cooperation between the Fed and the Administration, particularly in resolving difficult liquidity/solvency problems during crises but also more generally in order to ensure the coherence of monetary and fiscal policy in normal times. I am not suggesting that cooperation with the Administration in day-to-day policy implies a loss of independence, but it does imply that, in practice, independence is not black or white.

To summarise, the Fed has taken on a larger and more pervasive role, not only in the management of the economy but also in the operation of the financial system. Its competing goals have made it more difficult to hold to account, and the boundary between its actions and those of the fiscal authorities has in some cases become blurred. Lastly, the ample reserves regime and potential consequent loss of seignorage has reduced the Fed's day-to-day financial independence from the Treasury. It is hard to believe that these changes will not, sooner or later, lead to a re-evaluation of the Fed's independence, or at least to some change in the institutional relationship between the Fed and the Treasury.

One could imagine various ways in which closer cooperation between the Fed and the Administration could be engineered, even going back to the 'Quadriad' of the 1960s. I am not suggesting that this is the right answer, or even that this is the direction in which the institutional architecture will evolve. But in his keenness to defend the principle of independence, Bernanke may be under-evaluating the pressure building for a change to the current settlement. On the other hand, it may also be that the Fed's independence is more secure than I have suggested, drawing its strength from the separation of powers between Congress and the Administration that is embedded in the constitution. After all, the Fed was granted its effective independence in 1951 (where Bernanke starts his book) when no other state, however strong the Keynesian consensus at the time, thought of doing the same.

References

Acharya, V.V., Rajan, R., Chahuan R. S. and Steffen, S. (2022) "Liquidity Dependence: Why Shrinking Central Bank Balance Sheets is an Uphill Task", paper presented at the Kansas City Fed, Jackson Hole annual conference, 2022.Bernanke, B. S. (2020) "The New Tools of Monetary Policy", *American Economic Review*, vol. 110, no. 4, 943-983, April.

Ball L, *The Fed and Lehman Brothers: Setting the Record Straight on a Financial Disaster* (2018), Cambridge University Press.

Bernanke, B, *21st Century Monetary Policy: The Federal Reserve from the Great Inflation to COVID-19*, (2022), W.W. Norton & Company.

Binder S. and Spindel M. (2017) *The Myth of Independence: How Congress Governs the Federal Reserve,* Princeton University Press.

Blinder, A. S. (2013) *After the Music Stopped: The Financial Crisis, the Response, and the Work Ahea*d, Princeton University Press.

Blinder, A. S. (2022) *A Monetary and Fiscal History of the United States 1961-2021*, Princeton University Press.

Colangelo, A., Giannone, D., Lenza, M., Pill, H. and Reichlin, L. (2017) The national segmentation of euro area bank balance sheets during the financial crisis, *Empirical Economics*, 53, issue 1, p. 247-265.

Congressional Research Service (2021) *The Federal Reserve's Response to COVID-19: Policy Issues*, Updated February 8.

De Long J. B. (1997) "America's Peacetime Inflation: The 1970s". In *Reducing Inflation: Motivation and Strategy,* edited by C. D. Romer and D.H. Romer, 247-80. Chicago: University of Chicago Press.

Draghi, M (2014), "Unemployment in the euro area", *A Symposium sponsored by the Federal reserve of Kansas City*, Jackson Hole, Wyoming, August 29-31.

Debelle, G. and Fischer, S. (1994), "How Independent Should a Central Bank Be?", *proceedings of a conference sponsored by the Federal Reserve Bank of Boston*, June, pp. 195-221.

Goodfriend, M (2002), "Interest on Reserves and Monetary Policy," Federal Reserve Bank of New York, *Economic Policy Review* 8.

Hetzel, R. L. (2008) "What is the Monetary Standard, Or, How Did the Volcker-Greenspan FOMCs Tame Inflation?", *Federal Reserve Bank of Richmond Economic Quarterly*, vol. 94, No. 2, (147-171), Spring.

Lenza, M., Pill, H. and Reichlin L. (2010), "Monetary Policy in Exceptional Times" *Economic Policy* 62, 295-339.

Maurer, H. and Grussenmeyer, P. (2015), "Financial assistance measures in the euro area from 2008 to 2013 statistical framework and fiscal impact", ECB, Statistics Paper Series

Pill, H. and Reichlin, L. (2015), "Exceptional policies for exceptional times The ECB's response to the rolling crises of the euro area", in *Routledge Handbook of the Economics of European Integration*.

Reichlin, L. (2014) "Monetary Policy and Banks in the Euro Area: The Tale of Two Crises" *Journal of Macroeconomics*, Elsevier, vol. 39(PB), pages 387-400.

Reichlin, L. (2019) *La Banque Centrale Européenne et la Crise de l'Euro*, Fayard Paris, September.

Romer, C. D. and Romer, D.H. (2002) "The evolution of economic understanding and postwar stabilization policy". In *Rethinking Stabilization Policy.* A Symposium sponsored by the Federal reserve of Kansas City. Jackson Hole, Wyoming, August 29-31.

Rotemberg, J. J. (2013) "Shifts in US Federal Reserve Goals and Tactics for Monetary Policy: A Role for Penitence?", *Journal of Economic Perspectives*, vol. 27, no 4. (65-86) Fall.

Sargent, T.J., (1999) *The Conquest of American Inflation*, Princeton University Press.

Stein, J. C. (2013) “Overheating in Credit Markets: Origins, Measurement, and Policy Responses”, speech February 7. Wessel, D. (2009) In *Fed We Trust,* Crown Business, New York.

Woodford, M. (2000) “Monetary Policy in a World without Money.” *International Finance* 3, no. 2 (July): 229-60.

Woodford, M. (2012), “Methods of Policy Accommodation at the Interest-Rate Lower Bound” in *The Changing Policy Landscape*, Federal Reserve Bank of Kansas City, 35.