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### **The Impact of the Global Financial Crisis on Central Banking**

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### **Abstract and Keywords**

This chapter describes the impacts of the global financial crisis on monetary policy and institutions. It argues that during the crisis, financial stability took precedence over traditional inflation targeting and discusses the emergence of unconventional policy instruments such as quantitative easing (QE), forex market interventions, negative interest rates, and forward guidance. It describes the interaction between the zero lower bound (ZLB) and QE, and proposals, such as raising the inflation target, to alleviate the ZLB constraint. The chapter discusses the consequences of the relative passivity of fiscal policies, “helicopter money,” and 100 percent reserve requirement. The crisis triggered regulatory reforms in which central banks’ objectives were expanded to encompass macroprudential regulation. The chapter evaluates recent regulatory reforms in the United States, the euro area, and the United Kingdom. It presents data on new net credit formation during the crisis and discusses implications for exit policies.

Keywords: unconventional instruments, zero lower bound, regulatory reform, evolution of credit, exit strategies

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## **6.1 Introduction**

THE global financial crisis (GFC) led to numerous changes in the policies, relative emphasis on alternative objectives, policy instruments, and tasks of major central banks. It moved the financial stability motive into the forefront of central banks’ policy concerns and revived the explicit recognition of the lender of last resort (LOLR) function of the central bank in the face of shocks to the financial system. Although the financial stability motive was (at least implicitly) also present along with the price stability motive prior to the crisis, the crisis highlighted the critical importance of the LOLR and regulatory functions of central banks and other regulators.<sup>1</sup> Since 2008, the financial stability motive

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has been a main mover of monetary policy in the United States and subsequently in Europe and some emerging markets.

By inducing major central banks to reach the zero lower bound (ZLB) quickly, the GFC opened the door for substantial quantitative easing (QE) operations and triggered a still ongoing process of regulatory reforms. US policy rates reached the ZLB already in late 2008 and were supplemented by huge QE programs. During the first quarter of 2009, the Bank of England (BoE) base rate was reduced to 0.5 percent and is maintained at this level to this day. Although it did not react with the same immediacy and amplitude, the more conservative European Central Bank (ECB) engaged on a similar path after a while and as of 2015 has moved its policy rate into negative territory.

The crisis led to the development and utilization of nonconventional policy instruments on a large scale. The most prominent among those are QE, direct liquidity injections into the private banking system, negative interest rates, and forex interventions. It intensified both practical and academic research on the interactions (p. 172) between traditional monetary policy aimed at price stability and monetary, financial, and regulatory policies aimed at preserving the stability of the financial system. In countries directly hit by the crisis (such as the United States in the face of the subprime crisis or the ECB in face of the Greek sovereign debt crisis), central banks had two distinct functions. The more immediate function was to inject large quantities of liquidity quickly in order to prevent a total arrest of financial intermediation. But after some measure of financial stability has been restored, the longer-term issue confronting policymakers and reformers in the affected countries was how to reform regulation both within and outside central banks so as to reduce the likelihood of future crises.

Until the eruption of the subprime crisis, most Western central banks practiced standard inflation targeting. More precisely, given inflationary expectations, they set their short-term interest rates so as to minimize a linear combination of the output and inflation gaps over the medium term. This changed dramatically following the downfall of Lehman Brothers in September 2008. In spite of huge liquidity injections and policy rates in the vicinity of the ZLB, inflation above target ceased to be an issue and remains subdued in both the United States and Europe. As a matter of fact, during the last couple of years, the central banks of those big players became concerned with negative inflation gaps (inflation below target and even in the negative range).

The expansionary policies of the big blocks led both directly and indirectly to a new trade-off, this time between limiting the impact of the financial crisis on the real economy and the formation of bubbles in real estate and financial assets. In particular, the sustained expansionary policies of the Fed and of the ECB induced central banks in many smaller countries to follow suit, leading to investment booms in real estate and financial markets of those and other countries. Prior to the crisis, the extent to which monetary policy should take the risk of bubbles in those markets was controversial. Following the experience of the last several years, many central banks do give some weight to those considerations.

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The GFC led to a far-reaching, still ongoing process of regulatory reform aimed at identifying systemic risk early on, closing precrisis regulatory loopholes, and, particularly in the European case, devising regulatory institutions that would be able to deal with the international dimensions of systemic risks effectively. Major pieces of legislation/resolutions in this context are the July 2010 Dodd-Frank Act in the United States and the creation of a European banking union by the heads of state and government of the European Union in June 2012. In both cases, the respective central banks (the Fed in the United States and the ECB in the euro area) were charged with the supervision and regulation of systemic risks and, in parallel, given more authority in comparison to the precrisis era. Similarly, in the United Kingdom, an independent Financial Policy Committee (FPC) charged with monitoring and reducing systemic risks was created in April 2013 within the BoE.

In this chapter, section 6.2 describes the main unconventional monetary policy instruments that emerged during the crisis. Section 6.3 explores the interactions between QE) and the ZLB and provides some evidence on the equivalence between normal interest-rate policy and QE. Consequences of the relative passivity of fiscal (p. 173) policies for monetary policies during the GFC are explored in section 6.4, along with the old-new idea of “helicopter money” as an efficient device against deflation. The GFC triggered a persistent process of regulatory reforms in which central banks play an important role, particularly in the area of macroprudential regulation. Section 6.5 briefly describes the still ongoing regulatory reforms in the United States, the euro area, and the United Kingdom with particular emphasis on the growing role of central banks in the macroprudential area.

The ZLB constraint is particularly problematic when, as some recent evidence shows, the natural rate of interest is deep in negative territory. To overcome this problem, some economists have proposed raising the inflation target. Others have proposed taxing cash in various ways in order to prevent a flight to cash when the short-term rate is negative. Section 6.6 describes those proposals and discusses their limitations. The section also evaluates the old-new idea of 100 percent reserve requirements on banks and speculates about which of the unconventional monetary policy instruments used during the GFC are most likely to persist into the future. Section 6.7 documents a persistent slowdown in net new credit formation during the GFC, discusses the reasons for this slowdown, and outlines implications for exit strategies.

## 6.2 The Emergence of Unconventional Policy Instruments

The GFC led to the emergence of unconventional monetary policy instruments, the most important of which are quantitative easing, forex interventions, negative policy rates, and forward guidance.

### 6.2.1 Quantitative Easing

Also labeled as large-scale asset purchases by the Fed, QE is not new. Buying or selling assets by the central bank is a normal byproduct of conventional interest-rate policy even during normal times, since maintenance of the policy rate at the level desired by the central bank has to be supported by the injection or removal of liquidity through the buying or selling of assets. There are several factors that distinguish asset purchases during the crisis from their normal-times counterparts. First, the bulk of such purchases were done once the policy rate reached the ZLB. Second, particularly in the United States, the range of assets purchased was much wider than during normal times. Rather than limiting itself to government debt, the Fed bought mortgage-backed securities and other types of commercial debt. During the immediate aftermath of Lehman's fall, the Fed also bought banking stocks in an attempt to strengthen the capital position of the banking system.<sup>2</sup>

**(p. 174)** Finally, the exceptionally large magnitude of US QE operations distinguishes it from asset purchases during normal times. In reaction to the panic that engulfed financial markets in the immediate aftermath of Lehman's collapse, QE was used mainly to inject liquidity into the capital market. But as the recession caused by the financial crisis persisted, QE gradually became a device for circumventing the ZLB by directly lowering long-term interest rates in order to stimulate the economy.<sup>3</sup> Recent literature considers QE as a substitute for lowering the policy interest rate when the latter is stuck at the ZLB and attempts to measure the direct impact of QE on medium- and long-term interest rates.<sup>4</sup>

Although it engaged in some limited asset purchases already in 2008–2009, the ECB started to engage in large-scale asset purchases only at the beginning of 2015. Prior to that, the bulk of its liquidity injections operations were done through limited-term advances to the banking system.<sup>5</sup>

### 6.2.2 Forex Market Interventions

These are not new. They have been used by central banks of emerging markets as a device for ironing out “excessive fluctuations” in exchange rates long before the GFC. For several decades prior to the crisis, China pegged its currency to the US dollar in order to maintain the competitiveness of its exports. But the zero (and recently even negative) interest-rate policies of the United States and, more recently, of the ECB added a new dimension to such interventions.

To preserve their competitiveness, small open economies such as Switzerland, Israel, the Czech Republic, and others reacted to the expansionary monetary policies of the big blocks by lowering their policy rates, often in conjunction with forex interventions designed to stem the appreciation of their currencies. The potential importance of such interventions gradually increased as their policy rates approached the ZLB. In small open economies, an important transmission channel of monetary policy operates through the exchange rate. Once the ZLB is reached, the relative importance of forex purchases as a

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device for moderation of appreciation rises. Some countries, such as Israel, have initially used this instrument to build up forex reserves and occasionally to iron out excessive appreciation tendencies.

As of September 2011, the Swiss National Bank (SNB) introduced a one-sided peg on the euro/Swiss franc exchange rate at 1.2 and effectively defended it till January 2015, when the ECB announced a large QE program. This policy led to a substantial increase in Switzerland forex reserves, which, as of late 2015, are at a level similar to that of the country's GDP. The SNB's extreme reliance on forex interventions is directly related to the GFC. Being a safe haven currency, the Swiss franc tended to appreciate during the frequent panics experienced during the GFC, eroding the competitiveness of Swiss exports. Having reached the ZLB relatively early, the SNB found it expedient to rely relatively heavily on forex interventions. It is notable that once the ZLB is reached, there is (p. 175) no need to sterilize such interventions, implying that they become similar to the QE operations practiced by the Fed and the ECB.<sup>6</sup>

### 6.2.3 Negative Interest Rates

Recent negative inflation rates along with economic activity below potential induced a number of central banks to experiment with negative policy rates. Sweden, Denmark, and Switzerland set their deposit rates at negative levels to preserve competitiveness and to induce banks to lend. During the first quarter of 2015, the ECB adopted a negative deposit rate mainly in order to stimulate banks' lending. A similar policy was enacted in early 2016 by the Bank of Japan.

Negative rates on banking reserves mean that banks have to pay for keeping deposits at the central bank. Most banks do not pass this cost to small and medium-size deposits but do charge large depositors. It appears at first blush that those developments imply that the ZLB is not as binding as was believed in the past. A more sensible interpretation is that the bound may be reduced somewhat below zero but that as long as the returns on cash and on deposits differ, it will not be possible for institutional reasons to reduce the policy rate substantially below zero. This may potentially be a serious problem if the natural rate is expected to be substantially below zero for an extended period of time (Cúrdia 2015; Cúrdia et al. 2015). This issue is taken up in the next section.

### 6.2.4 Forward Guidance

Like QE and forex interventions, forward guidance is not a new monetary policy instrument. However, the ZLB constraint, along with widespread use of QE in the United States and more recently in the euro area, made it an effective complementary policy tool. Obviously, for this to be effective, preannouncements of future policy plans have to be subsequently delivered. This may be a problem if unexpected future developments call for deviations from previously announced policies.<sup>7</sup>

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Following experimentation with date-based statements about the target policy rate through 2012, the Fed started to handle this difficulty by using contingent forward guidance. In 2013, the Fed announced numerical thresholds for the rate of unemployment and inflation. In particular, it stated that the target policy rate will stay low as long as unemployment is above 6.5 percent and inflation remains at or below 2.5 percent. In his memoirs, Ben Bernanke (2015, 532) stresses that the figure for unemployment was a threshold rather than a trigger in the sense that the Federal Open Market Committee (FOMC) would not even consider lifting the policy rate as long as unemployment was above 6.5 percent. This numerical statement had repeatedly been backed up by the more general statement that the Fed would do “whatever it takes” to reduce the rate of unemployment. In the face of mounting doubts about the viability of the euro area, President [\(p. 176\)](#) Mario Draghi of the ECB used similar language to signal that the ECB will do whatever it can to ensure the viability of the EA.<sup>8</sup>

### 6.3 Interactions between the ZLB and QE and Optimal Monetary Policy

The GFC led to a very substantial and persistent decrease in net new credit formation by banks as well as through the capital market. This process started in the United States in parallel with the rescue of Bear Stearns in March 2008 and intensified after the collapse of Lehman Brothers. It subsequently spread to the Eurozone in parallel with the intensification of the European sovereign debt crisis. (Section 6.7 documents the magnitude of the credit arrest.) Owing to the fact that the main channel through which monetary policy influences economic activity is through the cost and availability of credit, this credit shrinkage was the major challenge confronting the central banks of countries affected by the GFC.

In normal times, the central bank affects the whole range of interest rates by changing the short-term rate. Conventional wisdom is that through substitution along the yield curve, a decrease in the short-term rate induces a decrease in longer-term rates on both banking and capital market credit. It is widely agreed that the stimulatory impact of monetary policy on the real economy operates mainly through such longer-term rates as well as by increasing the availability of credit to credit-constrained firms and individuals. In normal times, the desired short-term rate is achieved by open market operations in government securities. But once the ZLB is reached, an essential link in the transmission of stimulatory monetary policy gets disconnected, since the short-term rate is stuck at the ZLB. However, even in this case, sufficiently long-term rates on government debt remain positive and so are (normally riskier) corporate bonds. With the onset of the subprime crisis, this statement was a fortiori true for mortgage-backed securities.

Being stuck at the ZLB as early as the end of 2008, the Fed was the first major central bank to introduce large-scale QE operations as a substitute for further lowering of the short-term policy rate. The short-term link broken by the ZLB was bypassed by directly buying longer-term government securities, corporate bonds, and mortgage-backed

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securities. In other words, instead of trying to influence (the largely positive) longer-term rates through a short-term policy rate, the Fed's policy aimed at directly lowering long-term rates. In 2012, the Fed supplemented those operations by a "maturity extension program" under which it decided to swap 400 billion Treasury securities with maturities of less than three years that it owned for Treasury securities with maturities ranging from six to thirty years. As with QE, the explicit aim was to lower long-term rates and to release credit constraints. However, unlike QE, this operation did not require an expansion of the Fed's balance sheet, since the purchase of long-term government debt was financed by unloading short-term government debt (Bernanke 2015, 520).<sup>9</sup>

(p. 177) The ECB started to use QE on a grand scale only at the beginning of 2015. This is due to the fact that the ratio between credit flows through the capital market and credit flows through the banking system is smaller in the euro area than in the United States in conjunction with the stronger institutional focus of the ECB on price stability.<sup>10</sup> The recent extended period of negative output and inflation gaps in the Eurozone along with the recent better performance of the United States convinced the ECB to engage in QE operations in spite of its institutional leaning toward conservatism.

Empirical work by Swanson and Williams (2014) for the United States suggests that in spite of the fact that the policy rate had been at the ZLB since December 2008, interest rates with a year or more to maturity were responsive to news during 2008–2010 suggesting that the ZLB on the short end of the yield curve did not constraint movements in longer-term rates. The authors note that until late 2011, financial markets consistently expected the federal funds rate to lift off within four quarters. They attribute this finding to the combined effect of QE and forward guidance. Only beginning in late 2011 did the sensitivity of intermediate-maturity Treasury yields to news fall closer to zero. In spite of this, they conclude that the Fed's large-scale asset purchases (QE) along with forward guidance continued to move medium- and long-term rates.

Krishnamurthy and Vissing-Jorgensen (2011) estimate that QE1 and QE2 reduced the rates on Treasury bills and on agency and highly rated corporate bonds by 100 and 20 basis points, respectively. But the impact on lower-grade bonds was negligible unless directly targeted within a QE program. In particular, the impact of QE on mortgage-backed securities was significant only when QE involved the direct purchase of such securities.

The policy rates of the United States, the United Kingdom, and Japan have been at either the ZLB or within a short distance from it for quite some time. Even after the first liftoff of the US federal funds rate at the end of 2015, the Fed continues to postpone the next increase and signaled that further increases were going to be very gradual. Although a latecomer to the vicinity of the ZLB, the ECB currently has a negative policy rate, which is expected to remain in this range for quite some time. Partly because of those policies, long-term riskless rates are also low. But, as documented in Bean et al. (2015), long-term riskless rates have been going down for quite some time prior to the GFC because of

long-term structural reasons, such as abundance of savings due to aging, secular stagnation of investments, and increased demand for safe assets.

Some researchers have interpreted this state of affairs to imply that the Wicksellian real natural rate of interest is currently deep in negative territory for an extended period of time (Cúrdia 2015; Cúrdia et al. 2015). By contrast, since policy rates are very low and actual inflation is zero or even negative, the actual short-term riskless rate is either zero or marginally positive. In either case, it is, on this view, substantially higher than the natural rate. The modern formulation of the Wicksellian approach as embedded in the New Keynesian framework implies that in the face of shocks, optimal monetary policy should maintain the actual real rate as close as possible to the natural real rate. This implies that the closeness of current riskless rates to the ZLB interferes with the implementation of optimal monetary policy. (Section 6.7 discusses recently proposed institutional solutions to this problem.) (p. 178)

### 6.4 Consequences of the Relative Passivity of Fiscal Policies for Monetary Policies during the GFC and “Helicopter Money”

Traditional macroeconomic theory implies that when the interest rate is stuck at the ZLB, fiscal policy is particularly potent in stimulating aggregate demand. The reason is that expansionary fiscal policies are unlikely to trigger increases in interest rates at the ZLB. However, excluding the American Recovery and Reinvestment Act of 2009, fiscal policies in both the United States and the Eurozone were relatively passive during the bulk of the GFC for several reasons. In the United States, the main reason was the reluctance of a relatively conservative Congress to approve deficit financing along with increased polarization between President Barack Obama and a conservative Congress. In the euro area, the vicious circle between sovereign debt defaults and banking defaults along with the decentralization of fiscal decisions prevented large-scale discretionary fiscal expansions.

As a consequence of this fiscal immobility, monetary policies in both the United States and the Eurozone had to take a larger share of the anticyclical effort required to dampen the worldwide recession triggered by the GFC. The Fed responded vigorously and swiftly. Due mainly to its strong price stability mandate, the response of the ECB was relatively slower and not as vigorous as in the United States. But, as described earlier, with both the output and inflation gaps in the Eurozone substantially in negative territory during between 2014 and 2016, the anticyclical response of the ECB also became more vigorous.

The highly expansionary monetary policies of those big blocks (along with similar policies in the United Kingdom and Japan) induced central banks of smaller economies also to reduce their interest rates. Although the stimulatory effects of such policies are beneficial for world aggregate demand, they have several undesirable side effects. First, as more and more countries reduce their policy rates, the stimulatory impact of the real exchange

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rate via foreign trade on each single country's aggregate demand is reduced. This is somewhat reminiscent of "beggar thy neighbor" policies during the Great Depression with the following important difference: During the Great Depression, the instruments used to implement such policies were tariffs and quantitative restrictions on trade. During the GFC, the somewhat less blunt instruments are worldwide expansionary monetary policies that drive short-term policy rates down toward the ZLB. In its attempt to maintain external competitiveness, the central bank of each country reduces (p. 179) its policy rate, thus partially neutralizing the impact of the low rates in other countries on their competitiveness. The popular press refers to this as a "currency war." However, unlike tariffs during the Great Depression, the combined impact of worldwide monetary expansions on worldwide aggregate demand is still positive.

The second undesirable effect is that universally low interest rates encourage the formation of bubbles in real estate and financial markets. Although the charters of most central banks do not state that prevention of bubbles is an objective of the central bank, in practice, central banks with sufficient regulatory authority have used capital adequacy ratios, liquidity ratios, and payment-to-income ratios on mortgages during the GFC in order to partially offset the impact of low rates on the formation of asset bubbles.

The third undesirable aspect of low rates is that they reduce the pensions of savers who are reluctant to invest a substantial fraction of their savings in risky assets.

Caballero (2010) has suggested the following solution to this conundrum; decrease sale taxes without decreasing government expenditures, and finance the shortfall by means of a money gift from the Fed to the US Treasury. This is one way of implementing a "money helicopter drop." In order to ensure that such a step does not revive inflation once the economy returns to full employment, Caballero proposes that Treasury commit to return the Fed's "gift" once the economy is at its potential level. Although back in 2010 Caballero was mainly concerned with the US economy, as of the writing of this chapter, this proposal is obviously more relevant for the euro area than it is for the United States.

Comparison by Cukierman (2017) of the inflationary consequences of the **same** high-powered monetary expansion in the United States during the GFC and in Germany during the post-World War I inflation shows that inflation was much higher in Germany than in the United States. The main difference between the two episodes is that in Germany, the increase in money was immediately translated into government purchases, as proposed by Caballero in 2010. I believe this historical comparison strongly supports the view that a "helicopter drop" is very effective in quickly raising even a negative inflation rate toward the inflation target. It is ironic that although this idea is diametrically opposed to one of the basic tenets of the ECB charter, it is probably the swifter way to avoid a prolonged period of negative inflation as is currently the case in the euro area.

# 6.5 The Role of Central Banks in Postcrisis Regulatory Reform

The GFC triggered a process of regulatory reform particularly in the countries that were seriously affected by the crisis. Although details of those reforms differ across countries, there appears to be a consensus that detection, regulation, and prevention of systemic risk should be under the authority of the central bank, usually in cooperation (p. 180) with additional micro oriented regulatory bodies. The post crisis regulatory reforms in the United States, the euro area, and the United Kingdom are all built on the view that the best institutional location for macroprudential regulation is the central bank. In addition, recent legislation aims at providing regulatory frameworks in which cooperation and information exchange between different regulators are tighter than in the precrisis era.

## 6.5.1 US Regulatory Reform

The July 2010 US Dodd-Frank Act created a Financial Stability Oversight Council (FSOC) of about ten regulators, chaired by the Treasury secretary, in which the Fed plays a central role. Those regulators are expected to meet on a regular basis and to issue specific regulations designed to achieve the broad goals of the act. This process has been going on since the passing of the act and is still ongoing.<sup>11</sup> One of the main precrisis problems of the US regulatory system was the fractionalization of regulatory functions across different regulators, often with patches of the financial system that were uncovered by regulation. Important objectives of the Dodd-Frank Act are to eliminate such patches and to increase coordination and information exchange among different regulators within the FSOC. The council is charged with identifying and responding to emerging risks throughout the financial system. For this purpose, the council is directed and authorized to perform the following functions:<sup>12</sup>

- (i)** Make recommendations to the Federal Reserve for increasingly strict rules for capital, leverage, liquidity, risk management, and other requirements as companies grow in size and complexity, with significant requirements on companies that pose risks to the financial system.
- (ii)** Be authorized to require, with a two-thirds vote and vote of the chair, that a nonbank financial company be regulated by the Federal Reserve if the council believes there would be negative effects on the financial system if the company failed, or if its activities would pose a risk to the financial stability of the United States.
- (iii)** Be able to approve, with a two-thirds vote and vote of the chair, a Federal Reserve decision to require a large, complex company to divest some of its holdings if it poses a grave threat to the financial stability of the United States—but only as a last resort.
- (iv)** Establish a floor for capital that cannot be lower than the standards in effect today, and authorize the council to impose a ceiling of 15-to-1 leverage-to-capital ratio at a company, if necessary, to mitigate a grave threat to the financial system.

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**(v)** Require large, complex financial companies to periodically submit plans for their rapid and orderly shutdown, should the company go under—also known as funeral plans or living wills.

**(p. 181) (vi)** Create an orderly liquidation mechanism for the Federal Deposit Insurance Corporation (FDIC) to unwind failing systemically significant financial companies. Shareholders and unsecured creditors bear losses, and management and culpable directors will be removed.

**(vii)** Require that Treasury, FDIC, and the Federal Reserve all agree to put a company into the orderly liquidation process to mitigate serious adverse effects on financial stability, with an up-front judicial review.

**(viii)** Any emergency lending by the Fed must be approved by the secretary of the Treasury, and loans may not be made to insolvent firms.<sup>13</sup>

The legislation embraces the Thornton-Bagehot principle that emergency liquidity should be provided by the Fed—but only to solvent institutions. Interestingly, such emergency liquidity has to be approved by the secretary of the Treasury. This feature reflects the view that in a democratic society, a financial crisis that requires large liquidity injections cannot be left only to the discretion of the central bank.<sup>14</sup>

### 6.5.2 Euro Area Regulatory Reform

The main precrisis problem of the euro area was, and still is, the variety of regulatory systems across different countries. Although some variety is probably inevitable in view of differences in the financial structures of different countries, the globalization of banking business within the euro area calls for a tighter measure of common supervision and regulation. To address this challenge, a Single Supervisory Mechanism (SSM) for Europe was created in November 2014. It is made up of the ECB and the national supervisory authorities of the participating countries. Its main objectives are to ensure the safety and soundness of the European banking system, increase financial integration and stability, and ensure consistent supervision.

The SSM is one of the two pillars of the EU banking union, along with the Single Resolution Mechanism (SRM). The European banking union integrates supervisory and resolution mechanisms for banks within the European Union and, as of November 2014, makes the ECB directly responsible for the supervision of 129 significant banks within the European Union. These banks hold almost 82 percent of banking assets in the euro area. Banks that are not considered significant are known as “less significant” institutions. They continue to be supervised by their national supervisors, in close cooperation with the ECB. At any time, the ECB can decide to directly supervise any one of these banks to ensure that high supervisory standards are applied consistently. All euro area countries participate automatically in the SSM. Other EU countries that do not have the euro as their currency can choose to participate. To do so, their national supervisors enter into “close cooperation” with the ECB.

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The SRM became effective in December 2015. Its main purpose is to ensure the efficient resolution of failing banks with minimal costs for taxpayers and to the real economy. A Single Resolution Board ensures swift decision-making procedures, (p. 182) allowing a bank to be resolved over a weekend. As a supervisor, the ECB has an important role in deciding whether a bank is failing or likely to fail. A Single Resolution Fund, financed by contributions from banks, is available to pay for resolution measures.<sup>15</sup>

### 6.5.3 UK Regulatory Reform

The United Kingdom's Financial Policy Committee (FPC), formed in early 2011, is the country's systemic risk regulator charged with overseeing the overall stability of the financial system. The committee is given tough powers to tame systemic risk by clamping down on loose credit, overheated sectors, and previously unregulated parts of the financial system. In parallel, a firm-specific, microprudential, operationally independent subsidiary of the BoE, the Prudential Regulation Authority (PRA) was established to manage significant risks on the balance sheets of individual financial institutions. The affiliation of this authority with the BoE should facilitate cooperation and information exchange between the macro (FPC) and the micro (PRA) regulators.<sup>16</sup>

### 6.5.4 Common Elements in US, UK, and Euro Area Regulatory Reforms and Their Rationale

Regulatory reforms in all three areas are based on the notion that the central bank is the choice institution for macroprudential supervision and regulation. This consensus is supported by two main considerations. First, the central bank is the public sector's institution that is likely to have the widest view of the overall state of the financial system. Second, the central bank is also the institution that acts as LOLR in case of crisis. It therefore makes sense to charge the central bank with systemic stability and to endow it with the additional policy instruments needed to perform this task. Consequently, the central bank is well positioned to evaluate the trade-offs involved in taking preventive measures against a systemic crisis and the injection of public funds to limit the adverse effects of such a crisis if it materializes.<sup>17</sup>

However, this enlargement of the central bank's authority moves it closer to the political arena and in particular to fiscal decisions. This is problematic on two counts. First, involvement of the central bank in semifiscal decisions may endanger its independence. Second, as the magnitude of those liquidity injections rises, they become closer to fiscal policy in that they involve a redistribution of wealth. This violates the principle that in democratic societies, distributional policies should be determined by elected officials rather than by unelected bureaucrats. The regulatory reforms of both the United States and the United Kingdom handle this problem by involving the Treasury in the regulatory process. As we saw earlier, in the United States, the FSOC is chaired by the Treasury secretary, and in the United Kingdom, both the FPC and the PRA are accountable to HM Treasury.

(p. 183) The situation is somewhat different in the euro area. Since it operates within an area composed of nineteen different fiscal authorities with a stronger price stability mandate than in the United States or the United Kingdom, the ECB is not directly accountable to a single fiscal authority. This implies that in case of a crisis that requires substantial liquidity injections, the tension between the monetary and fiscal aspects of LOLR operations must be resolved by negotiations between the ECB and the euro area governments.

This raises a thorny question about the relative desirability of those two institutional arrangements. The answer to this question, most likely, depends on the relative risks to price versus risks to financial stability. When risks to financial stability are more important, the involvement of fiscal authorities is desirable even at the cost of some central bank independence (CBI).<sup>18</sup> However, when the converse is true, this statement is reversed. Be that as it may, the enhanced role of central banks in macroprudential regulation, in all three regimes, implies that in the future, central banks are likely to play a more important role than in the past in the internalization of the trade-offs between price and financial stability.

## 6.6 Open Questions and Some Old-New Ideas

### 6.6.1 How to Reconcile a Negative Natural Interest Rate and the ZLB?

The long period of low world interest rates experienced during the last decade is unique. The persistent maintenance of short-term policy rates in the vicinity of the ZLB by major central banks after Lehman's collapse is obviously an important reason for low short-term interest rates since that time. Those policies also partially contributed to the relatively low level of long-term risk-free rates. However, as shown by Bean et al. (2015), both nominal and real risk-free rates were already low prior to the GFC. This fact led some economists to argue that this is a result of secular stagnation driven by a fall in investment opportunities due to a slowdown in the rate of population growth and a decline in the rate of innovation (Gordon 2012; Gordon 2014; Summers 2014).

Bean et al. (2015) argue convincingly that the main reason for the decline in the risk-free long-term real rate is an increase in world savings induced by an aging population due to substantial increases in life expectancy without similar increases in retirement age. This still leaves an open question about the persistence of low interest rates in the future. Although they believe that the world savings rate is a slow-moving variable, Bean et al. argue that at some distant point, world savings are likely to reverse course. At that point, real rates will start to rise. Until that time, real rates are likely to be low. In particular, the short-term real rate, also known as the Wicksellian natural rate of (p. 184) interest, is likely to be low and, according to calculations made by some economists, even negative.<sup>19</sup>

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During periods in which the policy rate is at (or slightly below) the ZLB and inflation is far below the 2 percent target and even negative, this configuration leads to a positive real short-term policy rate that is obviously above the (negative) natural rate of interest. The current state of affairs in the euro area conforms to this description. At least conceptually, it implies that the ZLB imposes an effective constraint on modern Wicksellian optimal monetary policy, since it does not make it possible to reduce the real policy rate to the level of the negative natural rate. Two solutions have been proposed to this conundrum. One is to raise the inflation target to, say, 4 percent. The other is to adjust monetary institutions so as to eliminate the ZLB constraint.

The idea to raise the inflation target in order to bypass the constraint of the ZLB on monetary policy has been recently revived by Blanchard, Dell-Ariccia, and Mauro (2010) and Ball (2014).<sup>20</sup> By sufficiently raising the inflation target, it is obviously possible to hit any negative natural rate in spite of the ZLB. Obviously, this strategy will work only if the higher target is credible and is, therefore, able to raise inflationary expectations and reduce the ex ante real rate.

Although the logic of this argument is appealing, it has two potential limitations. First, if the higher inflation target achieves the objective of lifting actual output to its potential level, the higher-than-normal inflation target becomes time inconsistent. This may undermine the credibility of the higher target in the first place (Tabellini 2014). Second, at a more practical level, after a hard-won battle against inflation, most central bankers are generally reluctant to tamper with the inflation target out of fear that when more normal times return, this will upset the stabilizing effect of a permanently fixed target of 2 percent on long-run inflationary expectations. This argument carries more weight the lower the number of times the policy rate is expected to hit the ZLB in the future.<sup>21</sup>

The other way to neutralize the constraint imposed by the ZLB on optimal monetary policy is to adjust monetary institutions so as to neutralize the incentive to move funds into cash when deposit rates become negative. Buiter and Rahbari (2015) explore three possible ways to achieve that. One is to remove the fixed exchange rate between zero interest-rate cash currency and central bank reserves/deposits denominated in a virtual currency. This can be done by dating cash and by credibly committing to reduce its value periodically at a rate identical to the rate at which reserves depreciate due to the negative interest they carry.<sup>22</sup>

Although the logic of the idea is impeccable, it is hard to imagine that such a drastic (and inconvenient) institutional change is likely to be adopted anytime soon, only because some calibrated New Keynesian models like that of Cúrdia (2015) and Cúrdia et al. (2015) estimate that the US natural rate of interest rate is likely to be in the neighborhood of minus 4 percent for several years. Beyond this impressionist remark, it is important to remember that the interest rates that are important for economic activity are medium- and long-term rates and that, due to the positive slope of the yield curve, they are not necessarily constrained by the ZLB. This view is partially supported by evidence showing

that, at least until 2010, the impact of the short-term ZLB on US one- and two-year interest rates was negligible (Swanson and Williams 2014).

### (p. 185) **6.6.2 Should the Reserve Requirement on Banks Be Raised to 100 Percent?**

Following the Great Depression, Irving Fisher became a strong supporter of the “Chicago plan” which advocated the establishment of a 100 percent reserve requirement on banks. Both Fisher and the University of Chicago economists behind the proposal believed that by increasing the central bank’s control of credit, this institutional change would greatly reduce the likelihood of financial crises. But, as is well known, this idea was never implemented. Following the GFC, a modern reincarnation of the idea, adapted to the much deeper current financial markets, was proposed by Cochrane (2014), who advocates that: (i) banks should be 100 percent funded by equity, (ii) fixed-value debt should be 100 percent backed by Treasury or Fed securities, and (iii) capital ratios should be replaced by Pigouvian taxes. During 2015, a Swiss group collected the one hundred thousand signatures necessary to require a national referendum on requiring banks to hold 100 percent reserves.

Besides the obvious political opposition of banks to such a change, any serious evaluation of this matter should keep in mind the following considerations. First, by strengthening the link between high-powered money and credit creation, such a move will transfer a good chunk of decisions about the allocation of credit to the central bank. This will require central banks to develop the microeconomic skills necessary for evaluation of different credit risks. It is likely to increase the politicization of central banks and endanger their independence by inducing a stronger involvement of governmental politics in the allocation of credit.

Furthermore, Diamond and Dybvig (1986) argue that this proposal has the following additional drawbacks; it will damage the economy by decreasing the overall amount of liquidity and will necessitate the creation of new regulatory structures to control the institutions that will enter into the vacuum left when banks can no longer create liquidity. This is likely to be particularly detrimental for small and medium-size firms that have limited access to the capital market. In summary, it appears that although a 100 percent reserve requirement is likely to enhance the stability of the financial system, the jury is still out on the desirability of this idea.

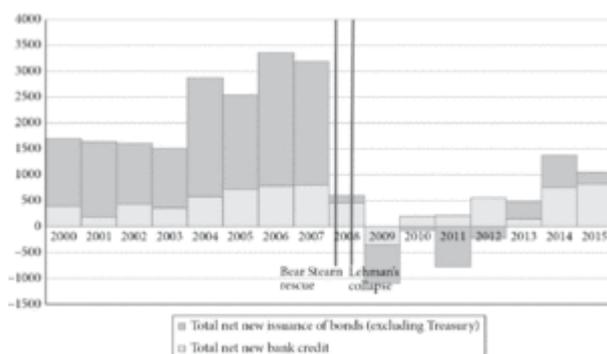
## **6.7 The Evolution of Credit over the GFC: Implications for Exit Policies**

Since 2008, and in spite of huge injections of high-powered money by the Fed after Lehman’s collapse, new credit allocations through the US banking system and its capital market experienced deep and sustained decreases. Somewhat less extreme but broadly similar processes occurred in the euro area, mainly after the public admission by Greek

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Prime Minister George Papandreou in November 2009 that Greek deficits and debt (p. 186) were substantially higher than previously available public figures.<sup>23</sup> Figures 6.1 and 6.2 illustrate the dimensions of total new credit arrest in the United States and in the euro area, respectively, since the onset of the GFC through 2015. In both the United States and the euro area, new total credit growth through banks and the capital market was seriously depressed for about five years. In about half of those years, total US credit actually shrank. There are signs of some pickup in total new credit in the United States during 2014 and 2015. However, the credit increments in those years pale in comparison to their counterparts prior to 2008. Except for the fact that it starts about one to two years later, a similar phenomenon characterizes the behavior of changes in total credit in the euro area.

There is little doubt that the deep and relatively long recession, first in the United States and later in Europe, is related to the arrest in credit growth. It is therefore important to understand the reasons for the deep and sustained arrest in the allocation of new credit. In the United States, the decision not to bail out Lehman Brothers after previously bailing out other systemically important financial institutions (SIFI) constitutes an important watershed. By demonstrating to financial market participants that not all SIFI institutions will always be bailed out, this decision generated an immediate panic. The ensuing flight to safety along with substantial decreases in the market value of assets severely reduced the willingness of banks to grant credit and of institutional investors to continue to lend to banks. Essentially, financial market participants became probabilistically aware of the existence of lower bailout probabilities.<sup>24</sup>



(p. 187)

Figure 6.1 Total Net New Bank Credit and Total Net New Issuance of Bonds in the United States, excluding Treasury Bills (\$ Billions)

Sources: bank credit, Bloomberg ALCBBKCR Index; bond issues, Securities Industry and Financial Markets Association (SIFMA).

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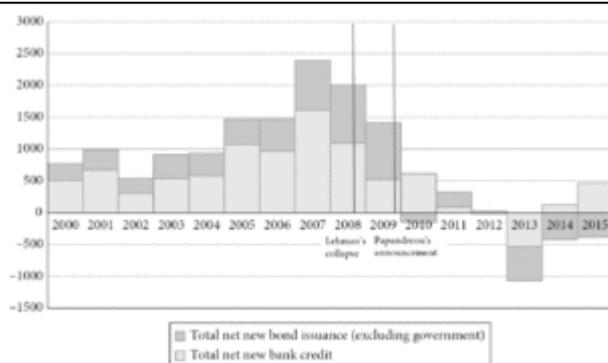


Figure 6.2 Total Net New Bank Credit and Bond Issuance in the Euro Area, excluding Government (€ Billions)

Sources: <http://sdw.ecb.europa.eu>.

Although the mechanism above provides a reasonable explanation for the sudden deep credit arrest immediately following Lehman's collapse, the persistence of this arrest involves additional longer-term factors. One is the well-known financial accelerator mechanism (Bernanke and Gertler 1995; Bernanke, Gertler,

and Gilchrist 1996). By reducing the value of real estate and financial assets, the initial trauma reduced the value of available collateral along with banks' equity capital. Both factors reinforced the unwillingness of banks to extend credit for some time after the initial panic.<sup>25</sup> As recounted in section 6.5, the GFC also triggered long-term regulatory reforms in major Western economies. The postcrisis emerging regulatory frameworks impose restrictions on automatic bailouts, require SIFIs to provide "living wills" and to perform stress tests, and impose more stringent capital, leverage, and liquidity ratios. Although some of those are phased in gradually, their impact on new credit formation is gradually felt in advance due to banks' attempts to improve their capital and leverage ratios.

The upshot of the previous discussion is that the reduction in the value of collateral, tougher regulatory demands from banks, and the lingering traumas in the aftermaths of Lehman's collapse and the Greek sovereign crisis have been a drag on credit growth and are likely to slow it down also in the foreseeable future. One implication of this point of view is that exits from the extraordinarily expansionary monetary policies followed during the crisis, first by the Fed and subsequently by the ECB, should be phased in rather carefully with an eye to what such exits are doing to credit expansion and the real economy. This statement is particularly relevant for the euro area, in which economic activity is substantially below potential and the rate of inflation is negative.

### (p. 188) 6.8 Conclusion

This chapter describes the main changes in the conduct of monetary policy and in monetary policymaking institutions triggered by the GFC. In reaction to the crisis, the policy rates of the United States and the United Kingdom quickly reached the ZLB. After a while, the more conservative ECB reached this range as well, and it is currently featuring a negative policy rate. Policy rates in the vicinity of the ZLB along with a relative passivity of fiscal policies induced heavier reliance on monetary policy instruments that had been considered unconventional during the Great Moderation. The

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most important among those are QE, forex market interventions, negative interest rates, and forward guidance.

The crisis triggered a wide-scale process of regulatory reforms in the United States, the euro area, the United Kingdom, and other countries. In practically all cases, the main responsibility for macroprudential regulation is now being vested with the central banks. Although it is likely that such broadening of central bank authority reduces the likelihood of systemic crises, it may increase the politicization of central banks in the future. In the euro area, the crisis triggered a substantial move toward unification of regulation under the umbrellas of a banking union that rests on three pillars: the SSM, the SRM, and the harmonization of regulation. Persistently low rates of inflation and interest may preclude the achievement of optimal monetary policy due to the ZLB if the Wicksellian natural rate is deep in negative territory, as some recent research for the United States shows. The chapter describes and evaluates various proposals, such as raising the inflation target and taxing cash, designed to neutralize the constraining impact of the ZLB on monetary policy. It also describes and evaluates the old-new idea of a 100 percent reserve requirement on banks as a device to reduce the likelihood of financial crises. In the context of the relative passivity of fiscal policy, the chapter argues that historical evidence from the post-World War I German hyperinflation supports the view that a money finance decrease in taxes (“helicopter money”) can be very effective in swiftly offsetting deflation.

The chapter documents the substantial and persistent slowdown in the growth of total new credit (via both the banking system and the capital market) in the United States and the euro area and argues that due to regulatory reform, the financial accelerator mechanism, and an increase in financial markets awareness of less generous bailout policies in the future, this slowdown is likely to persist. One implication of this view is that exit from the extraordinary expansionary monetary policies followed during the crisis should be rather gradual.

In summary, and looking ahead, the GFC encouraged the development of unconventional monetary policy instruments, led to substantial regulatory reforms and to the expansion of central banks’ authority over macroprudential regulation. How many of those changes are likely to persist into the future when normal times return? My judgment is that at least to some extent, all those changes are likely to persist. (p. 189) The saddling of central banks with macroprudential regulation and the regulatory and related institutional reforms in the United States and Europe are probably the most persistent changes. Cooperation between different US regulators is likely to be permanently tighter and banking regulation across countries in the euro area permanently more uniform.

Unconventional monetary policy instruments such as QE and forex interventions are likely to be used more frequently than prior to the crisis when the ZLB is reached or some other circumstances require the use of such instruments. Furthermore, in spite of the fact that many central bank charters do not directly saddle the bank with the responsibility to avert bubbles in real estate and financial markets, most central banks are likely to pay

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more attention to this issue within the framework of their postcrisis wider financial stability mandate.<sup>26</sup>

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### Notes:

(1.) Chapter 16 in this volume, by Taylor, Arner, and Gibson, contains a historical account of the changes that occurred over time in the relative emphasis given by central banks to financial versus price stability. Mayes, in chapter 20 of this volume, notes that the recent crisis led to an expansion of the authority and tasks of central banks.

(2.) With hindsight, this proved to be a profitable investment. Relatedly, He and Krishnamurthy (2013) find that injections of equity capital by the Fed were particularly effective in stimulating the economy.

(3.) During the six years following the Lehman Brothers collapse, the US monetary base more than quadrupled (Cukierman 2016, fig. 1).

(4.) Examples are Krishnamurthy and Vissing-Jorgensen 2011 and Swanson and Williams 2014. Further details appear in the next section.

(5.) Details appear in Cukierman 2014.

(6.) In normal times, sterilization is used to avoid conflicts between the interest-rate policy of the central bank and its intervention policy. However, once the policy rate becomes stuck at the ZLB, this conflict disappears.

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- (7.) An extensive survey of recent literature on central bank communications appears in Moessner, Jansen, and de Haan forthcoming.
- (8.) The verbatim statement: “Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough” (Draghi 2012).
- (9.) This operation is reminiscent of “Operation Twist” undertaken under McChesney Martin in the 1960s. Details of this episode appear in Modigliani and Sutch 1966.
- (10.) As a consequence, high-powered money in the Eurozone expanded much less than in the United States. Details appear in Cukierman 2014.
- (11.) A progress report appears in *Dodd-Frank Implementation* 2013.
- (12.) The act is quite comprehensive and covers many areas, including consumer protection. The text focuses only on the parts of the act that are relevant for financial stability.
- (13.) Obviously, unless insolvency proceedings have been opened, it is always a guess whether realized liabilities will be greater than assets, and if emergency lending is possible, other creditors will be very keen to avoid triggering insolvency.
- (14.) Further discussion of this issue is postponed to the end of this section.
- (15.) European Central Bank 2015.
- (16.) Responsibility for business regulation has been transferred to a third authority, the Financial Conduct Authority (FCA), which has responsibility for conduct issues across the entire spectrum of financial services. It is hoped that coordination among those three bodies will be reinforced by the fact that all three are either directly or indirectly accountable to the UK Treasury (HM Treasury 2011).
- (17.) Using a sample of as many as 124 countries during the 2007–2012 period, Melecky and Podpiera (2016) find that in countries with deep financial markets, or countries undergoing rapid financial deepening, locating microprudential regulation in the central bank along with macroprudential regulation reduces the likelihood of financial crises.
- (18.) In addition, to be effective, supervisors and regulators should be independent from political influence and interest groups. Attainment of such independence is likely to be even more difficult than preservation of CBI. Further discussion of those issues appears in Cukierman 2013.
- (19.) A recent example based on a New Keynesian framework appears in Cúrdia et al. 2015.
- (20.) Early advocates of such a strategy are Krugman (1998) and Svensson (2003).

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(21.) Using a calibrated New Keynesian model, Coibion, Gorodnichenko, and Wieland (2012) find that a 3 percent (or higher) inflation target becomes optimal only when the ZLB binds at least every seven or eight years. Most central bankers are unlikely to consider raising the target to avoid such relatively infrequent events.

(22.) The other two ways are to abolish currency or to tax it.

(23.) Figs. 2a, 2b, and 4 in Cukierman 2014 document the exceptional increases in banking reserves and high-powered money in the United States and the euro area during the GFC.

(24.) Cukierman and Izhakian (2015) formulate this change in perceptions as an increase in (Knightian) bailout uncertainty and show, within a general equilibrium framework of the financial system, that such a change leads to credit arrest, to a flight to safety, and to shrinkage of activity in the real sector. A data-connected, intuitive exposition of those ideas appears in Cukierman 2016.

(25.) The reduction in financial asset values was particularly dramatic in mortgage-backed and other asset-backed securities. Details appear in fig. 5 of Cukierman 2016.

(26.) Based on two surveys—one of central bank governors and the other of academic specialists—Blinder, Ehrmann, and de Haan (2016) conclude that the consensus among governors and academics is similar but that the winds of change are stronger in countries that were directly affected by the GFC.

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