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The Changed Role of the Lender of Last Resort: Crisis Responses of the Federal Reserve, European Central Bank and Bank of England

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The Changed Role of the Lender of Last Resort: Crisis Responses of the Federal Reserve, European Central Bank and Bank of England*

Gayane Oganessian

Abstract

This paper analyzes whether the Lender of Last Resort function has changed in consequence of the recent Global Financial Crisis. The unprecedented emergency actions of the Federal Reserve, European Central Bank and the Bank of England are analyzed in terms of Walter Bagehot's traditional Lender of Last Resort doctrine. The central banks' actions are compared to identify the extensions and paint a general picture of the modern and much more comprehensive Lender of Last Resort function, which includes provision of liquidity and collateral, lowering interest rates and expansionary monetary policy, loosening collateral standards, supporting critical institutions, opening special liquidity facilities that target specific markets or groups of agents, and becoming market maker of last resort and buyer of last resort. The Lender of Last Resort function has been found to have changed.

Keywords: Lender of Last Resort, Walter Bagehot's Lombard Street, penalty rate, secure collateral, solvency and illiquidity, monetary policy, Federal Reserve Bank, European Central Bank, Bank of England, Market Maker of Last Resort, quantitative easing, Buyer of Last Resort

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Introduction

The recent global financial crisis has been compared in magnitude to the Great Depression of 1930s and required central banks around the world to implement comprehensive Lender of Last Resort measures to constrain it. Since this crisis has been special in its own right, it is likely that the traditional Lender of Last Resort function has been changed to better and more effectively address the instability of the financial system. This paper analyses whether the Lender of Last Resort function has been changed as a result of the recent crisis, and if so, what are the main reasons. In order to answer these questions, Walter Bagehot's traditional Lender of Last Resort theory and its modern interpretations are examined in Section 1. Section 2 provides a detailed analysis of the actions of the Federal Reserve (Fed), European Central Bank (ECB) and Bank of England¹ (BOE) in terms of Bagehot's traditional Lender of Last Resort criteria. This analysis includes the identification of each of the central banks' deviations from the criteria. In Section 3, the central banks' Lender of Last Resort operations are compared to find similarities and differences, thereby painting a general picture of the recently extended or modified Lender of Last Resort function. The explanation of and reasons for the discovered differences and similarities are provided in the same section.

1. The Classical Lender of Last Resort Theory

1.1 Walter Bagehot's Lender of Last Resort Doctrine

In "Lombard Street: A Description of the Money Market" (1962 [1873]), Walter Bagehot extended the ideas of Henry Thornton (1802) and formulated the most well-known Lender of Last Resort (LLR) theory. He described not only the role and function of a central bank as LLR, but also its main operational principles. Like Thornton, Bagehot stressed that the central bank was unique in comparison to commercial banks, because it was the ultimate holder of liquid reserves or high-powered money (Bagehot 1962: 85, Humphrey 1989: 13). Hence, when commercial banks contract lending in times of panics or crises, the central bank has the ability and duty to lend and satisfy liquidity demands. Apart from protecting the money stock and ensuring stable money growth², the main task of the central bank as LLR³ is to constrain

¹ These three main central banks were selected because they produce the world's dominating currencies and extensively intervene in financial markets to stabilize the system.

² These were considered the main goals of a central bank in 19th century Britain. For more information see the Currency School vs. Banking School debate in Daugherty (1942).

³ In fact, the traditional LLR policy is intertwined with central bank's function of controlling the money stock (Humphrey 2010).

financial panics or prevent an initial default of a financial institution from triggering waves of subsequent failures throughout the system (Bagehot 1962: 29). In fulfilling this task, Bagehot believed the central bank should be guided by four main principles: (1) lend freely and to the public, (2) at a penalty rate, (3) to any actors with good collateral (4) who are illiquid but solvent. These principles, described in more detail below, constitute Bagehot's invaluable contribution to LLR theory.

1. Willingness to lend freely and to the public

To Bagehot, LLR role is primarily a macroeconomic one, which also means that the LLR should provide liquid funds to the whole system and not just specific institutions (Bagehot 1962: 25). The public should also be assured that the central bank acknowledges its LLR function and is ready to step in at any future time of need. For instance, Bagehot states that "the public have a right to know whether... the holders of our ultimate bank reserve... acknowledge this duty, and are ready to perform it" (Ibid: 85).

2. Lending at a penalty rate.

Bagehot claims that "very large loans at very high rates are the best remedy for the worst malady of the money market when a foreign drain is added to a domestic drain" (Bagehot 1962: 27-28). Since the theory was written at the time of the Gold Standard, high penalty rates would secure a nation's gold reserve by simultaneously attracting specie from abroad and preventing any outbound drains. The penalty rate serves other additional purposes. For example, high cost of borrowing from the central bank would encourage quick repayment of loans once the crisis ends. According to Bagehot, this would neutralize any emergency credit expansion and ensure stable growth of money stock's note component. It should also prevent any misuse of central bank's lending and moral hazard. The central bank would be rewarded for providing the liquidity and protection, while commercial banks would only borrow out of dire need and not precaution. As Bagehot claims, the penalty rate is "a heavy fine on unreasonable timidity" (Ibid: 97). Considering all of the above, the penalty or above-the-market rate would ensure that "...the Bank of England reserve may be protected as far as possible" (Bagehot 1962: 97).

3. Accommodation of any actors with good collateral.

Last resort loans should be made "to merchants, to minor bankers, to this man and that man" (Bagehot 1962: 25), which is consistent with the duty of the LLR to lend to the public and

satisfy the market's demand for liquidity. On the other hand, the borrower should not only be willing to pay the penalty rate, but also provide good collateral to receive the loan. According to Bagehot (Ibid: 97), LLR should lend "on every kind of security, or every sort on which money is ordinarily and usually lent." He even promoted the use of non-traditional collateral in crises, such as "railway debenture stock" (Ibid: 101). However, Bagehot appears to contradict himself by saying that the LLR "should refuse bad bills or bad securities" and that this will not "make the panic really worse" (Ibid: 97). As confusing as it may seem, Bagehot may be differentiating between the variety and the quality of collateral accepted. Considering the aforementioned and making a deduction, it doesn't matter what variety of collateral the central bank accepts, as long as it is secure or sound (default-risk-free). This point is closely connected to the following principle of lending only to illiquid but solvent institutions.

4. Lending to illiquid but solvent institutions

In Bagehot's words, liquidity should be provided to "solvent merchants and bankers" that constitute the "great majority of the market" (Bagehot 1962: 97). If the institution cannot provide sound collateral, it should be considered insolvent and allowed to fail. It is important to note that Bagehot considered the unsound institutions to be only a "feeble minority" whose failure would not be harmful, provided that the other banks were considered exempt from the initial causes of the aforementioned failure (Ibid: 97, 129). In any case, the main aim of the LLR is not to avoid a collapse of any institution at all costs, but to prevent such a failure from setting off a domino effect across the whole system. To further limit reliance upon the central bank, Bagehot emphasized the need to improve the soundness of the banking system and provide temporary emergency LLR support (Ibid: 27-28, 36).

Bagehot's LLR rule can be summarized as: unlimited lending to the public, against good collateral and at penalty rates, to illiquid but solvent institutions. Although the times have significantly changed, Walter Bagehot's LLR theory represents the basis of modern interpretations of a more comprehensive LLR function.

1.2 Lender of Last Resort Theory: Open to Interpretation

From a purely theoretical perspective, Bagehot's LLR function is open to different interpretations and is flexible, which also means it can change through time (Herr 2012: 20). In terms of high penalty rates, Bagehot wrote his theory at the time of the Gold Standard and was primarily concerned with protecting the money stock. In modern times, the outflow of gold is not a real threat, and high penalty rates can only be effective during times of extreme

capital flight and currency depreciation. The issue of 'good or secure collateral' is highly subjective and depends on what secure collateral is assumed to constitute (Moe 2012: 7). It may generally be securities or assets that will be good in the long-run (default free), but it is the central bank that decides what constitutes solid and accepted collateral. Hence, Bagehot's recommendations with regards to collateral standards could be considered as constructively ambiguous, in order to allow the central banks room for full accommodation of liquidity needs and prevention of system wide crises. With regards to the issue of solvency, it is difficult to distinguish between illiquidity and insolvency, especially in times of panics. The two are inter-linked, where a liquidity shortage may be combined with or lead to insolvency (Herr 2012: 4). In fact, the question whether institutions that received support were insolvent or illiquid would be answered only after the crisis, since a solvent but illiquid institution would be able to repay its loans in the period of recovery. Moreover, the LLR is assumed to lend freely to all institutions in need of liquidity, which also means that the list of eligible for central bank money institutions can be broadened with the development of a more sophisticated financial system. Therefore, the LLR function can easily be theoretically extended.

Taking into account that the financial systems of the world changed tremendously in the past 40 or so years, it would not be surprising that the Central banks' LLR functions also changed in line with these financial developments (Ibid: 20). Starting from the late 1970s, and gaining pace in the 1980s/90s, financial globalization and liberalization gained pace, promoted by the neoliberal market-oriented US hegemonic power after the collapse of the Bretton Woods System, the establishment of the US dollar as the world's fiat money, and price volatility with floating exchange rates (Hoenig et. al. 2011: 2-5). Financial innovation and deregulation resulted in the explosion of the shadow banking sector that became increasingly connected to the commercial banking sector through three channels of securitization, proprietary trading, and granting credit to non-bank financial institutions (Herr 2011: 135), particularly in the case of Anglo-Saxon countries. This lack of barriers between shadow and commercial banks allowed for the leakage of government subsidies intended for depository institutions, to other shadow financial institutions. Although the countries of continental Europe did not experience such an explosion in shadow banking as the US, investment banking gained importance particularly in the 1980s and 1990s. Considering that universal banking was allowed and relatively unregulated in Europe, European financial institutions not only engaged in intra-continental investment banking activities, but also heavily invested in US toxic papers (Herr 2012: 6). Generally, there was a shift from

traditional banking toward non-traditional, market-based and profit maximizing investment practices. Because finance changed substantially from Bagehot's time, it would only make sense that the function of LLR also acquired new and extended meaning in comparison to the traditional doctrine (Herr 2012: 20). In fact, modifications of LLR are necessary, provided they are in line with the traditional aim of stabilizing the whole financial system with a macroeconomic outlook. However, regulatory capture and the immense influence and pressure of the Too Big to Fail (TBTF) financial conglomerates to support the recent LLR extensions should not be disregarded in view of the importance of power struggles in institutional change.

Having established that the classical LLR theory is open to interpretation and subject to change, the next section provides an analysis of the recent crisis responses of the Federal Reserve, Bank of England and European Central Bank in terms of adherence to or deviation from Bagehot's criteria. This analysis allows for the identification of the changes to the traditional LLR, whereby the central banks' responses serve as examples of its modern version.

2. Central Banks' Responses to the Crisis and the Traditional Lender of Last Resort

The best way to understand the extent of the central banks' LLR intervention and deviation from the traditional LLR function is to analyze their balance sheets (Herr 2012: 12), or total assets in particular, depicted in Figure 2.1.

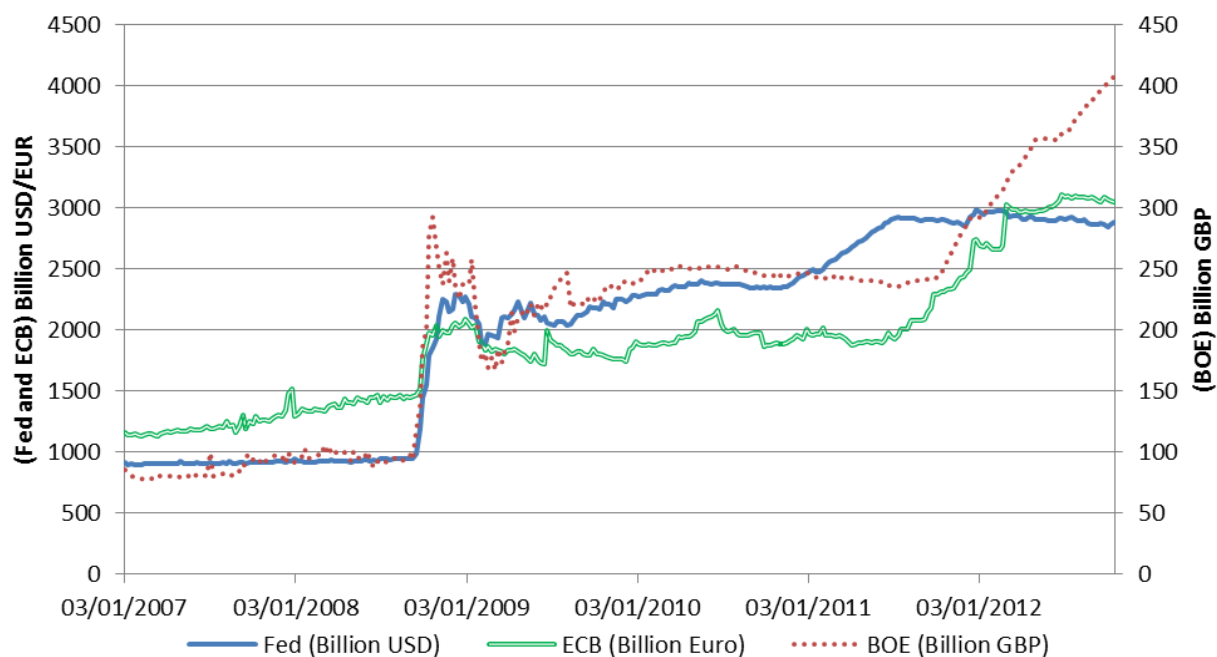


Figure 2.1 Total Assets of the Central Banks, Billion National Currency, 2007-2012

Source: Fed (2012a) Data Download Program, Bank of England (2012a) Statistical Interactive Database, ECB (2012a) Statistical Data Warehouse

As could be seen, the absolute increase in total assets from pre-crisis levels is greatest in the case of BOE. In fact, its assets increased by 379 per cent from 2007 until late 2012. The Fed follows closely behind, with a relative increase of approximately 216 per cent, while the ECB takes third place with a 164 per cent increase. On the other hand, the approximate cumulative 3 trillion of assets each held by the ECB and Fed far outweigh the 408 billion held by the BOE. It should be noted, however, that BOE's holdings continued to increase in 2012, while the Fed's and ECB's holdings exhibited not much change. As percentage of 2011 GDP levels⁴ (World Bank 2012, Eurostat 2012), the corresponding cumulative assets equal an astonishing 29 per cent for the ECB, 20 per cent for the Fed and 19 per cent for the BOE. Thus, the tremendous increases in all of the leading central banks' assets indicate the extent of their LLR interventions.

⁴ Total asset holdings by the end of 2011 in local currency at each of the central banks are compared to 2011 GDP levels of respective countries in local currency and at market prices. For ECB, the GDP level for the 17 Euro area countries is used. The latter explains why two data sources are used for GDP. Verified data for 2012 GDP levels is not yet available, while estimates are unreliable.

2.1 Federal Reserve's Responses to the Crisis and the Traditional Lender of Last Resort

The Fed took an extraordinary and radical approach to the global financial crisis, and when traditional monetary policy responses were ineffective and insufficient, the Fed turned to unconventional monetary policy tools in exercising and extending its function of LLR. It should be noted that the Federal Reserve Act (FRA) does not explicitly state that the Federal Reserve acts as a Lender of Last Resort (Fein 2008). Instead, the phrase is often used to describe the Federal Reserve's role in this regard. The three key sources of LLR authority can be found in Sections 10B, 13 and clause (3) in particular, and 14 of the FRA (Baxter et. al. 1999: 221).

By looking at the Fed's balance sheet, or more precisely on the development of its assets in Fig. 2.1, three phases can be highlighted: *Phase 1*: December 2007 to September 2008 when Lehman Brothers defaulted; *Phase 2*: September 2008 till November 2008; *Phase 3*: End of 2008/beginning of 2009 until today (Herr 2012: 12).

The actions taken and the facilities created in each of these three phases will be examined and analyzed in detail. By taking on this chronological and stage approach, it is possible to determine the evolution of the Fed's responses as the crisis unfolded. It should be noted that although liquidity existed in the system, it was not lent out to financial institutions demanding it, but kept safely in the free reserves of the central bank instead, as in a typical panic to try save the existing liquidity in times of crises (Herr 2012: 12). As the money markets collapsed, financial institutions heavily relied on the central bank as the LLR.

Phase 1: Short-term liquidity provision

The first phase is characterized by the use of traditional monetary policy tools, as well as the beginning of unconventional measures. These were used to inject short-term liquidity into the banking system and support financial markets in general by providing liquidity to other than depository institutions in need. The unconventional measures, depicted in Table 2.1, were taken up when private markets were unwilling to conduct normal intermediation and liquidity provisioning (Fed 2012b).

Table 2.1 Fed's Facilities in Phase 1 (December 2007-September 2008)

Facility	Main Aim	Target	Operation	FRA ^a (Section)	Amount ^b (Billion USD, \$)	Term ^c	Status
Central Bank Liquidity Swap Lines (CBLS)	Ease global dollar liquidity pressures	Foreign Central Banks	Central banks borrowed against prearranged line of credit	14	12,217 (28/11/2010)	12/2007 - 02/2013	Open until 02/2013; in case of need
Term Auction Facility (TAF)	Overcome discount window use stigma	Foreign and domestic depository institutions	Auction liquidity to commercial banks	10(B) and Amendment of Regulation A	3,818	12/2007 - 05/2010	Repaid with interest
Primary Dealer Credit Facility (PDCF)	Ease repo market liquidity strains	Primary dealers	Overnight lending of reserves	13(3)	8,951 (12/05/2009)	03/2008 - 02/2010	Repaid with interest
Term Securities Lending Facility (TSLF)	Facilitate access to liquidity in funding markets		Borrow liquid Treasuries for a fee in exchange for less liquid collateral		2,006 (17/07/2009)		
TSLF Options Program (TOP)			- Auction options that gave the right to draw upon a TSLF loan in exchange for eligible collateral - Only some options were fully or partly used				
Ad Hoc Credit	Prevent Bear Stearns default	Facilitate takeover by JP Morgan Chase & Co.	- Bridge loan - Purchase distressed assets through New York Federal Reserve Bank's Special Purpose Vehicle, Maiden Lane LLC			42.000	14/03/2008 and 20/09/2008

Sources: Fed (2012b), Felkerson (2011)

Abbreviations: FRA, Federal Reserve Act. ^(a)Authority under the Federal Reserve Act; ^(b)Total amount lent out during the time span of the facility, including the date of the last transaction where applicable; ^(c)Time span of the facilities, including the start and end dates.

The monetary policy tools that are considered as the Fed's conventional LLR tools include lowering short-term interest rates, initial open market operations (OMOs) and the discount window (Felkerson 2011: 12). Although Bagehot insisted upon high penalty rates to discourage gold outflow and moral hazard, the Fed lowered its interest rates to effectively 0.25-0 per cent (Fed 2012b). The aim of the aforementioned was to reduce the cost of borrowing, encourage banks to lend to each other and avoid depression in a systemic crisis. In terms of open market operations, Bagehot would not altogether discourage their use, apart from rendering the high penalty rates inoperative, because they serve as a market-oriented mechanism of liquidity allocation that allows to advance cash vigorously and freely to the public (Felkerson 2011: 3). Furthermore, OMOs were not highly developed and widely used back in his days. With regards to the traditional LLR tool, the Fed's use of the discount window proved ineffective even at discount rates that were lower than the federal fund rate (Fed 2012b). Although Bagehot's high discount rates were intended to discourage misuse, the stigma and suspected insolvency associated with borrowing from the window invalidated this option. The aforementioned disincentive for institutions was particularly heightened by preliminary requirement for borrowers to seek funds elsewhere in the markets, thereby making the discount window an option of very last resort.

Considering the ineffectiveness of and the stigma associated with the traditional LLR tool, the Fed opened the Term Auction Facility (TAF) to allow banks to borrow liquidity in groups and pledge wider than at the discount window range of collateral (Felkerson 2011: 8). It should be mentioned that this facility only changed the composition of the Fed's assets and not their quantity.

There were additional pressures in global short-term dollar funding markets on behalf of foreign central banks (Fed 2012b). To respond to these pressures, the Fed opened the Central Bank Liquidity Swap Lines (CBLS), and Dollar Liquidity Swap Lines (DLS) in particular. The Foreign Exchange Currency Swap Lines were never used, apparently because US institutions didn't demand foreign currency-denominated liquidity. However, the main DLS borrowers were the ECB, BOE and the Swiss National Bank (Felkerson 2011: 10). CBLS lines were consistent with the LLR function because assistance was provided to solvent, but illiquid foreign central banks that administered dollar liquidity to banks in their jurisdiction.

The Fed began taking further unprecedented actions by creating the Primary Dealer Credit Facility (PDCF) and the Treasury Securities Lending Facility (TSLF) (Fed 2012b), which marked the first instances of the Fed using Section 13(3) of the FRA in this crisis. The

need for these facilities was explained by the potential failure of large in size and interconnected with the whole financial system primary dealers cascading across markets and institutions (Felkerson 2011: 15-19). Although the traditional role of LLR is to provide liquidity to the market as a whole, providing this kind of support for specific solvent groups of agents is closely related, especially considering that it substitutes the money market. However, the extension of PDCF's eligible collateral to include unsecure, illiquid and privately issued securities could be considered as against Bagehot's criteria of 'secure collateral'.

Most notably in this phase, the Fed created ad hoc credit for the first time to facilitate the take-over of Bear Stearns by JP Morgan (Fed 2012b). The Federal Reserve Bank of New York first made a bridge loan of \$ 12.9 billion to Bear Stearns on 14th March 2008, in order to facilitate the takeover by JP Morgan and Chase. However, JP Morgan and Chase was concerned about Bear Stearn's mortgage trading portfolio, and the Federal Reserve Bank of New York subsequently acquired most of these assets through its special purpose vehicle, Maiden Lance LLC (or Maiden Lane I) with a loan of \$ 29 billion. Thus, Bear Stearn's bailout cost \$ 42 billion in total, and all loans were repaid in full (NYFRB 2012). Although this contradicted the traditional LLR, the default of Bear was considered to trigger further crises. Interestingly, Lehman Brothers was considered insolvent and allowed to fail.

Phase 2: Credit Easing and Support of Specific Institutions

As the crisis proceeded, the Fed took on more unprecedented measures using Section 13(3) of the FRA, which are summarized in Table 2.2. These facilities further deviated from the traditional LLR and led to an increase in Fed's assets. This phase could be characterized by the Fed engaging in credit easing and becoming a market maker of last resort (support specific markets and assets prices), which are not consistent of Bagehot's LLR (Moe 2012: 11). For example, through the Term Asset-Backed Securities Loan Facility (TALF) the Fed supported the ABS market and ABS prices in particular, by purchasing surrendered collateral through TALF LLC. Moreover, if funds were insufficient, the US Treasury's Troubled Asset Relief Program (TARP) provided additional debt financing (Moe 2012: 22) at the expense of the tax-payers. Thus, the independent central bank clearly cooperated with the central government.

Table 2.2 Fed's Lending Facilities Initiated in Phase 2 (September 2008-November 2008)

Facility	Main Aim	Instrument	Operation	FRA ^a Section	Amount ^b (Billion USD, \$)	Term ^c	Status
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF)	<ul style="list-style-type: none"> - Foster liquidity in asset-backed commercial paper market and money markets - Liquidity backstop for money market mutual funds - Stop money market mutual funds from selling off assets to meet redemption demands and halt asset price deflation - Promote money market mutual funds' investment in money market instruments 	—	Finance purchase of money market mutual funds' issues of asset-backed commercial paper by eligible buyers	13(3)	217	09/2008 - 02/2010	Repaid with interest
Commercial Paper Funding Facility (CPFF)	<ul style="list-style-type: none"> - Initiated because money market mutual funds reluctant to buy commercial paper - Restart flow of credit to real economy 	CPFF LLC	Direct purchase of newly-issued asset-backed commercial paper through CPFF LLC		737	10/2008 - 02/2010	Repaid with interest
Money Market Investor Funding Facility (MMIFF)	<ul style="list-style-type: none"> - Promote investment in money market instruments - Provide liquidity to money market mutual funds 	Private sector Special Purpose Vehicles (SPVs)	Federal Reserve Bank of New York provides funding to finance SPVs' purchase of money market instruments from eligible investors		No loans were made	10/2008 - 10/2009	No loans were made
Term Asset-Backed Securities Loan Facility (TALF)	<ul style="list-style-type: none"> - Support asset-backed securities markets and prices - Facilitate issue of asset-backed securities collateralized by consumer & business loans 	TALF LLC	5 year non-recourse loans to asset-backed securities holders against AAA-rated securities		71	11/2008 - 03/2010	Out. Loans until 03/2015; 937 million USD outstanding (28/11/2012)
Ad Hoc Credit	Prevent collapse of AIG and whole financial system	Revolving Credit Facility; Securities Borrowing Facility; Maiden Lane II and III; AIA/ALICO	Finance nationalization of AIG		161	09/2008	Repaid with interest

Sources: Fed (2012b), Felkerson (2011)

Abbreviations: FRA, Federal Reserve Act; SPV, Special Purpose Vehicle; LLC, Limited Liabilities Company; AIA/ALICO, AIA Aurora LLC/ALICO Holding LLC; AIG, American International Group Incorporated

^{a)} Authority under the Federal Reserve Act; ^{b)} Total amount lent out during the time span of the facilities; ^{c)} Time span of the facilities, including the start and end dates.

Through the Commercial Paper Funding Facility (CPFF) and the TALF described in Table 2, the Fed bought commercial paper and provided loans to investors who bought bonds backed by loans to new car buyers from automakers and banks. For example, from October 2008 through June 2009, the Fed bought \$45.1 billion in commercial paper from the credit arms of five automakers (Ford, BMW, Chrysler, General Motors AC and Toyota) (Herr 2012: 14). This move was meant to keep the lenders in business and the economy going.

What completely contradicts Bagehot's LLR criteria is the Fed's direct support to specific and insolvent⁵ financial institutions. The Fed basically financed the nationalization of AIG by providing a Revolving Credit Facility loan of \$ 85 billion (of which \$ 72 billion were used) in exchange for the transfer of 80 per cent of AIG's equity to the Treasury held by the AIG Credit Facility Trust (NYFRB 2012). From that point onward, the Fed and Treasury worked with AIG to stabilize and restructure it. Through the newly and specifically created Securities Borrowing Facility and Preferred interests in AIA Aurora Limited Liabilities Company/ALICO Holding Limited Liability Company, the Fed actually provided AIG with \$ 45.5 billion. In addition, the Federal Reserve Bank of New York created AIG-Related Maiden Lane II (purchase Residential Mortgage Backed Securities or RMBSs) and Maiden Lane III (used to bailout AIG's credit default swap or CDS division) that amounted to \$ 43.8 billion. In total, AIG bailout cost the Fed \$ 161.3 billion (NYFRB 2012). All loans were repaid to the Fed by June 14, 2012, with a net total gain of \$ 11.7 billion. In cooperation with the Treasury and the Federal Deposit Insurance Corporation (FDIC), the Fed also guaranteed liquidity and debt of Citigroup under the Master Agreement and Bank of America under the term sheet (Fed 2012b). Both were never implemented, while the Fed received \$ 50 million fee from Citigroup for termination of Agreement, and \$ 57 million from Bank of America as its exit fee.

Most of the above-analyzed lending facilities were wound down and most loans were repaid in full, as could be seen in Figure 2.2 on the next page. However, it could also be seen from Figure 2.1 that loan repayments only partly compensated for the increase in the central bank's total asset holdings. In fact, it was only an illusion that the aforementioned could not be decreased, considering that the economy did not restart and the crisis continued in spite of the efforts. Thus, the Fed was prompted into further unprecedented actions that led to an explosion of its balance sheet in the next phase.

⁵ Due to credit rating downgrades, asset devaluation, inability to borrow from the market and lack of equity to address its liabilities, AIG would file for bankruptcy on Wednesday, September 17th if the Fed did not provide liquidity (CNBC 2008).

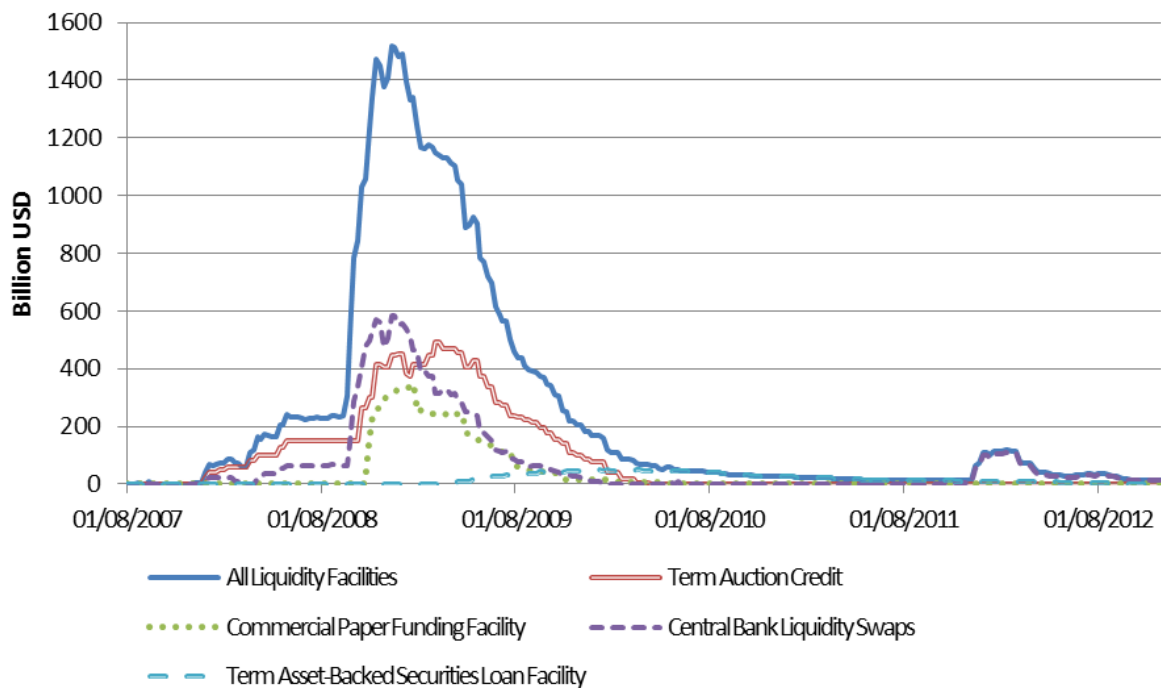


Figure 2.2 Winding Down Liquidity Facilities, Billion USD (\$), 2007-2012

Source: Fed (2012c) Recent Balance Sheet Trends

Phase 3: Quantitative Easing

In this phase the Fed followed the example of the Bank of England and engaged in a modified version of quantitative easing (Herr 2012: 16). It became more of a ‘Buyer’ rather than a ‘Lender’ of Last Resort. As a result, the Fed’s balance sheet increased to almost \$ 3 trillion (see Figure 2.1). Table 2.3 provides a summary of the programs, the aims of which were to spur growth and support mortgage and housing markets (Fed 2012b):

Table 2.3 Fed’s Quantitative Easing Initiated in Phase 3 (End of 2008-Most Recently)

Longer-term Securities Purchase Program (LSPP)	Main Aim	FRA ^a Section	Amount ^b (Billion USD, \$)	Term ^c	Status
Longer-Term Treasury Securities	-Improve conditions in private credit markets and the financial system as a whole -Support bond prices - Lower longer-term interest rates - Ensure that inflation is at the level set by the mandate	13(3) and 14	1,645 (31/10/2012)	03/2009	Ongoing
GSEs’ Debt Obligations	-Reduce cost and increase availability of credit for purchases of houses -Narrow spreads between rates on GSE direct obligations and US Treasury debt ⁶		175	11/2008-11/2009	82 billion USD outstanding by 10/31/2012
Mortgage-Backed Securities	- Encourage economic recovery - Lower long-term interest rates		852 (31/10/2012)	11/2008	Ongoing; 1,250 billion USD planned

Sources: Fed (2012a, 2012b), Felkerson (2011), Moe (2012)

Abbreviations: FRA, Federal Reserve Act; GSE, Government Sponsored Enterprise

^(a) Authority under the Federal Reserve Act; ^(b) Total amount purchased during the time span of the facilities, including the date when data was recorded where applicable; ^(c) Time span of the facilities, including start and end dates where applicable.

As part of its ongoing quantitative easing strategy, the Fed has established the Longer-term Securities Purchase Program (LSPP), including the Agency Mortgage-Backed Securities⁷ (MBSs) Purchase Program and outright purchases of Government Sponsored Enterprises’ (GSEs⁸) debt obligations (Fed 2012b). Through the LSPP, the Fed extended its open market operations (OMOs) to conduct outright purchases⁹ of longer-term Treasury securities (government bonds). Later in 2011, the Fed launched a Maturity Extensions Program, whereby short-term securities were sold to redeem longer-term treasuries. The goals of this program have been to keep asset holdings at around 2.6 trillion USD and long-term interest rates low. In other words, the Fed extends the maturity of its assets. By the end of 2012, the Fed plans to additionally purchase \$ 264 billion in Treasuries, making the total amount just

⁶ (Felkerson 2011: 28-29).

⁷ Agency MBSs refer to MBSs issued by Fannie Mae, Freddie Mac and Ginnie Mae. Some MBSs are issued by private institutions like brokerage firms, banks, and homebuilders.

⁸ Government Sponsored Enterprises, including Fannie Mae, Freddie Mac and Ginnie Mae.

⁹ Unlike temporary OMOs that are based on repurchase and reverse purchase agreements, permanent OMOs involve outright buying or selling of securities to permanently add or drain reserves in the banking system. The counterparties for OMOs are primary dealers, or banks and securities brokerages. Outright purchases involve a competitive bidding process, in order to ensure that trades are made at market rates. They’re conducted under section 14 of the Federal Reserve Act.

over \$ 1.6 trillion. Even though the Fed reimburses 80 per cent of interest payments to the Treasury, and reinvests the interest and principal earned on agency MBSs and agency debt into agency MBSs and longer-term Treasury securities (Fed 2012b), the government is effectively and however indirectly borrowing from the Fed¹⁰. As a result of quantitative easing, the Fed now holds approximately \$ 2.6 trillion of domestic securities outright, which mostly comprise of US Treasuries and Agency MBSs, as could be seen in Figure 2.3 below.

Through quantitative easing, the Fed has used its balance sheet as an additional and a last resort sort of tool to trigger economic recovery. Even though some (Moe 2012: 29) consider the Fed to have become the financing arm of the government, it is an unlikely aim of quantitative easing. The US government has never had problems with borrowing, and it is still considered to be the one place for investment.

It is also true that quantitative easing may lead to depreciation of the currency and the much desired export growth, but this may well be a positive side-effect. The real aim appears to be continuous support of financial asset prices, but this research questions is beyond the scope of this thesis. In any case, continuation of quantitative easing, which is most likely at least in the near future, points to the persistent high vulnerability of the US financial system and the potential of sliding back into a severe crisis.

¹⁰ The Treasury issues its bills and bonds or simply Treasuries to borrow money. The Fed then buys these from financial institutions through its temporary and permanent open market operations by creating reserves. Thus, the Fed lends to the Treasury.

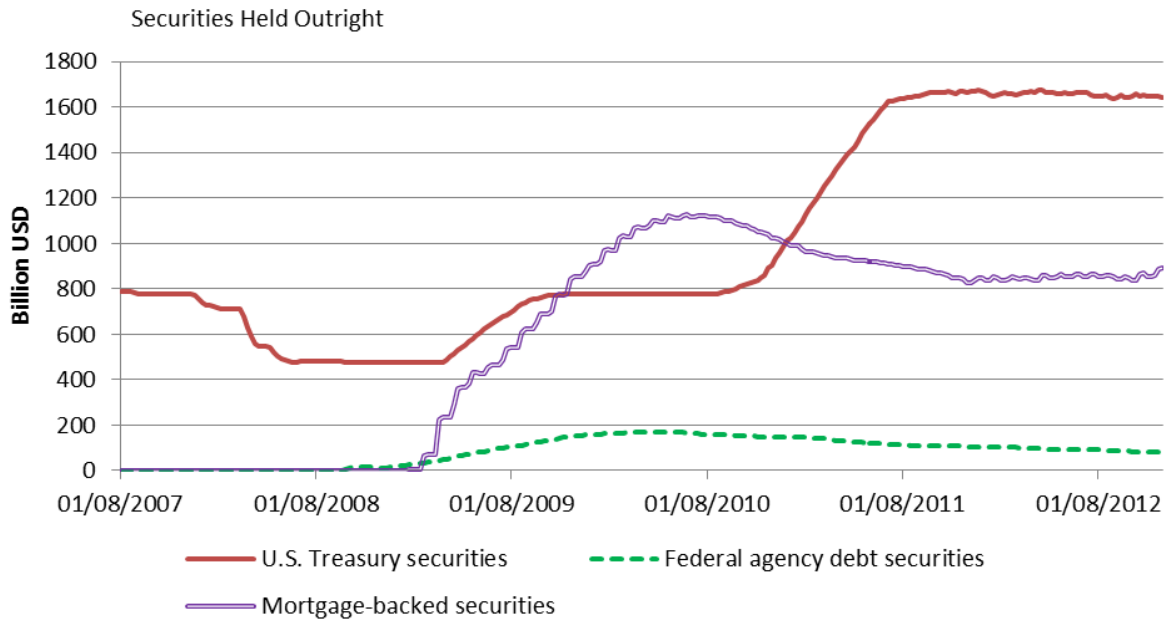
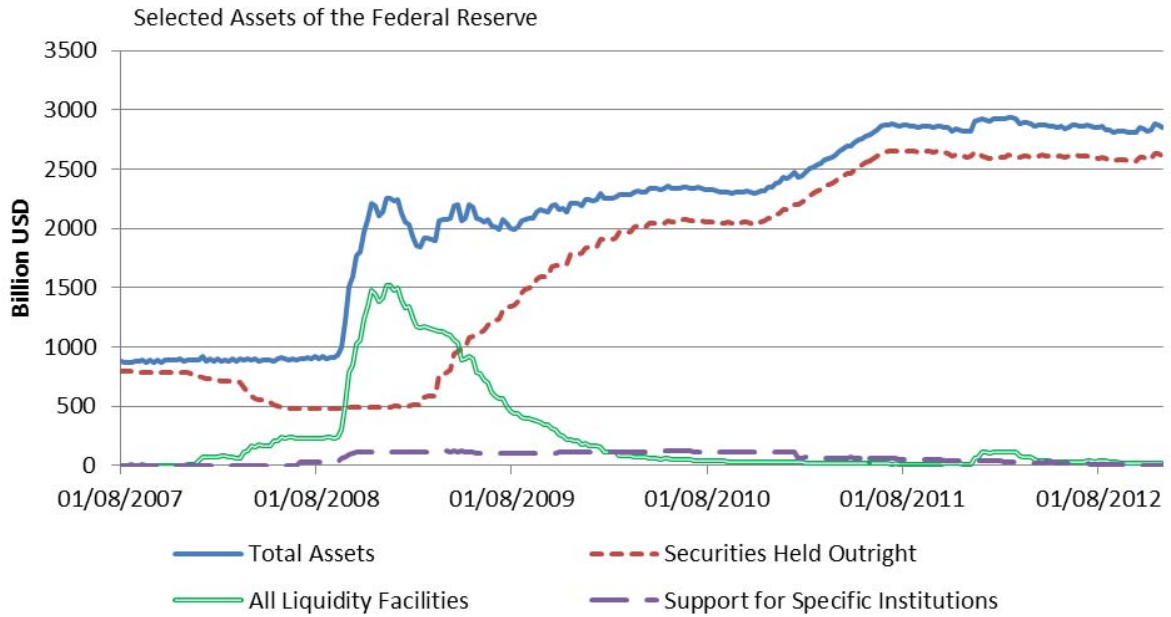


Figure 2.3 Composition of the Fed’s Assets, Billion USD (\$), 2007-2012

Source: Fed (2012a, 2012c) Data Download Program and Recent Balance Sheet Trends

2.2 Bank of England's Responses to the Crisis and the Traditional Lender of Last Resort

BOE's LLR responses could be characterized as conservative, as well as highly influenced by the aim to discourage excessive risk-taking and prevent reiteration of a similar crisis in the future. Hence, the list of BOE's unconventional lending facilities is rather short, as could be seen in Table 2.4 below.

Table 2.4 BOE's Unconventional Lending Facilities

Facility	Main Aim	Target	Operation	Amount ^a (Billion GBP, £)	Term ^b	Status
Emergency Liquidity Assistance	Respond to bank run	Northern Rock	Ad hoc credit to Northern Rock	27	09/2007	Loan transferred to HM Treasury in 06/2008
	Prevent failure	Halifax Bank of Scotland	Collateral swapped for Treasury Bills at a fee	62 ^c	10/2008	Repaid on 16/12/2008
		Royal Bank of Scotland				Repaid on 16/12/2008
Special Liquidity Scheme	Facilitate access to liquidity in funding markets	Commercial banks and building societies	Swap illiquid assets for highly liquid UK Treasury Bills	185	04/2008- 01/2012	Repaid on 30/01/2012
Discount Window Facility	Liquidity back-up during short-term liquidity shocks	Commercial banks and building societies	Collateral swapped for gilts	—	Created in 10/2008	Permanent facility
Indexed Long-term Repo Operations	Respond to money market liquidity strains	Banking sector	Auction fixed amount of central bank narrow and wider collateral	3.725 (08/01/2013)	Created in 06/2010	Monthly operations
Extended Collateral Term Repo Facility	Respond to market- wide liquidity stress and contingency problems	Whole market	Auction central bank reserves against wide range of collateral	10.825 (19/12/2012)	Created in 12/2011	Activated at BOE's discretion

Source: Bank of England (2012b, 2012d), John et. al. (2012)

^{a)} Total amount lent out during the time span of the facilities, including the date of the last transaction where applicable; ^{b)} Time span of the facilities, including the start and end date, or date of creation; ^{c)} Peak amount for each institution.

At the onset of the crisis, BOE adhered to the traditional LLR doctrine by lending against good collateral at a penalty rate to individual illiquid but solvent banks through its Standing

Lending Facility (SLF) equivalent to the discount window (Bank of England 2012b). This one of the two operational standing facilities provided overnight repo transactions at a premium over the Bank Rate against high-quality and highly-liquid collateral (Ibid). In this sense, the BOE completely adhered to the traditional LLR. However, it was ineffective in alleviating the crisis, since it only performed maturity transformation of long-maturity liquid assets into overnight liquidity.

The first real episode of the crisis in the UK was marked by a run on, failure, and subsequently bailout of Northern Rock in September 2007 (Ibid). In spite of BOE's explicit declaration of its LLR function, it did not respond immediately to the struggle of Northern Rock, the fifth largest mortgage lender in the UK. The central bank was unwilling to accept its high-quality mortgages as collateral and facilitate its takeover by Lloyds TSB through guarantee of Northern Rock's deposits. In fact, BOE only intervened when Northern Rock experienced a run by retail depositors and faced insolvency issues. BOE's response was to provide Emergency Liquidity Assistance of £ 27 billion and a guarantee of £ 40 billion of liabilities (Bank of England 2012b). These loans were later transferred to the Her Majesty's (HM) Treasury. Thus, the BOE, like the Fed, effectively financed the nationalization of a TBTF insolvent financial institution. In January 2012, Northern Rock was re-sold to Virgin Money, marking a return of public sector stakes in banks back to the private sector (HM Treasury 2011).

After the bailout of Northern Rock, BOE's attitude changed with regards to liquidity support for specific institutions. Although its attention was now directed toward preventing failure of systemically important institutions, it aimed to do so without creating incentives for imprudent liquidity management and moral hazard. The Northern Rock incident also prompted BOE to initiate special lending facilities in order to address liquidity strains.

In response to the ineffectiveness of the Standing Lending Facility and bailout of Northern Rock, BOE initiated the one-off Special Liquidity Scheme (SLS) in April 2008 (Ibid). Unlike the traditional LLR liquidity support, it operated as a collateral swap facility and did not involve loans of central bank reserves. In this scheme, illiquid AAA-rated securities were swapped for £ 185 billion worth of Treasury Bills (Bank of England 2012b). Using the nine-month drawing window, commercial banks and building societies could obtain loans of Treasury Bills up to 3-year maturity. In return, BOE required the value of collateral put forward to be greater than the market value of Treasury Bills borrowed. In case the borrowers defaulted, the HM Treasury would cover net losses. In other words, BOE tried to protect itself from losses and prevent moral hazard. By providing temporary support to

solvent institutions at unattractive rates and against secure collateral, the SLS satisfied some of Thornton-Bagehot's criteria. However, it was ineffective in reducing credit risk on borrowers' balance sheets (John et. al. 2012). Concluding with voluntary repayment plans, the facility expired with loans repaid in January 2012 (Bank of England 2012b).

As the crisis proceeded, the BOE's Monetary Policy Committee sharply cut its bank rate by 3 per cent during the fourth quarter of 2008, and a further 1.5 per cent cut in early 2009. In March 2009, the Bank Rate was reduced to 0.5 per cent and has since remained at that level, the lowest level in the BOE's three hundred-year history (Bank of England 2012c).

In October 2008, BOE provided Emergency Liquidity Assistance (ELA) to the Royal Bank of Scotland and Halifax Bank of Scotland (Bank of England 2009). These institutions were considered TBTF and BOE stepped in to prevent their failure. Unlike in the case of Northern Rock, the liquidity assistance took the form of collateral swaps, rather than ad hoc credit. As part of the ELA, securitized and unsecuritized assets were swapped for Treasury Bills at a fee. Borrowing peaked at approximately £ 62 billion, and loans were repaid by December 2012. The design of BOE's support to specific institutions was clearly influenced the past experiences with the SLS.

BOE created new permanent liquidity insurance facilities primarily based on the SLS, including the Discount Window Facility in October 2008, the Indexed Long-Term Repo Operations in June 2010, and the Extended Collateral Term Repo Facility in December 2011 (Bank of England 2012b). It has also opened its Asset Purchase Facilities in January 2009, becoming a Market Maker of Last Resort (MMLR), as well as a Buyer of Last Resort (BLR).

The explicit and permanent Discount Window Facility operates as a collateral swap facility, rather than Bagehot's direct source of central bank reserves for less liquid collateral. Preoccupied with price stability and fearing inflation, BOE made sure that this facility did not involve extra injection of cash and effect on the Bank Rate. It accepts a wider range of collateral, albeit without BOE's 100 per cent commitment¹¹ (Bank of England 2012b). The main difference between the Special Liquidity Scheme and the Discount Window Facility is that the latter accepts unsecuritized loans as collateral in exchange for gilts. It also provides 30-day loans, which can be extended up to 364-days for an additional fee. Fees vary depending on the collateral put forward and the size of the drawing relative to the size of the participant's group. For example, Level D collateral is the least liquid and respectfully comes at highest costs. They are also made unattractive during normal times to prevent misuse and

¹¹ BOE first assesses the solvency of the counterparty.

moral hazard. Thus, BOE accepts a mix of collateral and charges variable fees as part of this facility.

The Indexed Long-Term Repo Operations (ILTROs) replace extended Long-term Repo Operations and target the banking system as a whole (Bank of England 2012b). They are monthly and auction-based provisions of a fixed amount of central bank reserves at a single maturity. Each quarter, BOE provides two loans of up to 3-month maturity and one loan of up to 6-month maturity against narrow and wider collateral, such as gilts and government guaranteed bank debt. The Extended Collateral Term Repo Facility (ECTRF), on the other hand, is a contingent liquidity facility that is activated at BOE's discretion. Like the ILTROs, it provides cash, targets market-wide liquidity, accepts wider than for Long-term Repo Operations or the same as the Discount Window Facility collateral, and provides auction-based 30-day borrowing (Bank of England 2012b). Thus, BOE created special lending facilities, broadened the range of collateral and began to target liquidity stress in the markets in general.

Most importantly, however, is the comprehensive Asset Purchase Facility (APF) or BOE's version of becoming the market maker and buyer of last resort. It consists of the Commercial Paper Facility (closed in November 2011), the Corporate Secondary Market Scheme (ongoing) and Secured Commercial Paper Facility (ongoing) (Bank of England 2012b). The APF is mainly used to purchase medium to long-maturity conventional gilts in secondary markets, constituting Monetary Policy Committee's additional monetary policy tool. These purchases are financed by the creation of central bank reserves and are regarded as BOE's quantitative easing. The APF is also used to purchase corporate bonds and secured commercial paper, thereby making BOE the market maker of last resort. All purchases are conducted through the Asset Purchase Facility Fund (APFF) Limited, a special purpose vehicle, and make up the bulk of BOE's 'other assets' depicted in Figure 2.4 below. As a result of the APF, BOE's balance sheet has exploded and the central bank now holds £ 375 billion of gilts and £ 23 billion of corporate bonds.

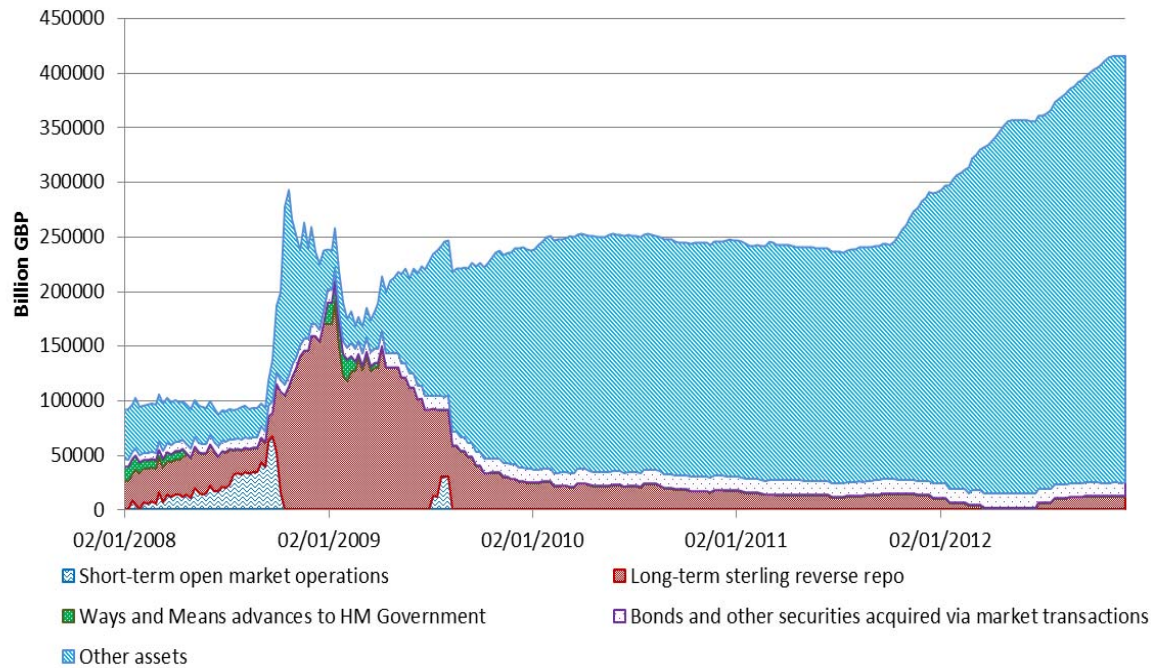


Figure 2.4 BOE's Composition of Assets, Billion GBP (£), 2007-2012

Source: Bank of England (2012a)

2.3 European Central Bank's Responses to Crisis and Traditional LLR

ECB has only partly followed Bagehot's LLR approach since the outbreak of the crisis, and unlike the Fed, its mechanisms and instruments to achieve financial stability are much more limited. The central bank faces several legal challenges in its LLR actions. For instance, Article 123 of the European Treaty prohibits the financing of government deficits. In addition, Article 125 of the European Treaty prohibits any bail-outs (EU 2008). Considering that ECB is the central bank of 17 Euro Area countries and is the sole issuer of the Euro, the aforementioned legal provisions compromise its LLR attempts. Like the BOE, ECB's mandate is centred on achieving price stability (Thompson 2012). Hence, ECB's primary tool is cutting the main refinancing rate in a crisis, while unconventional measures are seen as complementary to this policy. These measures, which are described in Table 2.5, aim to improve or substitute the intra-Euro monetary transmission mechanism, particularly in the case of debt-stricken peripheral countries.

Table 2.5 ECB's Unconventional Lender of Last Resort Measures

Facility	Main Aim	Target	Operation	Amount ^a (Billion Euro, €)	Term ^b	Status
Longer-Term Refinancing Operations	Relieve bank funding pressures	Euro Area banking system	Fixed rate tender procedure with full allotment; 1-year and 3-year maturity	1,700 (01/03/2012)	Began in 06/2009	Ongoing
Covered Bond Purchase Programs	Improve funding conditions and promote lending	Credit institutions and enterprises	Primary and secondary market purchases of Euro Area covered bonds. ECB holds the purchased bonds until maturity	76.418	07/2009-06/2010 and 11/2011-10/2012	Closed
Securities Market Program	Restore monetary policy transmission mechanism	Mainly government bond market	Secondary market purchases of private and public debt securities. Purchases are sterilized	210	05/2010-09/2012	Closed
Outright Monetary Transactions	Address distortions in government bond markets		Secondary market purchases of sovereign bonds. Pre-condition: macroeconomic adjustment program. Purchases are sterilized	Unlimited	Announced 06/2012	Ongoing

Source: Praet (2012); European Parliament Note (2012); ECB (2012c)

^{a)} Total amount lent out during the time span of the facilities, including the date of the last transaction where applicable; ^{b)} Time span of the facilities, including the start and end date, or date of creation.

With the Euro Debt Crisis, ECB is trying to reduce bond yield spreads and address the fragmentation of the Eurozone's financial markets. As necessary as these effort may be, they appear to jeopardize ECB's credibility due to the aforementioned limited mandate and legal prohibitions. For instance, accepting collateral that's perceived to be in default, such as government paper issued by Greece or Ireland, significantly batters ECB's reputation with negative implications for monetary policy effectiveness. Thus, ECB has been cautious in its LLR actions.

Instead of following Bagehot's penalty rate policy, ECB began to decrease its main refinancing rate in 2008 (ECB 2012b). Since then, the ECB has lowered its main refinancing operations rate from 3.5 per cent to a new all-time low of 0.75 per cent (Ibid). The intention

was to prevent the intensification of the crisis into a solvency crisis for households, government, firms and financial institutions with high debt burdens (Herr 2012: 3).

In addition to the existing regular refinancing operations, the ECB has engaged in unlimited longer-term refinancing operations (LTROs) in 2009 (Herr 2012: 18). These operations were unable to stimulate private credit demand, considering future investment uncertainty. However, they alleviated the uncertainty and tensions in money markets and debt and equity markets, as well as reversed the widening government bond yields. In this regards, Pisani-Ferry and Wolff (2012) consider the introduction of LTROs as beneficial and effective. The maturity of LTROs was extended up to 3-years, and they amounted to approximately € 1.7 trillion since the start of the operations (European Parliament Note 2012).

The ECB also actively lowered its already lax collateral standards, including assets that have been downgraded by ratings agencies, such as peripheral sovereign debt. Although extending the range of eligible collateral to include default-risk could be considered as against Bagehot's traditional principle of lending against secure collateral, in this case the ECB acted as the LLR for banks that were unable to obtain financing from the market. Moreover, national central banks provided Emergency Liquidity Assistance similar to the LTROs (Praet 2012, Thompson 2012).

Like the LTROs, ECB's Covered Bond Purchase Programs (June 2009 and November 2011) aimed to provide mainly Eurozone periphery's banks with liquidity (Thompson 2012). With a lack of demand and high costs in the covered bonds market, the ECB intervened in the primary and secondary markets, making approximately €80 billion purchases over the course of the two programs (Praet 2012, European Parliament Note 2012).

Liquidity provisioning of banks in the periphery has also been conducted via Target2 cross-border transactions. In this case, the ECB acts as an intermediary agent by channelling the excess reserves, which have been accumulated by the liquidity rich-banks of Northern Europe as a result of capital flight from the periphery, back to distressed banks in question. Hence, ECB substitutes the inter-bank market and the monetary transmission mechanism. Although Sinn (2012) claims that Target2 credit finances current account deficits of the GIPS countries, Bindseil and König (2011) find that Target2 transactions to a larger extent reflect the funding crisis in these countries. Facing bank defaults and asset fire sales as a result of deposit outflows, the periphery banks have increasingly relied on ECB's liquidity transfers. Thus, Target2 can also be seen as an example of ECB's LLR actions.

In order to stabilize standard refinancing operations of GIPS countries¹², ECB introduced the Securities Market Program in 2010 (Herr 2012: 10). Through this program, the ECB was able to conduct private and public debt purchases in the secondary market, thereby indirectly placing a ceiling on bond yields. Thus, the ECB engaged in quantitative easing, even though the official mandate was still to ensure price stability. The two spikes in SMP purchases can be observed in Figure 2.5 below.

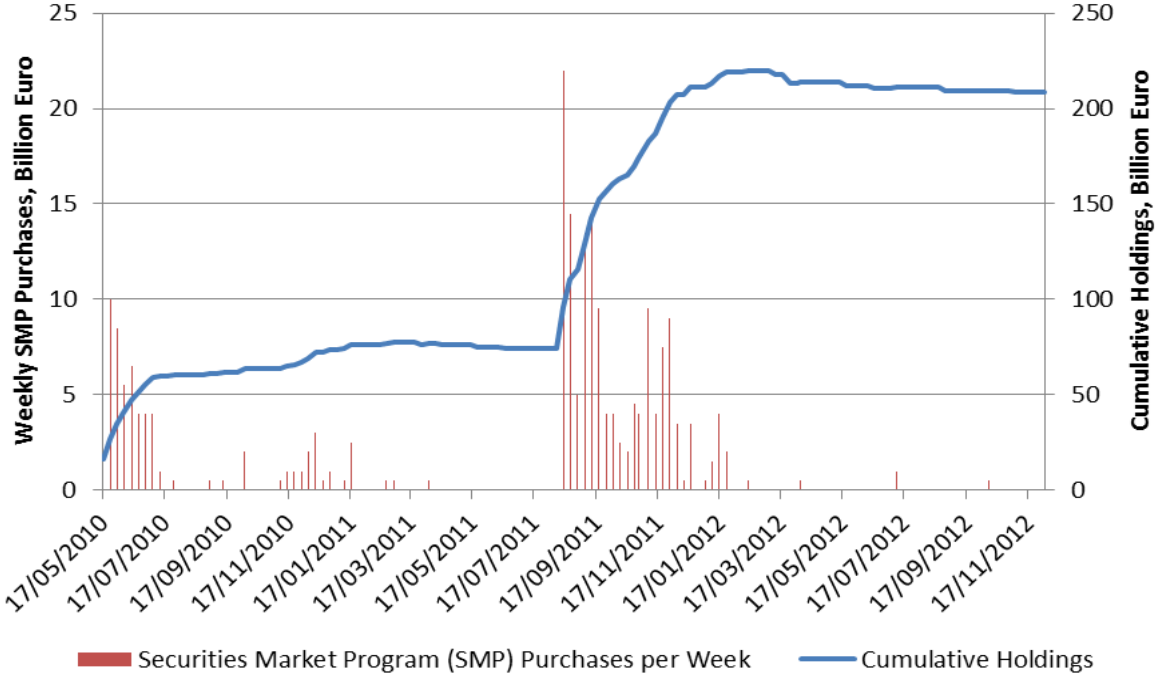


Figure 2.5 The ECB’s SMP Purchases, Billion Euro (€), 2010-2012

Source: ECB (2012c) Open Market Operations Ad Hoc Communications

The SMP had only temporary effects, particularly because the ECB placed a weekly cap in December 2011, claimed senior creditor status, and did not have permanent guidelines or agreements with regards to these transactions (ECB 2010, Herr 2012: 19). Such a limited LLR attempt contradicts the whole point of Bagehot’s LLR, which is to lend freely to the public and constrain financial panics. As a result of the program, the central bank’s cumulative holdings increased by about €210 billion by the time of its termination in September 2012 and maturity in October 2012.

Having learned from the experience of the Securities Market Program and facing pressures of asset price deflation, fuelled by high private sector indebtedness, capital flight

¹² GIPS was introduced as short-term for the countries Greece, Ireland, Portugal, and Spain that have problems to refinance themselves via regular financing operations.

from the periphery and poor economic performance (Herr 2012: 20), the ECB announced Outright Monetary Transactions on September 6, 2012 (Thompson 2012). This program marks a qualitative change in ECB's approach, because the purchases are unlimited and ECB does not claim seniority. However, the ECB does not purchase sovereign bonds with less than three years' maturity, in other words with the highest risk premium. Most importantly, the benefits of the program come with severe austerity measures set by the European Financial Stability Facility/European Stability Mechanism macroeconomic adjustment program. Such a pre-condition has prompted civil unrest in countries like Greece, taking into account its high social costs and detriment to possible future growth and crisis resolution. In fact, the applied austerity conditions have already reduced potential for recovery by lowering demand, income, and hence economic performance (ILO 2012: 59). For those who fear inflation, such as the Deutsche Bundesbank, the ECB sterilizes its Outright Monetary Transactions purchases¹³. In any case, the Outright Monetary Transactions are a tool for postponing the seemingly inevitable crash of the Euro, unless the European Monetary Union ensures comprehensive fiscal integration (Herr 2012: 11).

3. Comparison of Central Banks' LLR Responses

Having analyzed the three central banks' crisis responses, Table 3.1 summarizes the similarities and differences according to the broad categories of LLR responses to this crisis. It shows whether the respective central bank fully implemented the measures (Yes) or not (No). It also gives a hint as to the extent of implementation, such as in the case of the Fed's unparalleled Market Maker of Last Resort (MMLR) activities (Vigorous). A more detailed explanation of this comparison follows, with particular emphasis on the differences in the banks' actions. In general, however, it could be said that the Fed has been most vigorous, ECB has been similar to but more cautious than the Fed, and BOE has been more conservative.

All three central banks used the traditional LLR tool, the discount window, or its equivalent during the crisis. BOE's Standing Lending Facility (SLF) was the only discount window policy that adhered to Bagehot's traditional principles. However, the SLF's successor, the Discount Window Facility (DWF) operates only as a collateral swap facility, rather than a direct source of central bank reserves for less liquid collateral. Moreover, DWF's

¹³ ECB sterilizes bond purchases by absorbing fixed-term deposits. Thus, the ECB neutralizes impact on money supply and avoids new money creation in its quantitative easing.

penalty rates vary depending on the collateral put forward, as well as the size of the drawing relative to the size of the participant’s group. For example, Level D collateral is the least liquid and respectfully comes at highest costs. While ECB’s Marginal Lending Facility¹⁴ rate was still higher than its Main Refinancing Rate, constituting some sort of a penalty rate, it accepted a wider than the Fed’s range of collateral. Although both central banks accepted a wide-range of AAA-rated collateral, including highly-rated Asset-Backed Securities (ABSs) and Collateralized Debt Obligations (CDOs), the ECB went further to accept high-risk own-use ABSs (Cheun et. al. 2009). In terms of penalty rates, the Fed’s discount rate was even lower than its Funds Rate in order to promote borrowing from the discount window.

Table 3.1 Comparison of Central Banks’ Lender of Last Resort Responses

Responses	Fed	BOE	ECB
Discount Window	Yes	Yes	Yes
- Penalty rates	No	Yes	Yes
- Collateral policy	Relaxed	Strict	Lenient
Lending freely to the whole market	Yes	Yes	Yes
Lending to illiquid but solvent firms	Yes	Yes	Yes
Lowering interest rates	Vigorous	Moderate	Moderate
Accepting a wider range of collateral	Yes	Yes	Vigorous
Special Liquidity Facilities	Vigorous	Yes	Yes
Direct lending to shadow banks	Vigorous	Yes	No
Support insolvent institutions (sovereigns in case of ECB)	Vigorous	Yes	Yes
Market Maker of Last Resort	Vigorous	Yes	Yes
Quantitative Easing/Buyer of Last Resort	Vigorous	Yes	Yes

As could be seen from Figure 3.1 on the next page, the speed at which the central banks lowered nominal interest rates differed. For example, the Fed began lowering its federal funds rate much earlier than the other banks, specifically in 2007, because money market tensions became apparent first in the US, the country where the crisis started. Unlike the Fed that feared deflation, the ECB and BOE were cautious in fear of inflation. After the failure of

¹⁴ The Marginal Lending Facility is ECB’s equivalent of the discount window. It provides overnight liquidity from the central bank against sufficient collateral.

Lehman Brothers, however, BOE and ECB joined Fed’s policy of lowering base interest rates to solve the cash flow problem. High interest rates were not applicable in this systemic crisis and would only exacerbate it. Ponzi investors or borrowers would be forced to either default or sell off illiquid assets to meet increasing debt obligations. This would, in turn, add to deflationary pressures and exacerbate the crisis as in Minsky’s Financial Instability Hypothesis (Minsky 1978).

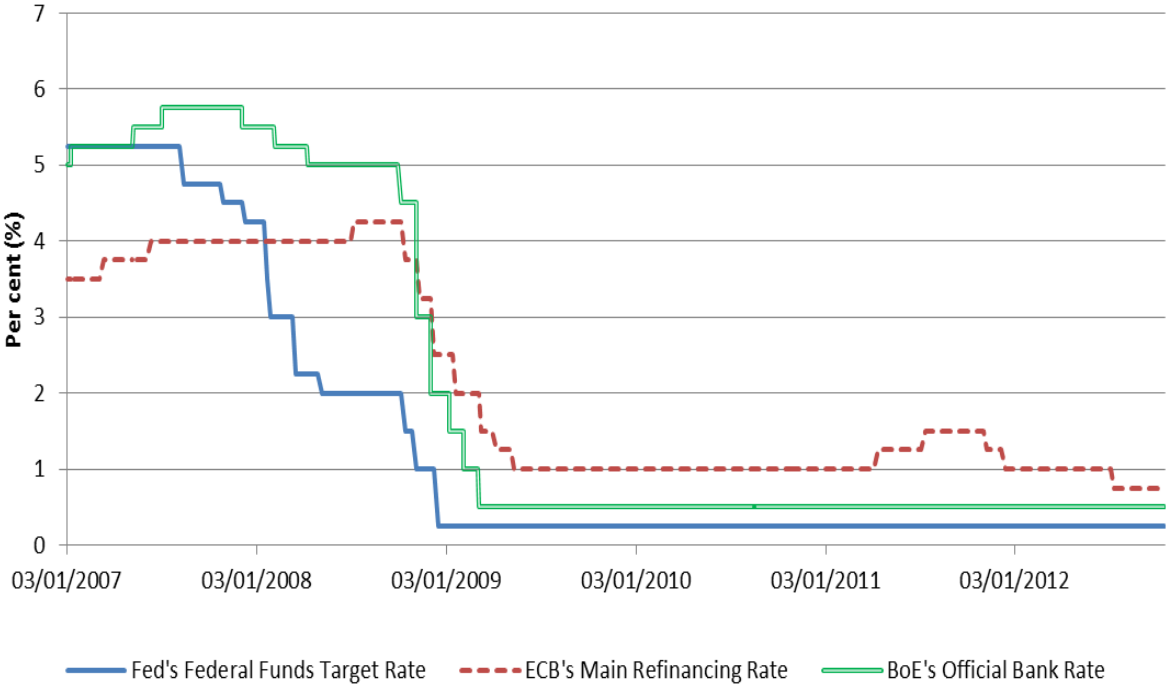


Figure 3.1 The Central Bank Base Rates, Per Cent (%) annual, 2007-2012

Source: Fed (2012d), Bank of England (2012c), ECB (2012b)

All of the three central banks broadened the range of eligible collateral as the crisis and “collateral squeeze” among banks intensified (Moe 2012: 17-19). The rationale behind these decisions was that tightening standards and increasing non-performing loans would only amplify financial market pro-cyclicality and lead to the opposite of desired effect (Ibid: 26, 55), thereby completely contradicting the fundamental purpose of LLR. At first, the Fed may appear to accept a broader range of collateral in the crisis from previously conducted analysis. It’s true that at least up to the crisis, BOE’s collateral policy was more restrictive than the Fed’s and ECB’s with its “gilt only” (private-issued investment grade bonds only) policy (Ibid: 20). However, the ECB has always had a more accommodative or ‘lenient’ collateral policy that’s open for possible extensions and lengthening of maturities (Ibid: 19). The reasons for this are that ECB cannot easily discriminate between public and private issuers, conducts its market operations with a variety of banks that have varying collateral pools, and

is forced to accept private sector loans with a lack of a well-developed euro-bond market. Hence, the extensions may be regarded as temporary for the Fed and BOE, but a permanent feature of the ECB.

The responses to the recent crisis mainly consisted of unconventional monetary policy measures and the creation of special lending facilities. ECB's and BOE's unconventional measures complemented rather than substituted the base rate policy as in the case of the Fed. This is due to the fact that the Fed approached the zero-lower bound when traditional monetary policy became ineffective. Closely related to this is the question of central bank's core purposes. While the ECB and BOE focus on achieving long-term price stability, the Fed's mandate includes more general economic concerns¹⁵. Furthermore, the differences in the scope of the extended LLR operations can be associated with different market structures and extent of cooperation between the central banks and central governments.

With regards to market structures, countries of continental Europe have more bank-based rather than market-based financial systems of Anglo-Saxon countries like the US. This also means that global trends in international finance have not been implemented to the same extent across countries, and the development and size of shadow banking varied. For example, the shadow banking system in the US is much bigger and inextricably linked with the real economy (through securitization) than in countries like Germany, where universal banking is of greater importance (Herr 2012: 6). Thus, the Fed used more extensive than ECB liquidity facilities that aimed at improving the credit flow and support of specific markets and specific groups of shadow banking institutions. Because Europe's productive firms, particularly in Germany rely more on commercial banks for financing than on commercial paper markets, such as in the case of US and UK productive firms, the ECB focused its LLR support on commercial banks (Ibid: 12). In fact, banks have been considered as the main source of euro area credit (De Grauwe 2011: 14-15) and hence, the focus of ECB's LLR actions. On the other hand, the Fed and BOE had to become market makers of last resort for the intermediary sector with their credit easing facilities. However, ECB's efforts in reducing bond yield spreads could be considered as equivalent to lending to insolvent institutions or crisis-stricken periphery countries and becoming a market-maker for their securities.

In addition, Fed's activities were more extensive and timely compared to the ECB and BOE, because the Fed was able to receive support from the Treasury through Troubled Asset Relief Program. For instance, the Treasury provided additional funds for the Fed's Term Asset-Backed Loan Facility. On the other hand, without more comprehensive fiscal

¹⁵ The Fed is also concerned with ensuring full employment.

integration in the Eurozone, the ECB lacked a central partner for its LLR operations (Thompson 2012). BOE fears compromise of its autonomy by the central government, which renders its LLR operations untimely and ineffective. BOE initially chose the non-interventionist and ‘wait-and-see’ approach due to the lack of cooperation with the Financial Services Authority and the HM Treasury. Nevertheless, all central banks finally engaged in some form of quantitative easing.

Quantitative easing has been carried out by all three central banks through the secondary markets with the aim to improve conditions and restart the real economy. In effect, it was used as a final or ‘last-resort’ balance sheet tool that was supplementary to lowering interest rates and monetary policy stances of the three central banks (Moe 2012: 13-14). While ECB and Fed use open market operations to buy longer-term rather than short-term maturity securities as part of their quantitative easing strategies (Fed 2012b), BOE’s quantitative easing is conducted through a Special Purpose Vehicle. The intention is to preserve the central bank’s autonomy from the HM Treasury; with the latter also committing to bear any losses and receive any profits (Bank of England 2012b).

Like the Fed and BOE, ECB is prohibited from engaging or conducting bond purchases in primary markets (De Grauwe 2011: 14). However, Fed used to peg prices and yields of Treasuries from the end of WWII until 1951, when the Fed-Treasury Accord ended this practice to ensure monetary policy autonomy (RFRB 2001). With regards to the Fed’s direct purchase of Government Sponsored Enterprises’ (GSEs’) obligations, the Fed used to be able to directly supply working capital to commercial and industrial enterprises, in case they were unable to obtain assistance from other sources. This was done under the authority of Section 13(b) of the FRA, which was repealed in 1958 (MFRB 2002).

In all three cases, quantitative easing is not implemented or is at the very least ineffective in the traditional Japanese sense, which is to boost the quantity of credit creation (Lyonnet and Werner 2012). This is reflected in the liabilities side of the Fed’s and particularly BOE’s balance sheets (Fed 2012a, Bank of England 2012a), where extra liquidity provided through quantitative easing is deposited back at the central bank in the form of reserves. While the Fed and BOE have focused on credit market dysfunction and improving availability of credit for households and business through supporting financial asset prices, ECB has focused on the Euro zone’s complete breakdown of the monetary transmission mechanism and began to indirectly finance public households. In other words, ECB indirectly acted as LLR for government bonds markets of the monetary union (De Grauwe 2011).

Conclusion

The actions of the three central banks were analyzed in detail and compared to the traditional LLR function. All of the three central banks have been found to greatly deviate from the traditional doctrine. They initially used the conventional monetary policy tools that were generally in line with Bagehot's criteria, but had to resort to increasingly more innovative tools as the crisis proceeded.

The three central banks' LLR responses were then compared to each, and the main similarities and differences in the approaches were identified. Similar measures were adopted due to the trends in international financial development and the global and system-wide nature of the recent financial crisis. However, the responses varied in the timeliness and scope of the aforementioned approaches, because of differences in structures of the financial systems, initial monetary policy stances, legislation, and level of autonomy.

As a result of the comparison, the characteristics of a modern LLR have been identified, which include the provision of liquidity and collateral, lowering interest rates and expansionary monetary policy, loosening collateral standards, supporting critical institutions, opening special liquidity facilities that target specific markets or groups of agents, becoming market maker of last resort and buyer of last resort. Thus, the traditional LLR function has been modified as a result of the recent crisis, and the main features of the modern LLR have been found.

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