

# **Central Banks and Financial Stability: Rediscovering the Lender-of-Last-Resort Practice in a Finance Economy**

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## **1. Introduction**

The financial turmoil of 2007-2009 combined shortages in market liquidity, funding liquidity and central bank liquidity with self-reinforcing dynamics. Market liquidity fell considerably for a wide range of assets and became extremely thin for structured credit products. Such market-wide events in the financial system are perceived simultaneously by all market participants, whose reactions are synchronized and fuel the price decline as well as the reappraisal of risks. Furthermore, the adoption of fair value accounting rules immediately validates market prices in the balance sheet of financial institutions. Therefore, changes in asset prices impair the net worth of all the participants and undermine funding liquidity. A tightening in market liquidity rapidly translates into changes in the equity base of banks and other market intermediaries (nonbanks or shadow banks). Since liquidity of financial institutions interacts with their solvency, the frontier between illiquidity and insolvency becomes blurred. In such a context, central banks acted in 2007-2009 as lender of last resort (LLR) and adapted their tools and practices in accordance with the specific nature and depth of the interbank and financial disruptions. They created new facilities that covered a broad spectrum of instruments for supplying liquidity to different financial institutions.<sup>1</sup> Consequently, they have been

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<sup>1</sup> On the 2007-2009 crisis, see Bank for International Settlements (2009), Brunnermeier, (2009), Adrian and Shin (2010), Cecchetti and Disyatat (2010), Gorton (2010), Mishkin (2011). On the emergency measures, see Aglietta and Scialom (2009), Cecchetti (2009), Freixas (2009), Mehrling (2010), Gagnon, Raskin, Remache and Sack (2011), Goodfriend (2011).

regarded as providing liquidity to the market in a “nonstandard way” (Chailloux, Gray and McCaughrin, 2008, p. 5). A question is then to know whether central banks have adopted novel and exceptional procedures with regard to LLR practices.

For this purpose, we compare emergency measures taken by central banks in 2007-2009 with those applied during financial crises throughout the classical specie regime (1821-1914). The classical period constitutes a reference for at least three reasons. Firstly, Thornton (1802), Tooke (1848) and Bagehot (1873) devised the “classical” theory of lender of last resort and studied the innovative actions of the Bank of England.<sup>1</sup> Secondly, the financial environment presented similarities with the contemporary one insofar as markets for securities were, for the most part, developed and even globalized with a very low rate of inflation.<sup>2</sup> Moreover, large amounts of commercial paper circulated among nonbank financial institutions such as bill brokers and discount houses. Bagehot (1873, p. 196) described how “in Lombard Street, the principal depositors of the bill brokers are the bankers [...]. Such deposits are, in fact, a portion of the reserve of these bankers; they make an essential part of the sums which they have provided and laid by against a panic”. Similarly, unregulated financial institutions such as hedge funds, market mutual funds or investment banks play a major role nowadays in the financial system as well as in the crisis propagation process. In the present paper, all the features of the classical as well as the current periods (financial globalization, low rate of inflation, high development of financial markets and prevalence of unregulated banking) will be referred to as a *finance economy*. Thirdly, the banking crises and the central bank interventions during the classical period were sometimes as impressive as was the case during the current period, from the crash of 1987 until the collapse of 2008-2009.<sup>3</sup> By contrast, from the Interwar in United States and the Second World War in Western Europe to the 1980s, even if financial

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<sup>1</sup> Humphrey and Keleher (1984), Goodhart (1988, 1999), Humphrey (1989), Laidler (2003) examine the lender of last resort in theory and in history.

<sup>2</sup> On financial integration and effect of capital mobility on banking crisis, see Neal (1992), Eichengreen (1996), Bordo, Eichengreen and Kim (1998) and Bordo, Eichengreen and Irving (1999), Kaminsky and Reinhart (1999), Bordo and Murshid (2001), Obstfeld and Taylor (2004).

<sup>3</sup> The financial and banking crises and central bank interventions that were observed during the 1990s in Europe, Japan and United States are close to the recent period from a historical and economic point of view, and they even reveal features that have recently been at work. In other words, financial crises and central bank actions in the 1990s are part of the finance economy period that began in the 1980s and continued into the 2000s.

liberalization began in the late 1960s in the United States, the banking system can be considered as highly regulated and financial disorders and lending of last resort were not so frequent and significant. In their study of the severe banking crises, Reinhart and Rogoff (2009a, 2009b) show that most of them have taken place since the 1980s in developed countries and since the 1990s in emerging ones. Reinhart and Rogoff (2009a, p. 205) state that the relative calm from the late 1940s to the early 1970s “may be partly explained by booming world growth but perhaps more so by the repression of the domestic financial markets (in varying degrees) and the heavy-handed use of capital control.”

With reference to the classical period, we shall mention the Bank of England and the US Clearing Houses. Unlike most European nations, the United States had no official central bank during the nineteenth century. After the severe crisis of 1907, the U.S. Congress produced a political compromise – the Federal Reserve Act of 1913 – that settled the long-standing conflict between supporters and opponents of central bank (Timberlake, 1993). Under the National Banking System that prevailed before the Federal Reserve, central bank functions were fragmented and carried out by different institutions. Among them, the National City banks, especially those from New York, centralized part of the money reserves; the Treasury attempted to smooth interest rates, especially when Leslie Shaw was Treasury Secretary; and the Clearing Houses intervened as lenders of last resort. The New York Clearing House was probably the most sophisticated of the US Clearing Houses during the National Banking era and acted as a quasi-central bank. It organized multilateral offsets of bank notes and cheques issued by commercial banks, controlled and monitored member banks, and issued loan certificates that banking institutions used as interbank means of payment. The loan certificates were considered as a high-powered medium and could be issued in large amounts during periods of liquidity pressures.<sup>1</sup>

In order to know whether the recent “nonstandard” central bank interventions constitute a real change, we shall present a comparison, in kind and not in degree, with the classical period. The main difference described in section 2 between the two periods

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<sup>1</sup> On the US Clearing Houses, see Whitney (1878), Cannon (1910), Sprague (1908, 1910) and Gorton (1985). The Clearing House system cannot be likened to a *complete* central bank for at least two reasons. On the one hand, the participation of banking institutions in regional Clearing Houses was not legally compulsory. On the other hand, the clearing system was not federally unified. The lack of unification in the US banking system was not completely resolved at the beginning of the Federal Reserve System (Wicker, 1996).

is based on the monetary regime - the specie standard in the classical period and the fiat money regime in the current period - which entails a difference in the central bank rate policy and in the nature of cooperation between central banks. However, both periods may similarly be considered as financial economies, characterized by the extension of securities markets and the active role of nonbank institutions. Thus, beyond the matter of the monetary regime and the bank rate setting, we attempt to discern continuity in the practices of the lender of last resort in a finance economy. In this respect, section 3 examines the importance of central bank money injections in 2007-2009, as well as those made during the classical period. Section 4 analyses in both periods the enlargement of the set of counterparts, which raises problems relating to stigma and banking supervision, and section 5, the enlargement of eligible collateral, which is linked to the broadening of the category of counterparts, as well as to financial innovations. The enlargement of the range of counterparts and collaterals led central banks to act simultaneously as lender and market maker of last resort. Section 6 underlines that the market maker in last resort is not only a contemporary function of central banking but it emerges in periods of finance economy and has certain analytical implications. Finally, as detailed in section 7, the centralized liquidity allocation implemented by central banks in 2007-2009 seems to have been an innovation insofar as it went beyond crisis management or liquidity injection. The fact that central banks have recourse to the centralization of liquidity allocation reveals the severity of the recent crisis, whereas the injection of liquidity appeared to be sufficient to resolve financial crises in the past. Section 8 concludes that, since the financial markets and innovations are highly developed, central banks tend to intervene in a “nonstandard way” and to act simultaneously as lenders and market makers of last resort. We also conclude that the historical roots of financial stabilization by central banks in a finance economy, characterized by large, complex financial markets and unregulated banking, may be found in the classical period and have just been rediscovered.

## **2. Interest rate policy and monetary regime**

As a first response to financial and banking difficulties in 2007-2009, central banks in many countries reduced their interest rates to very low levels. The Federal Reserve began to ease monetary policy before the other central banks and has been reducing the target for the federal funds rate since September 2007. Usually, interest rate policies are not coordinated among central banks. However, the intensification of financial trouble after the Lehman Brothers bankruptcy in September 2008 led to an unprecedented

response, and outstanding coordination took place on 8 October 2008 when six major central banks simultaneously announced a policy of rate cuts. In 2009, the Federal Reserve, the Bank of Japan and then the Bank of England had brought interest rates to nearly zero and the European Central Bank to 1%. The goals of these sharp reductions in interest rates were twofold. On the one hand, they contributed to containing contagion through a reassessment of the net present value of investment projects and prevented the effects of liquidity shortage on asset prices. On the other hand, they directly reduced the cost to banks of obtaining liquidity from central banks and reduced a potential source of bank losses.

The central bank rate cuts in 2007-2008 were possible because of the fiat monetary regime with flexible exchange rates and cannot therefore be compared with the discount rate policy of central banks under the classical specie regime. At best, during the classical period, there was a lack of coordination among Banks of Issue in Europe and each of them could set their discount rate without taking the others into consideration. At worst, there was rivalry among central banks that triggered extreme changes in their discount rates and during international crises central banks could competitively raise their interest rates in order to limit external drains of precious metal. A paroxysm occurred during the 1857 crisis between the Bank of England and the Bank of France, when they respectively raised their interest rate to 10% and 8%, and led a “bank war” across the Channel through telegraph lines (Patterson, 1866; Plessis, 1985). The well-known argument of the Bagehot (1873) recommendation for an active use of the discount rate is directly linked to this historical context. It rests on the argument that a “very high” level of interest rate was supposed to generate deflation and thus to restore the balance of trade and import of precious metals.

The monetary regime governs the interest rate policy and also the nature of the international lender of last resort. Under the classical metallic regime, the central banks were constrained by convertibility into specie. International lending cooperation among them could take place through transfers of bullion but remained exceptional during the classical period (Viner, 1937; Flandreau, 1997). Under a fiat money regime, they can mutually provide unlimited amount of reserves through swap line programs and thus a network of central banks can behave like an international lender of last resort.<sup>1</sup> From September 2008, the Federal Reserve announced a significant expansion of reciprocal

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<sup>1</sup> The use of the term “international lender of last resort” to define mutual swap operations could be controversial. Actually, there is no international currency used universally by central banks, but a small number of national currencies used mutually in an international context as an exchange reserve.

currency arrangements with foreign central banks through the cross-border Term Auction Facility which enhanced overseas dollar funding (Goldberg, Kennedy and Liu, 2011). The dollar swap arrangements allowed the Federal Reserve to supply dollars without needing to take a look at the collateral policies of the European Central Bank or Swiss National Bank, and provided foreign banks access to dollar term funding at US market determined rates but using European-based collateral. The alleviation of dollar shortage of foreign banks helped the Federal Reserve to reinforce its control over the rates paid for dollar funding in money markets and limited ‘fire sales’ of dollar denominated assets by foreign financial institutions.

The fiat money regime that prevails nowadays is far less constraining than the classical specie regime and also renders the policy of interest rate cuts possible. However, beyond these differences and irrespective of the monetary regime, other practices of the LLR can be similar in a finance economy.

### **3. Liquidity injection and change in asset composition of central bank balance sheets**

In 2007-2009, central banks provided liquidity on interbank and other wholesale markets in two sequential ways. Firstly, from the beginning of the crisis until the failure of Lehman Brothers, central banks sustained liquidity through changes in the asset composition of their balance sheets, while keeping the overall size nearly constant. As long as the increase in a risky class of assets (private securities) was compensated by a decrease in another class of assets (public bonds) held by the central banks, net injections of central bank liquidity were minor. Secondly, after the Lehman Brothers bankruptcy, central banks dramatically raised the size of their balance sheet. Between September 2008 and January 2009, the size of the balance sheets of the European Central Bank, the Federal Reserve and the Bank of England respectively grew by 45%, 150% and 155% (Board of the Governors of the Federal Reserve, 2009; European Central Bank, 2009). Such expansions appraise the magnitude of the net liquidity injection as well as the extension of purchase of larger classes of assets. The central banks’ operations crossed a new threshold that triggered a further deterioration in the quality of the assets side.

During the nineteenth century, the expansion in the balance sheets of central banks was not as spectacular as for some central banks in 2007-2009. Nevertheless, despite the specie regime and its convertibility constraint, the Bank of England actively intervened in favour of banks and financial institutions by issuing high-powered money in significant amounts. During the year of 1825, Bank of England notes in circulation went

up 47% from late November to late December (Parliamentary Papers, 1832, appendix 13, p. 192). It may also be noted that after the Bank of England's intervention, the composition of the asset side became unquestionably riskier. Between June 1824 and December 1825, the reserves of the Bank of England fell from £12 million to £1 million and the annual average amount of commercial paper under discount rose from £2.4 million in 1824 to £4.9 million in 1825 (*ibid*, appendix 1, p. 169, appendix 19, p. 224). The Bank's intervention in 1825 promptly stopped the panic during the days following the injection of liquidity (King, 1936; Neal, 1998). The same result occurred with the Bank's intervention in 1847, 1857 and 1866 after the announcement of the suspension of the Act of 1844 by the Government (Newmarch, 1866). In the late nineteenth century, the Bank's liabilities in the form of bankers' balance gained in significance as a lending instrument during panics and, for instance, they raised by 40% in three months during the 1878 crisis (Collins, 1992).

The classical period shows how liquidity injection or even its mere announcement could be sufficient to calm down financial distress whereas central banks appeared powerless to induce such a catalytic effect during the 2007-2009 crisis. In any case, injections of liquidity are massive and recurrent in a finance economy and, as we shall see, seem to be associated with a widening of the range of counterparts and of eligible collateral.

#### **4. Unregulated banking and widening the category of counterparts**

In their usual open market operations, central banks do not deal directly with all the commercial banks and securities firms but only with a pre-specified category of counterparts that redistribute the liquidity in the banking system. The different components of the monetary operating frameworks (the maturity and frequency of discretionary operations, the counterpart arrangements and the range of eligible collateral, etc.) may differ from country to country (Borio and Nelson, 2008). For instance, in the European Central Bank system, the range of eligible counterparts is wide and common across operations (open market operations and standing facilities), whereas, in the United States, the counterparts for discretionary operations are significantly fewer than those with access to standing facilities (lending and deposit facilities). Despite the fact that the relaxation of the eligibility of counterparts has been greater in the banking systems that initially had a more restricted framework (in the United States for instance), the central bank interventions during the recent crisis presented similarities with regard to the widening of the counterpart range.

The need for adjustments of the central bank liquidity operations was justified by banks' reluctance to lend to each other in 2007-2009. It was reinforced by the banks' unwillingness to use discount windows or marginal lending facilities, to avoid disclosing their financial weakness. The usual purpose of standing facilities is to support settlement in the payment system by providing collateralized overnight loans to direct participants in the payment system who are experiencing temporary shortfalls in their settlement balances. Generally, banks pay a penalty rate for this direct source of liquidity, but the range of counterparts and the eligible collateral are wider for standing facilities than for open market operations. Nevertheless, using such bilateral lending was perceived by banks as carrying a stigma, for it signalled their financial difficulties to the other market participants. Since the transparent provision of liquidity is interpreted as proof of vulnerability, it could lead interbank counterparts to react exactly in the manner that the financial support was supposed to prevent. As a consequence, there was relatively little use of standing facilities, even on days when interbank market rates rose above the standing facilities rates. In order to improve the distribution of liquidity provision inside the interbank market, the Federal Reserve created a new discount window programme in December 2007, the Term Auction Facility (TAF). Through this short-term credit facility, the Federal Reserve allowed a depository institution to place a bid for an advance at an interest rate resulting from an auction. The TAF concerned all of the 7000 commercial banks (and not only the 20 primary dealers involved in the open market procedure) and the accepted collateral (that is, any collateral eligible to secure discount window loans) was much broader than with the standard repo. Importantly, the TAF differed from the discount window insofar as it guaranteed the bidders anonymity and thus avoided the stigma problem. Moreover, the Federal Reserve was taking collateral at a price that was almost certainly above what the banks could get for it anywhere else (Cecchetti, 2009).<sup>1</sup>

The Primary Dealers Credit Facility (PDCF), set up in March 2008 by the Federal Reserve, has been another symptomatic step widening of the counterpart range. The

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<sup>1</sup> The history of the US Clearing Houses gives an insight into the stigma problem. Clearing Houses had strong incentives to monitor member banks and control them so as to evaluate the quality of their portfolio in accordance with their capital (Cannon, 1910). The New York Clearing House publicly published information on the balance sheets of member banks as well as on their weekly clearing balances. However, during crises, the New York Clearing House decided to suspend publication of individual bank information in order to protect weaker banks against the stigma of liquidity shortage (Gorton, 1985).



primary dealers were not only banks but also investment banks and brokers. The latter could not have access to either discount window borrowing or the TAF, which are both restricted to depository institutions, that is, to member banks under the central bank regulation. Through the PDCF, they could henceforth borrow from the Federal Reserve.<sup>1</sup> Like discount loans made to commercial banks, the PDCF allows borrowers to pledge a relatively large set of collateral, including all investment grade corporate securities, municipal securities, mortgage-backed securities and asset-backed securities for which a price was available. The privilege of access to emergency liquidity is normally reserved for member banks of the Federal Reserve System, which bear regulation constraints limiting their risk-taking. In extending the LLR umbrella to investment banks, which were initially exempted from the banking regulation that is required for central bank membership, the Federal Reserve crossed the Rubicon. This kind of regulatory arbitrage and free riding is not without precedent, as the US trust company episode in 1907 reveals.

Trust companies emerged as financial intermediaries in the late nineteenth century in the United States. They were specialized in collateralized loans, invested in the real estate sector and chose aggressive strategies. In New York City, the assets of the trust companies increased 2.5 times more than the assets of the national banks during the decade preceding the 1907 crisis (Moen and Tallman, 1992). Under the National Banking System, national banks were federally regulated while trust companies were far less affected by state regulation. In particular, New York trust companies were less constrained by their reserves than New York national banks, which had to meet a legal reserve ratio equal to 25%. Before 1903, the New York Clearing House (NYCH) accepted some trust companies as member banks, but in June 1904, it required a reserve ratio between 10% and 15% so as to establish relative regulatory uniformity within its system. The NYCH was not only worry about its own narrow interests, but more generally with the preservation of banking stability in New York City. However, trust companies that were not Clearing House members refused to apply these new entry requirements, and some member trust companies decided to leave the NYCH in order to maintain their competitive advantages. Actually, the problem was not that the NYCH was too negligent (Wicker, 2000), or on the contrary, too stringent (Freixas and Parigi, 2008). The real problem was the free riding behaviour of unregulated financial institutions. They tried to preserve each opportunity for profit that the absence of legal

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<sup>1</sup> Paragraph 3 of section 13 of the Federal Reserve Act allows lending to nonbanks under “exigent and unusual circumstances” and thus could authorize the PDCF.

requirement could offer, to the detriment of the financial and banking system as a whole. During the panic of October 1907, the NYCH did not straightforwardly sustain trust companies, but preferred to grant loans to New York national banks, which then gave assistance to trust companies they had close ties with and could get information about. Moen and Tallman (2000, pp. 147, 161) convincingly show that participation at the Clearing House was the key factor for resolving the crisis: “The clearinghouse took action to protect the payments system, but the clearinghouse’s method to contain panics relied on timely balance-sheet information of member institutions; information from non-member trusts was perceived as much less reliable. [...] The New York trusts’ isolation from clearinghouse [...] was the key element in propagating the massive runs on deposits. [...] These results indicate that further studies highlighting the extent of clearinghouse or central-bank coverage during crises will be useful in understanding the factors affecting the occurrence and severity of bank runs.”

In Britain, eligible counterparts were not as codified during the nineteenth century as today - for instance, several banks and financial institutions did not directly hold a current account in the Bank of England - and they were far numerous than that of institutions with which the Bank had regular relationships. Large amounts were advanced to bill brokers and not only to banks. As an illustration, during the last three months of 1857, the Bank of England advanced more than £9,500,000 to London bill brokers and discount companies, whereas the advances to London and provincial bankers were £7,000,000, and also £14,500,000 to London merchants and traders (PP, 1858, app. 13, p. 405). The Bank of England met with similar difficulties with brokers as the NYCH met with the trust company, and hence announced a new rule in 1858 stipulating that the discount to the bill brokers was “closed altogether” (Neave, PP, 1858, qs.688–695). As Woods (1939, p. 134) has interpreted it, the objective of the rule was to threaten the brokers as far as possible, in order to force them to maintain reserve balances at the Bank.

The broadening of the set counterparts was mostly associated with the enlargement of the collaterals which are eligible for the central bank facilities.

## **5. Financial innovation and enlarged eligible collateral**

When central banks inject liquidity, they protect themselves against credit risk by accepting collateral. The range of eligible collaterals is not harmonized across countries and it differs also in terms of qualified assets across operations such as open market and standing facilities. The credit facilities granted by central banks in 2007-2009 raised the

demand for liquid collaterals (primarily government or government-guaranteed assets) and so deprived banks of them for their regular funding operations in the interbank markets. In order to overcome the impediments to a smooth distribution of liquidity, most of the central banks therefore relaxed the requirements for eligible collateral.

The Federal Reserve and the Bank of England respectively created the Term Securities Lending Facilities (TSLF) and the Special Liquidity Scheme (SLS) to purchase part of the illiquid assets by exchanging them temporarily with more easily tradable assets.<sup>1</sup> These measures corresponded to an enlargement of eligible collaterals; their purpose was to lessen strains in wholesale interbank markets and to re-engage the banking sector in the intermediation process. They partly affected the market pricing of these specific assets and entailed a shift in the asset composition of central banks' balance sheets from liquid and safe assets towards illiquid and risky ones. Such a balance sheet policy was transmitted through two main channels. First, the announcement that the central bank was engaged in operations involving illiquid assets was designed to enhance investor confidence and reduce liquidity premiums (signalling effect). Secondly, the swaps of illiquid private assets for risk-free public sector bonds upgraded the overall risk profile of bank balance sheets and were able to limit banks' reluctance to lend to each other (portfolio balance effect).

Strictly speaking, central banks did not broaden the range of eligible collateral in the early nineteenth century, because they had not *a priori* defined a narrow set of securities purchased in normal circumstances.<sup>2</sup> However, since the beginning of the history of lending in last resort, the spectrum of collaterals against advances and securities purchased by central banks, like the category of counterparts, was quite extensive. In this respect, the declarations of the directors of the Bank of England during the 1832 Parliamentary Inquiry with regard to the assistance of the Bank of England during the 1825 crisis are very suggestive. J. Harman (Parliamentary Papers, 1832, q. 2217),

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<sup>1</sup> The TSLF announced by the Federal Reserve on March 2008 was a more precise tool for addressing the dislocations in the credit market by striking at the core of the financial problems, namely mortgage-backed securities. On April 2008, the Bank of England announced the SLS, which was quite similar to the TSLF and allowed banks and building societies to swap some of their illiquid private sector assets for Treasury Bills.

<sup>2</sup> In the United States, according to the preamble of the Act of 1913, the Federal Reserve could grant loans to member banks by rediscounting commercial papers and short-term negotiable instruments issued as "real bills", that is, for "agricultural, industrial, or commercial purposes". See, Clouse and Small (2004).

quoted by Tooke (1848) and Bagehot (1873), gave an instructive portrayal of the lender of last resort: “we lend [our assistance] by every possible means, and in modes that we never had adopted before; we took in stock as security; we purchased Exchequer bills; we made advances on Exchequer bills; we not only discounted outright, but we made advances on the deposit of bills of exchange to an immense amount”; the governor J. H. Palmer (PP, 1832, q.164) added that advances against title deeds had also been considerable. Thus, as early as 1825, the Bank of England discounted outright and made advances against collateral including commercial paper, bills of exchange, stocks and Exchequer bills. Such practices continued throughout the nineteenth century. For instance, the governor J. Morris (PP, 1848, House of Commons, qs.2645–2648) explained that during the 1847 crisis, large amounts of aid was afforded by the Bank in unusual ways, against real estate and debentures.

Financial innovations - such as securitization, nowadays - partly explained the enlargement of the range of qualified collateral. As an example, during the 1860s, a new financial instrument, widely used for financing the railways in Britain, consisted of a contract by which the railway builder accepted shares or debts issued by the railway companies in payment instead of cash. As a result, it boosted the intermediation activity of new credit and financial institutions, which could purchase railway stocks and securities to builders and negotiate them on markets. Newmarch (1866, pp. 230–1) gave a description of “a system of extravagant agency and commission” which was “pushed off with success in various avenues of the money-market”. At the same time, the Companies Act of 1862 authorized firms in general and financial institutions in particular to replace unlimited liability with limited liability and consequently created incentives to increase their leverage. In September 1866, after the credit crisis in May and the ensuing intervention of the Bank of England, some commentators worried about the fact that the Bank was holding too many risky assets like railway securities (Bank of England, 1866). However, Bagehot (1873, pp. 151–2) did not share this cause for concern and believed that the Bank could hold a large range of securities (commercial bills, public debts, India securities, and railway debenture stocks) in a panic.

The broadening of collateral may also imply the lengthening of maturity for liquidity provision. In 2007-2009, central banks faced a changing maturity composition in banks’ demand for funding liquidity, with an increase in the net demand for term funding relative to overnight funding, in order to reduce their liquidity mismatch. Some banks purchased assets from or extended credit to the off-balance-sheet vehicles that they had created and the money-market funds that they managed. Lending in difficult circumstances for very short maturities entailed a rollover risk and remained ineffective

in periods of panic. To a varying degree all central banks increased the availability of long-term funding supplied to the market through discretionary operations (Basel Committee on Banking Supervision, 2008). In comparison, the lengthening of maturity was not so frequent during the classical specie regime, and central banks often reduced the maturity of the bills they discounted in order to manage the level of their reserves. Nevertheless, when the Bank of England decided to put an end to the panic in December 1825, the Court agreed to advance at 5% against “long bills - beyond 95 days - which it did not usually discount” (Clapham, 1944, II, pp. 99–100).

All these central banks’ measures to ease the conditions for the provision of reserves by enlarging the range of eligible collateral had been observed right throughout the episodes of finance economy. They created the need for a wider interpretation of the lender of last resort, to include the function of the market maker of last resort.

## **6. Insights into the market maker of last resort**

In normal circumstances, the usual private market makers intermediate between end-users of the financial system but, unlike general financial intermediaries, they do not act as agents for end-users, but as principals. They provide continuous and effective two-way prices under all market conditions and keep an orderly market by smoothing out price fluctuations. When extended financial markets collapse, private market makers operating in a short-term profit strategy might have neither the incentives nor the capital to carry on their routine function of market stabilization. Furthermore, a financial stability policy confined to granting credit facilities against good collateral is not enough to alleviate the uncertainty regarding the average quality of assets. Central banks that are not constrained by profit maximization may replace the usual market maker by absorbing and removing a significant amount of dubious assets. This is the “market maker of last resort” function. Buitert and Sibert (2007) who coined the phrase suggest that it can be fulfilled in two ways: first, outright purchases and sales of a wide range of private sector securities; second, acceptance of a wide range of private sector securities as collateral for repos and at the discount window.<sup>1</sup> In the case of the Federal

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<sup>1</sup> Bolton, Santos and Scheinkman (2009, pp. 598–9) suggest a different view. They argue that the government - and not the central bank - should play the role of market maker of last resort and that an “effect of the central banks’ broadening of collateralized lending, by accepting a larger set of securities, is that it worsens the lemons problem in secondary markets”. But the problem remains the same when the government intervenes.

Reserve system in 2007-2009, Merhling (2010, pp.106, 132) also explains the successive action of the central bank – from the lender of last resort to the “dealer of last resort” role – as follows: initially, “the Fed focused its intervention on funding liquidity, depending on the private dealer system to translate that funding liquidity into market liquidity”; after the collapse of Bear Stearns in March 2008, “the Fed began to pay more attention to the market liquidity dimension directly” through the introduction of the TSLF.

As the financial crisis deepened after the Lehman Brothers failure in September 2008, the market maker of last resort function was systematically performed through outright asset purchases or special lending facilities. Central banks focused on the nonbank credit market as well as on operations involving private sector securities. For instance, the Federal Reserve intervened in the key market of commercial papers by lending directly to market participants, including ultimate borrowers and major investors. The commercial paper market is a key source of short-term financing for US corporate firms and, after September 2008, commercial paper rates spiked even for the highest quality firms; most firms were unable to borrow for periods longer than a few days. The Commercial Paper Funding Facility (CPFF) was specifically intended to address rollover risk for commercial issuers and to improve the operations of the commercial paper market (Adrian, Kinbrough and Marchioni, 2011). The Federal Reserve also bought direct obligations from housing-related government sponsored enterprises, as well as mortgage-backed securities backed by Fannie Mae and Freddie Mac.

A line of thinking would claim that the recent financial experience would open up a new era in which central banks should evolve from their lender of last resort (LLR) to market maker of last resort (MMLR) function. However, from a theoretical point of view, the issue is not to relinquish the LLR in favour of the MMLR role, but rather to consider that central banks have to extend their LLR practices since they are placed within a finance economy, to the detriment of the narrow view prevailing in a regulated banking system. The dynamic interdependence between market and funding liquidity prevailing in finance economy induces that the LLR and MMLR functions are intrinsically linked and should be analytically integrated. Moreover, from a historical point of view, the previous section has shown that the broadened practice of the LLR may be found in the classical period, since 1825 in England, and has merely been rediscovered. Even if the concept of MMLR was not formulated, it was implicitly discussed inside the institution. For instance, in September 1866, following the Bank of England’s intervention in May, some of its shareholders doubted that its duty was to

support a segment of the money market by holding private railway company securities, and they wanted to know “whether any of those debentures come from railway companies that had since been able to meet their obligations” (Bank of England, 1866, p. 1106). They worried that rumours outside the Bank stated confidently that large amounts of bills had not yet been returned. The Governor answered with reassuring words that the Bank held “no debentures except those of first class railway companies” (*ibid.*). The fact that the MMLR concept was not shared or even formulated by central bankers during the classical period should not disguise the fact that central banks were able to hold private securities from markets in difficulty. Similarly, despite the fact that the Bank of England was operating as a supplier of high-powered money during periods of pressure (Collins, 1992), the responsibility of LLR was far from being unanimously accepted among the directors and *a fortiori* was not formally announced.

The rediscovery of the MMLR as a part of the LLR function in a finance economy may lead us to foresee certain implications. Firstly, central banks might lose their position of neutrality with respect to private agents. Once they temporarily intervene in the private sector and security markets, and sustain prices of some categories of assets, they might influence the bid-ask spread and relative prices and thus favour some borrowers over others. Secondly, in acting as MMLR, central banks go beyond the strict application of the narrow view that would advise lending against good collateral to illiquid but solvent banks. Once they have been ready to purchase several kinds of private securities (which are not necessarily “good”) from banks and also nonbank institutions (on which solvency information is very limited), they suffer from a worsening of the quality of their balance sheet. Finally, the enlargement of the LLR function threatens the smooth exit of the crisis and the financial stabilization policy. Contrary to the expansion of the central bank’s balance sheet arising from liquidity facilities that are self-liquidating, the expansion stemming from risky asset market purchases does not easily reverse itself when the financial system recovers. Risky assets accumulated during the crisis may remain for some time within the central bank’s portfolio and may even trigger an erosion of its capital.

## **7. The process of centralized allocation of liquidity**

In the context of the beginnings of the finance economy in the 1980s, Goodfriend and King (1988) assumed that interbank and financial market participants would be able to distinguish between illiquid and insolvent institutions and that the market as a whole could efficiently allocate liquidity between banks with a surplus and those with a

deficit. They claimed that “today’s financial markets provide a highly efficient means of allocating credit privately” and found that “it is difficult to make a case for central bank lending and the regulatory and supervision activities that support it” (*ibid*, p. 15; *idem*, p. 19). They concluded that monetary policy would be able to play an important role in a banking crisis only by managing the volume of high-powered money, without costly regulation and supervision from the central bank. However, the 2007-2008 disruption of interbank lending reveals problems of decentralized allocation of liquidity, insofar as amounts of idle liquidity could coexist with segments of liquidity shortage in interbank markets – and not only because market liquidity shortage undermine funding liquidity. Therefore, central banks had to go beyond the change in the volume of their balance sheets: they reorganized interbank markets by centralizing the liquidity allocation from banks with a surplus to those with a deficit.

What we mean by centralized allocation of liquidity is the twofold measure increasing the quantity of provision for banks with a deficit *and* absorbing the excess liquidity of banks with a surplus. Centralized allocation of liquidity is thus different from crisis management. A crisis manager organizes the equalization of reserves from a pool of banks with a surplus to those with a deficit (Fischer, 1999). The crisis manager can use moral persuasion to induce cooperative behaviour, but the decision remains at the discretion of banks with a surplus. The rescue of Long Term Capital Management (LTCM) by a set of creditor banks in 1998 is a famous recent case of crisis management by the Federal Reserve. In 2007-2009, central banks did not play a simple crisis manager role. While they massively increased liquidity provision and enlarged the category of eligible counterparts and collateral, they *also* absorbed excess liquidity by means of various instruments such as deposit standing facilities, reverse repos, current accounts for reserve requirements and excess reserves. Between June 2007 and September 2008, the size of the Federal Reserve’s balance sheet did not significantly change the gross liquidity injection that was compensated by the sales and redemptions of Treasury securities. After the Lehman Brothers collapse, the Federal Reserve balance sheet more than doubled *and* the depository institutions’ current account balances (which cover minimum reserve requirements and excess reserves) increased from \$20 billion in January 2007 to \$860 billion in December 2008. Reserve holding was mostly voluntary and even encouraged by the introduction in October 2008 of the remuneration of excess reserves, whereby the Federal Reserve borrowed from member banks with surplus fund. It enabled banks to hold them without bearing opportunity cost and reduced the difference between the interest rate on reserves and the interest on the federal funds markets. Concerning the other central banks, the main liquidity-absorbing



instrument used by the European Central Bank was the deposit facility (which rose from €1 billion at the end of June 2007 to over €300 billion at the end of 2008), whereas the Bank of England issues central bank bills. The important increase in liquidity provision on the asset side of the balance sheet, in addition to the liquidity absorption on the liability side, indicates that central banks centralized the liquidity allocation and thus partially replaced the money market.

In the classical period, central banks could occasionally intervene as crisis managers. The action of the Bank of England during the Baring collapse in 1890 is commonly mentioned. But as seen in the third section, the Bank acted most of the time as a LLR by issuing high-powered money during panics. In the United States, the evolution of the way the Clearing Houses functioned is instructive. At its beginnings, during the 1860, 1861 and 1873 crises, the NYCH acted as a crisis manager and had to organize the equalization of reserves through the transfer of reserves from banks with a surplus to those with a deficit. Evidence clearly shows that the equalization of reserves took place at the discretion of associated banks (Sprague, 1910, p. 94; Coe Report quoted in Wicker, 2000, p. 124). For this reason, it was a very uncertain method and it was progressively replaced by the issuance of a high-powered medium, namely, the clearinghouse loan certificates. The injection of liquidity by the Bank of England or the NYCH was generally sufficient to end liquidity pressure with no apparent need for the centralized allocation of liquidity described above. This was no longer the case in 2007-2009. The importance in kind and in degree of the centralized liquidity allocation implemented by the Federal Reserve and the European Central Bank revealed the severity of the freeze and disruption of the interbank markets.

## **8. Conclusion**

Beyond the monetary regime, which determines differences regarding central bank rate policy and the international lending in last resort framework, we have discerned similarities in the action of the central bank as lender in last resort, between the classical period and the current one, both characterised by the development of financial markets and unregulated banking. Central banks similarly issue large important amounts of high-powered money, adjust the level of information on weak banks during a crisis, can be however disturbed by the lack of information on unregulated institutions, and finally, enlarge the category of counterparts as well as the spectrum of collateral. All of these features lead central banks to act not only as a lender but also as a market maker of last resort. This implies that the more the central bank reinforces their involvement by

purchasing dubious private sector assets, the more difficult the crisis exit policy becomes. Finally, during the recent crisis, central banks have had to go further than they did during the classical era, by absorbing excess liquidity in addition to the liquidity provision. Such a centralization of liquidity allocation seems to have been neither observed historically, nor anticipated by theory.

After the Great Depression and the Second World War, the banking system as a whole was regulated, financial markets were far less developed, and banking crises were less frequent and significant. The historical experience of a wider involvement of the central banks was forgotten and even useless. Economists as well as central bankers then shared a narrow view of the LLR in mind. Nowadays, central banks are placed in a finance economy in which financial markets and innovations are highly developed. They have no choice but to go beyond the narrow conception of the LLR and adapt their tools in consequence, for instance, through the enlargement of the category of counterparts and that of the spectrum of eligible collateral and through the outright purchase of a large set of assets. A line of interpretation would see such procedures as exceptional or as a forerunner to a MMLR paradigm. But the fact is that a wider conception of LLR has simply been rediscovered, just as the historical roots of lending in last resort in a finance economy may be found in the classical period. The main theoretical implication of this rediscovery is that, since the finance economy is significant, the concept of the MMLR should be integrated into the concept of LLR.

More than fifty years ago, Minsky (1957, pp. 185–6) anticipated these conclusions on the need, in theory and in practice, for a broader view of the responsibilities of the lender of last resort under a context of the development of financial markets and innovations. “The evolutionary changes in the money market result from in both new kinds of assets and new kinds on financial institutions. [...] What is required to counteract the effects of such evolutionary developments is a broadened view of central bank responsibilities [...]. The classical Bank of England position was as a lender of last resort to a financial intermediary, the discount houses, which, in terms of paper available, deeply penetrated the British money market. A broad view of a central bank’s responsibilities includes the maintenance of the stability of, and acting as a lender of last resort to, a broad segment of the financial market. Hence as new financial institutions develop and as new types of paper appear on the money market, such institutions and paper would not necessarily be ineligible for central bank aid in time of crisis.”

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