

2009 | 22

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ISSN 1502-8143 (online)

ISBN 978-82-7553-527-4 (online)

Bagehot for beginners: The Making of Lending of Last Resort Operations in the Mid-19th Century

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5 October 2009

Abstract

In this paper we survey the development of lending of last resort operations in the mid-19th century. We identify and document critical dimensions of the extension of lending of last resort functions, and also develop original empirical tests enabling us to identify such things as the emergence of “free lending” during financial crisis. Our focus is predominantly on the Bank of England, but we also survey some counterpart evidence for the Bank of France. Our main finding, which extends earlier work (Collins 1992), is that free lending and extensive liquidity support against good collateral developed gradually after 1847 and was already a fact of life before Bagehot published Lombard Street. Another finding is that the extension of the Bank of England’s LLR function went along with a reduction of its exposure to default risks, in contrast to accounts that have associated Lending of Last Resort with risk taking or feared, as some contemporaries did, that systematic LLR operations would encourage moral hazard. Finally, we provide a new interpretation of the “high rates” advocated by Bagehot. We suggest that they were meant to prevent banks from free riding on the security offered by the central bank, forcing them to march forward to prevent a market retreat and maintain a critical degree of liquidity.

JEL: E58, G01, N13

Keywords: Lending of last resort, Bagehot, Bank of England, financial crises, history of monetary policy

¹. We are grateful to the Graduate Institute of International and Development Studies, Geneva, for its support, and for the generous contribution of Mr Pierre Mirabaud. Ugolini acknowledges financial support from Norges Bank (The Central Bank of Norway). This paper grew out of the Graduate Institute course and workshop on “International Money and Finance: Theory and History”, that took place during the Fall Semester of 2008. Special thanks are due to several students for the part they took in discussing some of the ideas that are articulated here. We are also grateful to archivists at the Bank of England and the Bank of France for their help and welcome. Remaining errors and misinterpretation are entirely our own.

The recent subprime crisis, described by some observers as a run on banks that manifests itself as a liquidity crisis (Gorton 2008), has aroused renewed interest for the famous Bagehot's rules encapsulated in a set of principles for successful lending of last resort operations. These principles were described in Bagehot's *Lombard Street*, published in 1873, but Bagehot's ideas emerged gradually over the 1860s in a succession of papers published in the aftermath of the so-called Overend Gurney Crisis of 1866.² Walter Bagehot, then editor of *The Economist*, wrote at a time when recurrent crises in the money market threatened the British economy with financial collapse and dislocation. Problems of the 19th-century money market were not unlike those of our own. This market was a place where banks traded securitized short term Collateralized Debt Obligations known as "bills" and originating in either trade or finance transactions. Banks sold their certification of the bills for a fee, and this made them liable in case of default. Vast amounts of such securities were exchanged during normal times but the market seized in panics. A triggering factor could be doubts on the quality of underlying assets as occurred during commodity prices crashes (in 1866 the collapse of the price of cotton raised doubts on collaterals). When this occurred, the inter-bank market dried up, and short-term claims became illiquid. There were fire sales, further liquidations, and bank closures. Just as we saw in 2008, the market then spiraled down in a desperate attempt to bottom out.

Bagehot like other predecessors before felt that such emergencies called for the creation of a mechanism who would support the money market and restore normal operation. He thought that the Bank of England should provide this mechanism and in fact already provided it. More precisely, in the aftermath of the 1866 crisis, Bagehot argued that *de facto* if not *de jure*, the Bank of England had begun to acknowledge a role as lender of last resort. The claim did upset top Bank of England officials, such as Thomson Hankey (a director of

². Gorton (2008, pp. 2-3) states in his introduction that "it is true that today's panic is not a banking panic in the sense that the traditional banking system was not initially at the forefront of the bank run [...]. Still, I would say that the current credit crisis is essentially a banking panic. Like the classic panics of the 19th and early 20th centuries in the U.S., holders of short term liabilities (mostly commercial paper, but also repo) refused to fund banks due to rational fears of loss—in the current case, due to expected losses on subprime and subprime-related securities and subprime-linked derivatives. In the current case, the run started on off-balance sheet vehicles and led to a general sudden drying up of liquidity in the repo market, and a scramble for cash, as counterparties called collateral and refused to lend."

the Bank and former governor), who countered that, should a policy like that be ever acknowledged as such, the world would fall apart as this would encourage irresponsible behavior.³ The exchange has come to be seen among economic historians and economists of thought as the mother of all controversies on the incidence of lending of last resort on moral hazard and the debate still rages today among theoreticians.

Bagehot emphasized several principles for successful rescue operations. They included extensive asset-for-cash swaps, with an eye on the quality of the assets that were taken by the central bank, and at high interest rates. He never formally distinguished between these principles, and never said there were three. But subsequent commentators have enshrined this by distinguishing among three principles: “free lending”, use of “good collateral” only, and reliance on “penalty rates”. Yet as of today, the significance of Bagehot’s ideas is still disputed. There has been and there is discussion on the meaning of free lending, good collateral, and penalty rates.

Bagehot’s work can be assessed in different, not mutually exclusive ways. His theory can be discussed with respect to the wording and language actually used in *Lombard Street*, and previous articles published by *The Economist*, as an attempt to infer what the author had in mind, in the way preferred by historians of economic ideas. It can be discussed without reference to what Bagehot had in mind, through the lenses of subsequent monetary theory and models in an attempt to see which universes support Bagehot’s recommendations.⁴ This is the way preferred by today’s theoreticians. Finally, it can be discussed with respect to the actual policies and actions that prevailed at the time Bagehot articulated his arguments, descriptions and prescriptions. This guise is the one privileged by economic historians, but economists interested in hypothesis testing and empirical assessment of the performance of LLR operations should also prefer such an approach. The following pages belong to this third group.

Specifically, we have gathered from primary and secondary sources, material bearing upon the issue of lending of last resort as it presented itself around the mid-19th century. Working with both the teachings of Bagehot and modern theory on one hand and with the

³. Hankey (1867), pp. 25-38; Bagehot (1873), VII.13-21.

⁴. We prefer “subsequent” to “modern” because, by definition, modern theories always change.

actual experience of two leading central banks of the time (the Bank of England and the Bank of France) on the other hand, we provide a picture of crisis management in the era of Bagehot. Our work continues and extends a short but penetrating note by Michael Collins published some years ago by the *Economic History Review*.⁵ This note does share with us the basic idea that lending of last resort developed *de facto* before Bagehot's teachings and took the form of generous lending and support to the banking system. On the other hand, we differ from Collins in that we expand the time period to consider the earlier crisis of 1847, relate our findings more closely to Bagehot's rules, and provide findings that suggest that the principles encapsulated in *Lombard Street* were not unknown on the other side of the Channel either. Our goal is narrowly positive: we seek to trace, with the help of novel statistical data, the making of Bagehot's rules through the succession of crises that hit the monetary and financial systems of the two countries, viz. in 1847, 1857 and 1866 for England, and 1848, 1857 and 1881 for France. It may seem surprising given the relevance of the topic that our research has so few predecessors.

The conclusions we reach are the following. First, we find that there was an evolution in the way central banks dealt with crises, from a policy of universal credit rationing before 1850, to a policy that strongly supported the market by providing unlimited loans, or at least much more generous ones. This evolution, we found, was not limited to England. A similar trend was observed at the Bank of France, and the chronology, to the extent that comparison across crises that did not occur at the same date is legitimate, supports the notion of a general pan-European transformation. This similarity is intriguing and suggests that at one broad level, the development of LLR operations does not owe much to country-specific factors, nor to specific exchange rate regimes such as the one that was in place in Britain since 1821.

Second, we find that, contrary to a view that is common in both traditional and more recent discussions, the extension of lending of last resort did not result in increased moral hazard. This may appear as something of a puzzle, but we shall see that it can be explained by the fact that the extension of liquidity support was not accompanied by a relaxation of prudential standards, much to the contrary. Hankey's criticism of Bagehot's rule as an

⁵. Collins (1992); see also Ziegler (1990).

encouragement to rogue behavior is thus inadequate and misleading. Using material from the Bank of England Archive, we discover that at the time LLR policies emerged, there was a receding amount of problem bills, suggesting that standards were being tightened not relaxed. We note that a by-product of the making of Lending of Last Resort operations was the making of a high-quality London bill market that was certified by the most prestigious merchant banks, and made liquid by the Bank of England. The extent to which this helped establish the London bill as the supreme instrument in the international money market cannot be discounted.

Third, our characterization of LLR policy as proceeding from a robust knowledge of the operation of the money market by the central bank and the use of prophylactic devices during intercourse between the bank and the market sheds a new light on the third and less understood of Bagehot's three sacred principles. We suggest that the "high" rates Bagehot recommended may be understood as a fine on bankers' reluctance to lend to one another, or equivalently, as an encouragement to make use of the information they have on one another rather than seek the safety of the Bank, for this may result in a complete collapse of inter-bank lending and destruction of information. This conclusion is interesting given the difficulties that central banks have had recently to restore confidence by lowering interest rates and becoming what one observer has called the money "market maker of last resort".⁶ When bank deposits at the central bank earn interest and when the interest rate on new lending is low, the incentives for inter-bank lending does disappear and banks are happy to let the money market to be fully internalized by the central bank. But this, we suggest, stands in the way of a revival of the money market.

The remainder of the paper is organized as follows. Section I provides a brief survey of the Bagehotian legacy in modern LLR theory, outlining central themes. Section II describes the historical background, outlining the operation of the money market and the relation it had with the central bank in Britain in the mid-19th century. Section III discusses free lending. Section IV discusses collaterals. Section V discusses moral hazard. Section VI discusses penalty rates. We end with conclusions.

⁶. *Maverecon*, Willem Buiters's Blog, "The Central Bank as a Market Maker of Last Resort", 12 August 2007.

Section I. Bagehot's Legacy in Modern Theory

To explain why there should be lending of last resort, economists first explain why there should be panics. As a result, the forms taken by lending of last resort in the literature owe a lot to the way panics arise in economic models. Diamond and Dybvig (1983) were the first to formalize the occurrence of bank runs as a possible outcome.⁷ Their run emerges because agents go on the “wrong” equilibrium thus producing a self-fulfilling collapse, which turns out to be rational *ex post*.⁸ Some papers have criticized the underlying hypotheses of such models, showing that they are quite contingent to the set of contracts that agents are allowed to make.⁹ Gorton (1988) studies panics in the U.S. National Banking Era and concludes that crises were predictable by indicators of the business cycle, suggesting that self-fulfilling bank runs are empirically irrelevant.¹⁰

Goodhart (1987) emphasizes the role of balance-sheet's mismatches, which enables him to put more real-life insights in his analysis. Banks are intermediaries that use short-term nominal deposits – redeemable on demand – to finance long-term projects. Since the price of both the asset and liability sides are fixed, the possibility of an adjustment to a bad shock affecting the asset side through a devaluation of the liability side is ruled out. Barring this, the only variable important for depositors is the probability of having deposits reimbursed. Bank runs occur because the quicker agents remove deposits, the more likely they are – individually – to be reimbursed. But a run impacts negatively the economic welfare of those depositors who do not get reimbursed and of the debtors who get liquidated. In this context, Goodhart argues that “a Central Bank will aim to prevent, and, if that fails, to recycle such flows – subject to such safeguards as it can achieve to limit moral hazard and to penalize inadequate or improper managerial behaviour.”¹¹ However, Gorton and Huang (2006) show

⁷. More recent variants include Cooper and Ross (1998), and Green and Lin (2003). A variant of the Diamond and Dybvig (1983) explanation of bank run in terms of sunspots is Postlewaite and Vives (1987), incorporating information asymmetry and uncertainty about the fundamentals to study a model in which bank runs can occur.

⁸. In this perspective, bank runs have been described as a result of a “psychological” phenomenon (or sunspots) not to poor financial management.

⁹. See Wallace (1988); Green and Lin (2003); Andolfatto, Nosal, and Wallace (2007).

¹⁰. This has been theorized in the literature on information-based bank runs; see Chari and Jagannathan (1988), Jacklin and Bhattacharya (1988), and Allen and Gale (1998).

¹¹. Goodhart (1987), p. 88.

that such emergency liquidity provision during crisis can be ran by the private sector, through a coalition of banks issuing redeemable claims backed by the assets of all member banks.¹² A governmental (or state-owned central bank, which neither the Bank of England nor the Bank of France were) is only useful if the government has much more resources than private agents or if other costs to panics are considered – for instance, if panic disrupts lending to sound corporations or threatens the country’s medium of exchange.

Other interesting issues that have been considered by theoreticians include the channel through which the central bank provides help to the banking system, and the price at which the emergency provision of liquidity is made. It is fair to say that the answer to these questions depends critically on the environment in which banks operate. Goodfriend and King (1988) dismiss the role of central banks in allocating funds to illiquid banks.¹³ They argue that in well-functioning financial markets a solvent institution cannot be illiquid, and conclude that the only role for central banks consists in providing the *market* with the aggregate liquidity and let the market distribute it to individual banks. In other words, they suggest that central banks should only deal with aggregate liquidity shocks but refrain from targeting help to specific banks: open-market operations are useful, but the discount window is redundant or nefarious. However, Repullo (2000, p. 580) notices that the same informational reasons that explain why banks’ loans are illiquid in aggregate can imply that one bank may not be able to borrow the required funds from the others. This may be amplified by strategic considerations. In some situations, some participants to the money market are unwilling to lend to other participants, as this may help to weaken competition in banking. In some market structures, banks may seek to amplify other banks’ liquidity problems to force a liquidation. This can arise when some assets are bank-specific (meaning that the market for these is easy to manipulate).¹⁴ The subprime crisis provided instances where accusations were made of disingenuous refusals to lend to one another. Rochet and Vives (2004) also suggest that since the central bank is involved in periodic operations with

¹². In their model, bank panics – or run on deposits – are rational in that they constitute a way for uninformed depositors to monitor banks’ behavior.

¹³. See also Bordo (1990), Kaufman (1991), and Schwartz (1992).

¹⁴. Acharya, Gromb, and Yorulmazer (2008).

commercial banks, it can be in a favorable position to monitor or lend to a given banking establishment.

Another important issue is whether a discount window stimulates or not moral hazard. Martin (2006) suggests that a lender of last resort does not encourage risk taking, provided that it does not suffer from severe informational disadvantage on the commercial banks' activities. This result is also obtained if the central bank has priority over the assets of the banks it lends to.

The question of the interest rate at which the central bank should lend has attracted considerable interest. In sharp contrast with Bagehot's recommended policy of lending at very high rates, the theoretical literature has generally argued in favor of the central bank lending at a zero interest rate (Allen and Gale, 1998; Antinolfi, Huybens, and Keister, 2001; Champ, Smith, and Williamson, 1996; Freeman, 1996; Green, 1997; Martin, 2006; Rochet and Vives, 2004; Williamson, 1998, 2004). The reason is that, in models where the rationale for a lender of last resort is a coordination problem that prevents commercial banks from lending to one another other, the interest rate of the discount window should be set at a sufficiently low rate to guarantee the continuation of liquidity provision. It is also likely that, following Friedman and Schwartz's (1963) critique of the Fed's handling of the aftermath of the 1929 stock market crash, the consensus has moved to the general notion that, following crises, central banks should swamp the market with money.

Some authors, however, have rationalized a policy for high interest rates. At a broad level, a credible high rate in times of crisis may make banks reluctant to take risks as this will increase the cost of emergency refinancing (Sheng 1991; Summers 1991). Sleet and Smith (2000) provide an example in which the central bank rate must be set at a very high rate to compensate the losses it may make from bailing out insolvent banks. Technically, the social return to rescuing a distressed banking system (through the operation of a discount window at a very high rate) is then high enough to compensate the increase in risk-taking behavior that its mere existence implied in the first place.¹⁵ Freixas, Parigi, and

¹⁵. This can actually be taken as a suggestion that Bagehot's rationale is fragile. If there are parameters for which lending of last resort at high rate is profitable, there must be others for which it is not. Sleet and Smith (2000) also show an example in which the advantage of the financing of risky businesses does not outweigh the cost of liquidation and closure.

Rochet (2004) also suggest that a penalty rate can be optimal when the main source of moral hazard by banks lies in faulty *ex ante* screening of borrowers. Penalty rate reduces this kind of risk taking because it discourages insolvent banks from appealing to refinancing facilities. Finally, in a different vein, Martin (2009) shows that the penalty rate can help to allocate central bank's funds to the most needy banks, as this eliminates the incentive for sound lenders to withdraw too early from the market.

Section II. The Money Market and the Central Bank in the mid-19th Century

To understand central bank operations during the mid-19th century, the simplest is to start from a description of the money market. Money markets in Europe operated along common general principles. The staple instrument of these markets was the two-name bill. Drawn by one agent, countersigned by another, it bore two signatures and could then be traded, or in the language of the time, discounted. Through this mechanism, unknown houses could draw on the credit of banks commanding respect and credibility on the market place. The operation was known as “accepting”, and the prime instruments in this market were the “acceptances”. Leading “merchant banks” (as investment banks were called) accepted huge amounts of bills annually in a manner that closely resembled the modern “originate and distribute” model. On the one hand, the banker with a prestigious name earned a fee from accepting the instrument; on the other hand, the debtor earned the spread between the interest rate at which he would have been granted credit on his own name and the lower one at which the claim, once accepted by a well-known intermediary, actually traded.¹⁶ Compared to modern practice, the only missing part is the rating agency.

Both the debtor and the banker who had lent his name to upgrade the credit of the bill and give it greater saleability as a result, were responsible for payment. So were also all subsequent discounters (purchasers) who had endorsed the bill and then put it back in circulation. If the acceptor failed, the “primary” debtor was called in. In some legal systems, the holder of the bill could call in any name in the list of signatures on the bill leaving it up to the summoned party to recoup their claim. In others, creditors had to go by order of

¹⁶. For a description of the workings of the 19th-century bill market, see e.g. Gilbert (1856), Seyd (1868), or Withers (1909).

endorsement with the acceptor first, the last endorser second, and so on, following the chronology of endorsements.

Bills were packaged in aggregate instruments called “parcels” that could be swapped across the board. Parcels bore the guarantee of the packer. In some places, such as in England, the practice of bill broking developed. Banks needing cash and banks having surplus of cash traded positions on a daily basis through the agency of bill brokers. Bill brokers lived from surplus funds from the banking system, which were taken on call and secured by the bills brokers were invested in. The market rate was the rate at which the market for prime bills would clear. Tensions in the money market were therefore eventually reflected in higher call rates. London appears to have been one place where this mechanism was most refined and perfected. In other places, such as Paris, the inter-bank market was less active and apparently less fluid, although a full study of the long-run evolution of this market is yet to be made.¹⁷ Prime paper, accepted by the most prestigious institutions known as the *Haute Banque*, was said to be always negotiated on favorable terms and to find ready buyers.

To a not inconsiderable extent, central bank operations were not, to begin with, significantly different from those of other regular commercial banks (Goodhart 1988). “Banks of issue” as they were initially known (i.e. privileged banks with a more or less exclusive right to issue and circulate bank notes) got involved in both originating (accepting) and discounting (purchasing) bills. For instance, conventional accounts of the policies of the Bank of France claim that its provincial branches or *comptoirs* accepted bills in which the Paris headquarters was later invested. In this case, the branch was both the acceptor and the discounter, so that there was only one signature originating from outside the Bank.¹⁸

Towards the middle of the 19th century, central banks had a broad clientele of customers who were eligible for discount facilities. These customers were not only or even primarily bankers. Among Bank of England discount accounts active around 1850, one finds such

¹⁷. There is a description for instance in a book by Haupt (1894) that towards the late 19th century bill brokers emerged, and were used as intermediaries traded parcels across banks in what appears to have been an OTC inter-bank market.

¹⁸. On this issue, see Plessis (1998).

names as “Blackwell, publishers”.¹⁹ Some authors argue that as time passed the activity of banks of issue became more focused on discounting banks’ paper. Several central banks retained a substantial commercial activity and some even expanded it, creating a large number of branches. The so-called “bank rate” was the price at which these discount operations were taking place.²⁰

Figure 1 provides a picture of the evolution of the number of discounters at the Bank of England between 1844 and 1914.²¹ This concept may differ from that of the total number of discount accounts since some accounts might have been dormant. But in principle the two notions should be related to one another. After an initial increase (the number of discounters reaches a peak of more than 1400 in 1847), we see that figures began to decline steadily—they were below 400 after 1900. A rigorous statistic for the population of Bank of England’s discounters is yet to be constructed. However, leafing through the books, we get a sense that, apart from a contraction coming from mergers and bank closures, a large fraction of the accounts that closed down were non-banks, supporting the conventional wisdom of a gradual specialization of the Bank of England towards arm-length dealings with the money market.

Discounting of bills was an outright purchase in the market. To the extent the bill was paid at maturity, there were no more interactions between the bank of issue, the discounter, or the primary debtor. Only when bills were returned unpaid did the central bank turn to the other intermediaries. Thus bills discounting was “secured” by the credit of the discounter or acceptor. Sometimes, especially for private banks where liability was unlimited, knowledge that the discounter owned some valuable estate was sufficient. The credit of the discounter was subjected to scrutiny. One had to be “introduced” to the Bank of England, and its books bear a mention of the person who had fathered each discounter. Some names appear frequently: insiders of the Bank of England (governors, members of the

¹⁹. See Bank of England Archive, Discount Office: “Rating Book, showing each discounter’s credit limit”: C29/13. More generally, see C29/11 to 18 for 1827, 1845, 1850, 1856, 1860, 1874 and 1882, the later being updated until the 1920s.

²⁰. After 1878, the Bank of England began to discount below the bank rate (see e.g. King 1936, pp. 291-296). Bank of England Archive C30/3 provides statistics on discounts below the bank rate. This does suggest that the amounts discounted below the bank rate were not enormous.

²¹. Bank of England Archive C30/3.

board), prominent merchant bankers, etc., supporting the view that discounters were a club²².

But a good introduction was not enough. Evidence on unpaid bills shows that a variety of additional securities were being asked as a pledge against discounts. Discounters could be asked to issue promissory notes on themselves for a larger amount than the bills to be discounted, and give them as collateral. With these notes, the discounter recognized himself as liable towards the Bank of England should the discounted bill not be paid. Some registers provide indications of limits per discounter, although the way things are presented make it difficult to comprehend how these limits were enforced and if they were.

Discounting as we described it above implied an outright purchase, conditional upon the bill being a good one. Another type of operation was the advances, which are comparable to contemporary “repo” operations in that a security was pledged at the bank and then repurchased by the debtor at a given date. One difference between modern repo operations and 19th-century “advances”, however, is that there again the amount of security taken was substantial. Depending on the quality of the collateral, banks took large haircuts, so that if the loan was defaulted upon and the security left with the bank, the exposure would be minimal. This may have been understandable when the collateral was government bonds, which were subject to large jumps in case of political crisis, but is also observable in the Bank of France’s fully secured business of lending on gold and silver.²³

Figure 1 here.

Section III. Lend Freely

a) Credit Rationing: A Test

The first of the three Bagehotian “rules” is the most straightforward. From both text and context, “free lending” is an argument about credit rationing. It is obvious from many parts of *Lombard Street*, where Bagehot blames the timidity of the Bank of England during the

²². This is supported by inspection of Bank of England Archive C29/4, Discount Office: “List of discounters, giving name, trade, and by whom introduced [...], 1804-1899”.

²³. See Flandreau (2004, pp. 230-231) for a discussion of terms and conditions for lending using gold and silver as security.

crisis of 1847.²⁴ This interpretation is also consistent with the coverage of Bank of England operations that *The Economist* gave during the crisis of 1847 (at a time when Bagehot was not yet involved). The main accusation the newspaper made during the crisis was that the Bank engaged in policies that discriminated against longer bills through both price and non-price mechanisms. Price mechanism took the form of higher discount rates for longer maturities. Non-price ones were outright credit rationing. As *The Economist* complained, the Bank had refused to “discount any but extremely short dated paper”: as a result, “the minimum rate of the Bank of England is no longer any rule or criterion; [...] the Bank nominally maintains a rate of discount which, practically, does not exist.”²⁵ Or again some days later, the newspaper argued that “in the early part of the week the Bank discounted first class May and June bills at 5.5%, and bills due early in July at 6%; but the applications were greater than even the increased scale of business enabled the Bank to comply with, and there have, therefore, been a large amount of bills refused”.²⁶ Until the crisis finally reached its apex and the Act of 1844 suspended on 25 October to permit the Bank to do away with its statutory constraints and lend more generously, similar statements would be frequently read.

The news published in *The Economist* reflected information that was available in the market, which itself learnt from the Bank through its daily interactions with the Bank’s discount window as well as the Bank’s circular. The rapidity through which the news about rationing was known to the public and divulged by *The Economist* is notable. For instance, internal Bank of England sources indicate that on 15 April “the governors in their instructions to the committee of Daily Waiting in fixing the rate of discount on bills of exchange, be recommended to take into consideration the periods the bills have to run – as also the position of the accounts of the discounters etc.”²⁷ Two days later, on 17 April, *The Economist* reported: “The Bank, by omitting any mention of time in the weekly notice, has relieved itself from an implied obligation to take bills of any special date, and the

²⁴. E.g. Bagehot (1873), VII.32.

²⁵. *The Economist*, 24 April 1847.

²⁶. *The Economist*, 1 May 1847.

²⁷. Insider Bank of England memorandum filed under November 1857 and reviewing (with some omissions) the Bank’s policy regarding the maturity of the bills it discounted from 1821. Bank of England Archive, G15/97, “Memorandum in regard to the *échéance* of bills discounted at the Bank, filed under November 1857” (“*échéance*” is French for “maturity”).

consequence has been, that they have rejected large quantities of paper falling due after this month.” The policies of the Bank were thus fairly transparent to the market. This is not surprising, since credit rationing had a direct effect on discounters who were turned down. Their disappointment found its way in the press.

Our inference from this is that information available on the market is a proper way to infer what is happening inside the Bank. This suggests a test of the extent to which credit rationing was taking place. If a central bank does behave as a LLR, its interest rate (for any given category of risk) ought to be always above or equal to the market rate. Otherwise an arbitrage would be feasible. Suppose that this were the case. Then, rational agents would prefer to discount their bills at the central bank rather than at higher market rates. And thus it is that the central bank’s rate cannot be lower than the rate prevailing in “Lombard Street” (the market rate). A simple test of whether or not the central bank behaves like a LLR (conversely of whether it does credit rationing) is to compare the market rate and the bank rate. If the bank rate is below the market rate, we reject the null that the central bank is a LLR (accept the alternative that there is credit rationing).

Using the descriptions and information from *The Economist*, we have collected data on both the market rate and the bank rate for three-month bills during the three main crises of the mid-19th century, viz. in 1847, 1857 and 1866. The magazine does enable distinguishing between two maturities, “long” and “short”, and for 1847, “very short” as well.²⁸ The test is to compute the difference between the market rate and the bank rate for a given maturity, and to see whether the result is positive (reject the hypothesis that central bank is a lender of last resort). The outcome is shown in Figures 2a to c. As can be seen, the data strongly suggest that there was rampant credit rationing during the crisis of 1847, but it receded afterwards. There is a brief violation in 1857, just before the suspension of the Act. During the crisis of 1866, no credit rationing is visible.

Figures 2a to c.

²⁸. The articles run by the magazine and the data it published can be used to reconstruct the succession of policy changes as they were reported. We have organized this material in Figure 2a. We report, according to *The Economist*, the spread between market and bank of rates for “very short” (a few days) “short” (a couple of weeks) and “long” (forty-five to ninety days) bills. If we are to believe the reports from *The Economist*, use of price and non-price discrimination against long term bills were correlated with one another.

b) Rejection Rates

Another way to look at discrimination by the central bank (the converse to free lending) is to explore the relation between applications for discounts and the actual amounts discounted. The Bank of England Archive contains some evidence enabling to document this for the three crisis years.²⁹ It consists of reported monthly total applications and actual discounts, as shown in Figures 3a to c. Total rejection rates suggest a change of behavior between 1847 (11%) on the one hand and 1857 and 1866 on the other hand (3.5 and 4.5% respectively). Moreover, the rejection rate at the peak of the crisis declined over time. It is 16% in October 1847, 7% in November 1857 and 3.5% only in May 1866. Such figures would not prove anything by themselves, as a lot of unobservable strategic behavior was probably at work. Agents, understanding that the Bank would not discount them anyway, might have reduced their applications later on. However, in conjunction with the earlier evidence from price data on the lack of credit rationing during the later periods, the evidence on rejection rates provides strong suspicion that a revolution was going on.

Reinforcing evidence can be got by observing the increase in discounts at the peak of the crisis. It becomes much stronger as time goes by. The average ratio between the amount of discounts during non-crisis months and the crisis month is 54% in 1847, 38% in 1857 and 23% only in 1866. Over time, therefore, agents were learning that the Bank was becoming more generous and accordingly they increased their applications, which were generally received favorably. The evidence strongly suggests there was an increase in the liberality and elasticity in the supply of credit by the Bank of England during financial emergencies.

c) Cross Section

The last bit of evidence we report here has to do with what was happening on the other side of the Channel at about the same time. France went through three major crises, the first two being more or less closely associated with commercial and financial turmoil in England and the world (1848 and 1857), while it avoided the problems of 1866 but experienced a crisis of its own in 1881-82. We have collected material for the setting of the interest rate, looking for evidence of maturity rationing. The interest rate data for the Bank

²⁹. Bank of England Archive, Discount Office, Daily Discount registers, C28/7, C28/17 and C28/26.

of France is from Vitu (1864) who gives the maximum maturity and for each maturity, the corresponding interest rate. As can be seen in Table 1, during the first two crises, the Bank of France reduced the maximum maturity and charged higher interest rates for longer bills. We recognize the tactics already observed at the Bank of England.

To track the evolution of the policies of the Bank of France, we now replicate the test performed for the Bank of England discount rate and compare the Bank of France rate for prime three-month bills with the market rate for similar instruments. Until 1861, when *The Economist* started reporting it, there is no reliable series for the Paris inter-bank market. Explorations in bank archives have never managed to produce a continuous series for this rate for early periods, although correspondence in merchant bank archives establishes conclusively that a Paris money market and a Paris market rate did exist. As a result, the proper construction of the relevant series awaits its historian.³⁰ To sort this out, we have relied on a trick, which uses the London price for swaps of spot and time deposits in Paris (the so-called exchange rate for sight and three-month bills) to infer a measure for the “shadow price” of money in Paris. This is used for the years before which the material in *The Economist* is available.³¹ The indications for the early phase are thus estimates only, although probably reasonable ones (when the “true” series becomes available it turns out to be fairly close to the estimated one). This must be borne in mind since, by contrast, the material we had for the London money market is the actual interest rate that was quoted in real transactions.

The outcome of this exercise is presented in Figure 4. Rather than focusing specifically on crises years, we present the long-run evolution of both the Bank of France rate and the money market rate, estimated (pre-1861) or measured (afterwards). As can be seen, credit rationing and violation of the Bank of France “ceiling” are routine events in the first part of the century. In effect, the Bank of France initially behaves as if it had an interest rate target of 4% and lets the market rate hover above it from time to time. The Crisis of 1848 exhibits some spectacular violations, which are not unlike what we observed for the Bank of

³⁰. Data for market interest rates are only available following the boom of joint-stock deposit banks, which by nature or inclination have typically left more systematic statistical material in their archives than the private merchant banks.

³¹. For a discussion in English on this procedure, see Flandreau et al. (2008).

England. The lack of a point estimate for the market interest rate in some months is itself indicative of credit rationing. It means that traders in London stopped buying prime bills payable in Paris: yet this would have not occurred, had the Bank of France stood willing to discount unlimited amount of these. Finally, we see that violations decline over time. There are still some in 1857, but just like what we saw earlier for the Bank of England, violations tends to recede over time. In the end, the Bank of England and the Bank of France appear to have obeyed the same rules of motion.³²

Section IV. Good Collateral

The question of the “good” securities – those eligible for advances – is the next we examine. One difficulty with dealing with it is that there is circularity in the effects of successful lending of last resort: *ex post*, those who deserve to be saved are saved and that is how we know they were deserving. This issue is the same as that of the perplexingly thin line between insolvency and illiquidity. In this section, we are interested in determining not what ought to have been a good security, but what contemporaries perceived to be a good security – and as a result, how good securities became such.

The case of bills is perhaps simplest: by good bills, central banks meant bills bearing prestigious names as acceptors, bills brought in by sound discounters, or bills on which they took serious guarantees. Noting this however hardly closes the matter, and we shall return to it in Section V. But in any case, during emergencies the supply of good bills was limited, and reliance on other means to secure credit became necessary. Therefore, the discount window was supplemented very early on by collateralized loans (or repos-cum-haircut operations) known as “advances” and done on all kinds of securities.³³ Figure 5 shows (for London) the amounts discounted and the total advanced to the market on an

³². According to Flandreau (2004), after 1857 a greater degree of freedom was granted to the Bank of France through the abolition of usury laws and from that point on, the Bank stopped resorting to credit rationing.

³³. Bagehot (1873, VII.68) quotes a very famous statement by Bank officials about their behavior during the 1825 crisis: “We lent money by every possible means, and in modes which we had never adopted before; we took in stock on security, we purchased Exchequer Bills, we made advances on Exchequer Bills, we not only discounted outright, but we made advances on deposits of bills of Exchange to an immense amount—in short, by every possible means consistent with the safety of the Bank.”

annual basis since 1844 (counterpart figures for the branches of the Bank of England could not be found). As can be seen, advances increased dramatically during crises, as did bills.

Figure 5 about here

And thus, we may wonder, what were the good securities on which a proper central bank would be expected to lend freely? Bagehot provided a precise discussion.³⁴ He noted that while the “standard” security was government bonds, other instruments such as railway securities ought to be included as well in more successful lending of last resort packages. Consistently, we suggest here an original test of the evolution of LLR operations that uses the good collateral as touchstone. If the Bank does not stand ready to lend freely on a good collateral, agents are forced to resort to fire sales of that collateral. Government securities therefore are sold on the market, rather than pledged at the central bank. The incidence of the crisis on “safe” bond prices is thus a shadow measure of the extent to which LLR operations prevail. The stronger the price declines, the more likely it is that the Bank is not acting as a Lender of Last Resort.

Figure 6 shows the behavior the “good security” *par excellence*, namely British consols, during the three crises under study. As before, we have associated the climax of the crisis with the suspension of the Act of Peel (relieving the Bank from its convertibility obligation), which we take as benchmark, looking at the price of consols in the ten weeks before and after it. We see that the 1847 crisis seriously depreciated consols, but the two subsequent crises less so. The 1847 crisis saw a peak in depreciation of about 9% at the apex, while this was reduced to 4% during the 1857 crisis, and only to 2% during the 1866 crisis. We take this as a reflection of the fact that the central bank was lending freely on consols and that the market understood it: fire sales were avoided. This finding complements nicely the regression of credit rationing documented in the previous section.

³⁴. “The Bank also advances on consols and India securities, though there was, in the crisis of 1866, believed to be for a moment a hesitation in so doing. But these are only a small part of the securities on which money in ordinary times can be readily obtained, and by which its repayment is fully secured. Railway debenture stock is as good a security as a commercial bill, and many people, of whom I own I am one, think it safer than India stock; on the whole, a great railway is, we think, less liable to unforeseen accidents than the strange Empire of India. But I doubt if the Bank of England in a panic would advance on railway debenture stock, at any rate no one has any authorised reason for saying that it would. And there are many other such securities.” Bagehot (1873), VII.73.

On this latter account, there is anecdotal but strong evidence that the crisis of 1847 again proved pivotal in shaping “modern” views on crisis management as they would be later encapsulated in Bagehot’s *Lombard Street*. One feature of the crisis of 1847 that caught the attention of observers was that price declines occurred across asset classes and infected top securities too. When in late September the Bank of England was reported to try and support the market by enlarging discounts of short bills, it was said to be curtailing its advances and thus limiting lending on consols and exchequer bills. The result may have been the strong decline observed in Figure 6. *The Economist* adhered to this interpretation, and reported negatively that the Bank was taking with one hand what it gave with the other.³⁵ Historians of economic thought will pick the existence of a fair deal of pre-Bagehotian wisdom in this criticism. In any case, when *Lombard Street* was published, it really reflected much of the existing wisdom on crisis management, as advocated by *The Economist* for a quarter of a century and as practiced by Bank of England since the crisis of 1866. Bagehot would have probably agreed.

Section V. Moral Hazard

a) Moral Hazard: A Simple Test

Before we discuss Bagehot’s last “rule”, a brief pause is in order. Economic historians have often described the period after 1873 as one of gradual adoption and triumph of Bagehot’s principles at the Bank.³⁶ The previous sections strongly suggest that “triumph” must have been limited to the ideological field, not to the intellectual one. What occurred post 1873 was, at best, an official recognition of policies that the Bank of England already followed. Here we meet with and qualify the famous controversy sparked by publication of

³⁵. *The Economist*, 2 October 1847: “The Bank has experienced a great pressure, and has been obliged to decline paper to a large amount, as well as applications for advances on securities. After the weekly meeting on Thursday, a notice was issued, raising the rate of interest on advances again to 5,5%; and this morning it was further intimated that no further advances whatever would be made upon consols, warrants, or Exchequer bills, the object being, it is said, to enable the Bank to make their advances more liberally on bills of exchange, to the aid of commerce. We fear, however, that in attempting to draw this distinction they have overlooked the fact, that advances made to brokers on stock are most generally on behalf of private bankers and bill brokers, who through their own connections can more effectually aid commerce than the Bank itself. It is impossible that any one can now fail to admit the error committed by the directors in the frequent changes which they have made within the last month in the terms for making advances.”

³⁶. Fetter (1965), pp. 257-283.

Lombard Street between Bagehot and Hankey. It is usually portrayed as a debate about the danger that Bagehot's rules would encourage moral hazard. That the rules described by Bagehot had been tacitly adhered to by British monetary authorities, as Bagehot actually claimed, implies that Hankey's rebuttal had mostly political and bureaucratic significance: the Bank of England did not want to lose any degree of freedom by committing itself to any pre-specified policy. A parallel that comes to mind is the modern emphasis on what the European Central Bank calls "constructive ambiguity" and the large economic literature on opacity.³⁷ We leave it to future scholars to discuss, with the help of Bank of England inside material, the significance – from the Bank's vantage point – of its own version of constructive ambiguity, keeping in mind that the dynamic of the crisis of 1866 suggests that the market had sorted things out and knew precisely where the Bank stood.

This means that an interesting and heretofore never discussed issue is the extent to which the adoption of such new operating rules did indeed encourage moral hazard. To address it, we searched the Archive of the Bank of England for information on delinquency rates. The information on this matter is organized in two registers that record on a yearly basis the number of delinquent accounts and corresponding amounts.³⁸ The question we have in mind is whether there was an increase in delinquency following the generalization of modern lending of last resort principles, as the moral hazard hypothesis would predict.

To deal with this question, it is important to get into some detail on the statistics of unpaid bills. In the Bank of England files, delinquency is organized on a per-discounter basis, not on a per-bill basis. This suggests the following operations. Within the mass of bills that the Bank of England discounted some were being returned unpaid, but the guarantees that had been taken (to repeat Section II, discounters had in general been asked to pledge some security) prevented this from reaching the books of the Bank. The bill was paid, with the discounter making up for the loss. A tight correspondence between statistics for "suspended discounters" and "new [delinquent] accounts" suggests that if the discounter

³⁷. Presentation of the ECB's Annual Report 1998 to the European Parliament, *Introductory statement delivered by Dr. Willem F. Duisenberg, President of the European Central Bank*, Strasbourg, 26 October 1999: "[The] policy of "constructive ambiguity" can limit the [...] problem of moral hazard". "Constructive ambiguity" is a term usually credited to Henry Kissinger, obviously to be read in a different context. A recent discussion of the economic incidence of central bank's transparency is Svensson (2006).

³⁸. Bank of England Archive C 30/3 and C 34/4.

did not manage to make ends meet, he would lose access to the discount window.³⁹ However, there could be cases where the discounter would not be able to provide the balance: this is when the material was entered in the books as a “delinquent account”, generally leading to the exclusion from the discounters’ list. The Bank then opened a debit account for the delinquent individual, a debtor to the Bank. Revenues on this account (from the discounter, acceptor, or from the primary beneficiary of the bill, if this were another person than the discounter) came as an offset and while a number of write-offs were made, the account started producing a revenue as some partial recovery occurred. Measuring the actual losses for such debit accounts would be a painful task. Random draws found that the amount lost were a trifle of initial sums. The eventual return occasionally outperformed early write-offs.

We conclude from previous discussion that the number of new delinquent accounts and the amounts inscribed to their debit are an indicator of the volume of problems that the Bank had to deal with. It is thus an indication of the quality of the safety nets that the Bank established for itself (and of course, of the overall quality of credit in the economy). We understand the concern of supporters of the moral hazard view to be that problems ought to have increased with the recognition of the role of the Bank of England as a lender of last resort.

The data we have collected enable us to reconstruct the number of delinquent accounts and amounts at risk of loss in London for the entire century between 1814 and 1914, as well as the total amounts at risk for both London and the provincial branches as a share of Bank of England total discounts for the period 1844-1914. Results are represented in Figure 7 and 8. There are many interesting insights that can be gleaned from these new charts. One is the occurrence of peaks in financial crises, with famous episodes being easily

³⁹. One anecdote that underlines the importance of the fiduciary relationship between the Bank of England and its customers is provided by the experience of the Greek House of Vagliano, which attracted much contemporary interest. In 1889 it was discovered that a clerk working at Vagliano’s had forged bills that he had then presented for discount at the Bank of England. The merchant bankers filed lawsuits against the Bank for having paid large sums over the counter to the clerk. They charged that the Bank ought to monitor the quality of bills (a quick inspection of the bill and account would have revealed the fraud), and lost. It was ruled in the House of Lords that the discounter, not the Bank of England, was responsible for ensuring the quality of bills (Chatziioannou and Harlaftis 2007, pp. 38-39).

recognizable. We are also struck by the apparent virulence of the crisis of 1825, which shows up with close to 100 problem accounts the next year. It is also interesting to see that crises tend to show up with a lag. The peak of problems was reached in 1849 for the crisis of 1847, and in 1858 for the crisis of 1857.

Another interesting message from the chart is about the geography of problems. As seen, branches' share in problems increased over time, and delinquency remained marginally more substantial there. Branches were a greater source of concern until the end of the period. This may have been a reflection of the fact that, as some earlier writers have suggested, branches were softer than London during the 1850s and possibly beyond (King 1936, pp. 188-189; Ziegler 1990).

But the overarching message is that the amounts at risk became really negligible by 1873. There was a general decline in the total number of problems and their extent. This is quite discernible for London data, with problems essentially disappearing by the time Bagehot wrote *Lombard Street*, but the trend is evident for the Bank of England at large.

There can be only two possible interpretations. The first is that the world became a safer place after 1873, so that there were just less problems around. This in itself would run against the moral hazard story, because it suggests that the development of LLR operation was followed by an improvement rather than a deterioration of credit quality. A more credible alternative however is that as the Bank of England extended its crisis management operations, it also became increasingly more demanding regarding the requirements it put on agents discounting with it. The suggested interpretation is that its net exposure to market risk went down, because discounters were called on their capital to make up for any loss on discounted instruments, thus eliminating moral hazard. We conclude that free lending against good collateral has nothing to do with moral hazard and an expectation to be "bailed out". The historical fact is that the early development of LLR had as companion feature a greater emphasis on quality.

b) More Cross-Section

It is interesting to compare the record of the Bank of England with that of the Bank of France. Strict matching of data is difficult, however, owing to the way the two central banks organized their statistics on unpaid bills. While we saw that the Bank of England operated a

per-discounter scheme, the Bank of France collected information at the individual bill level, counting the totals that were returned unpaid. But this very heterogeneity in record keeping may have reflected differences in operation, and in particular the fact that the Bank of England strongly relied on intermediaries while the Bank of France retained a greater role in origination of commercial paper, purchasing paper of which it was a discounter and thus in effect taking more exposure.

Figure 9 below compares the evolution of amounts at risk for both central banks. The pattern observed for the Bank of England does obtain for the Bank of France as well, with the amount of unpaid bills as a percentage of total discounts declining steadily over time. This evidence – along with the material already reported, suggesting that the Bank of France was moving from a policy of credit rationing to a policy of genuine support of the market in case of crisis – suggests that, beyond differences between the two institutions, more careful screening of the paper taken was there too a companion feature of the emergence of modern lending of last resort.

Finally, this section would not be complete if we did not emphasize the substantially higher share of problem bills in the case of France. The Bank of England operated in a perfectly risk-free market, whereby losses were entirely transferred to market participants. As a result it can be described as having provided liquidity in an anonymous way, conditional upon the banker dealing with it being eligible. Anonymity was by definition not a feature of the French system, since risks (however small) were taken and had to be managed on a case-by-case basis.⁴⁰ To what extent this was made possible by some specific features of the London market for acceptances – and to what extent central bank operations reinforced these features – is an important subject which future research will have to address.

Section VI. High Rates

This last rule is the trickiest, not least because Bagehot never used the word “penalty”. Instead he spoke about “high” or sometimes “very high” rates. This point has already made before (e.g. Goodhart 1999, p. 341), but the reference to “penalty” rates is an enduring

⁴⁰. On the Bank of France as an originator of bills, see Nishimura (1995), pp. 543 and 547.

one.⁴¹ The appearance of this moral overtone can perhaps be tracked back to the beginning of the 20th century, when both in U.S. and in the U.K., central bankers progressively focused on open market operations and began to fix official discount rates at a considerably higher level than market ones: in this context, resort to standing facilities could only be envisaged by very bad agents, and the higher fees they were obliged to face may have come to be seen as “penalty” ones.⁴² Bagehot’s prescriptions, however, were meant for a very different situation, in which agents resorting to the central bank’s standing facilities were typically good.

Of course, as already suggested in the first Section, the notion that rates rise during the crisis is consistent with different views, the straightest one being simple market analysis. During a monetary crisis, a number of suppliers of short-term credit disappear while demand increases. Other things being equal, one ought to observe an increase in interest rates, the clearing price between supply and demand. This situation naturally brings the market inside the bank. In one extreme version of the argument, the lender of last resort can then exercise a monopoly power and set the interest rate that maximizes revenues. However, this interpretation is dubious in the case of the Bank of England because the free provision of cash to the economy required a suspension of the Act of Peel, and this implied that “excess” profits from LLR operations would be paid to the British government, not to shareholders.⁴³ Without going that far, however, we can readily see that if the central bank does substitute fully for the foregone suppliers, one would still have an increase of the interest rate, because the demand schedule shifts to the right. The recommendation to use high rates could thus be taken as an encouragement not to “sterilize” the effect of the crisis. This interpretation would make of Bagehot’s high rates some equivalent of peak pricing in public economics.

The question however is why. An analogy with principal-agent theory, which suggests that with imperfect information, reward is proportionate to effort, may provide a clue. It is

⁴¹. A show of hand in an economics class suggested that the typical student understood the notion of “penalty” to be somehow related to the need to punish bad borrowers, and it is our impression that this notion prevails among economists. When asked about practical rules regarding how to price the rate in order to achieve this separating equilibrium, students remained silent – just like theory.

⁴². Bindseil (2004), pp. 117-128.

⁴³. Flandreau (2008).

hard to observe how badly banks have behaved. The clear announcement that, in the event of a crisis, the badly-run houses will face high cost may have a disciplinary effect. A related argument is that the penalty rates would push bad borrowers into default, while sound borrowers would manage (Martin 2009). The high rate is then a sorting device.

However, in *Lombard Street*, the “high rates” are motivated in a variety of ways, none of which squaring with the intuitions above. We identify two main uses.⁴⁴ The first, most obvious and perhaps less interesting interpretation comes in reference to Britain’s exchange rate regime – the gold standard. It is explicit and perfectly transparent in several parts of *Lombard Street*. In one often quoted part, Bagehot writes about the need for “very large loans at very high rates [being] the best remedy for the worst malady of the money market when a foreign drain is added to a domestic drain”.⁴⁵ The implication here is that a crisis-stricken gold-standard country is presumably confronted with a gold outflow. The free supply of liquidity by the central bank would create a conflict with the exchange rate regime. One would therefore need to combine generous credit to defend the banking system and high rates to defend the parity.⁴⁶ Several digressions by Bagehot dwell on this mechanism. In one place, he seems to suggest that the raising of the interest rates might be avoided, if the external drain were not taking place.⁴⁷ In other words, not all crises are twin crises.⁴⁸ If this is the justification for the higher interest rates, then the third rule is not part of the standard recipe for lending of last resort. It is part of a different toolbox, intended to deal with a current account crisis, and we can leave it to rest here. We also note that in some extreme instances, this rule could prove unworkable because high rates only make it worse for the banking system, so that the country has eventually to choose between the less of two evils (the exchange and current account crisis or the financial crisis).

⁴⁴. A third one, which is discussed in various parts, has to do with the need that the bank rate be located above the market rate, as already indicated, and in this sense is “higher”. We shall not devote time to this matter.

⁴⁵. Bagehot (1873), II.48.

⁴⁶. This interpretation is consistent with a number of earlier papers including Humphrey (1975), Humphrey and Keleher (1984), and Martin (2009).

⁴⁷. Bagehot (1873), II.38-47.

⁴⁸. Similarly, the Bank of England Memorandum already quoted suggested that credit rationing was a policy whose “course appears to have been taken as one of the measures for securing the convertibility of the Bank Notes”.

The second interpretation for the high rates we find in *Lombard Street* opens interesting perspectives. While Bagehot generally repeats his favorite themes, this discussion only comes up once.⁴⁹ Moreover, the argument itself balances between two possible logics, and the formulation is not transparent. It is better to quote Bagehot entirely, without any editing or additions:

“First. That these loans should only be made at a very high interest rate. This will operate as a heavy fine on unreasonable timidity, and will prevent the greatest number of applications by persons who do not require it. The rate should be raised early in the panic, so that the fine may be paid early; that no one may borrow out of idle precaution without paying well for it; that the banking reserve may be protected as far as possible”.⁵⁰

As seen, the notion that the banking reserve should be protected is mentioned again, but it comes along with an argument about taxing timidity that relies explicitly on a hypothesized asymmetry of information. However, the asymmetry of information Bagehot has in mind is not about the difficulty for the central bank to know who is sound and who is not. It is about preventing that the not needy gets the fund. The resulting “fine” (a concept that gets as close to penalty as Bagehot ever was) is imposed not on the weak bank but on the defiant lender, and is therefore tantamount to a tax on those responsible for the liquidity squeeze. The “punishing” ingredient involved, therefore, has to do with correcting the behavior of those who have ample resources but withdraw them from the market. The Bank is substituting for a supply that ought not to have disappeared, and the high rates of interest are an indication that the arrangement cannot last. In other words, by raising the opportunity cost of not lending, the central bank encourages a revival of the inter-bank market and signals its unwillingness to be the market maker of last resort.⁵¹

Some technical background elements reinforced this situation. One is that bankers balances at the Bank of England substituted against deposits at the Clearing House and thus provided a safe alternative to inter-bank lending and clearing. Banks could hold on to their bills, seek cash by parking good securities with the Bank of England, sell to the Bank

⁴⁹. Bagehot (1873), VII.58. It is not really echoed in other parts of the book, nor is it discussed again later.

⁵⁰. Bagehot (1873), VII.58.

⁵¹. Anecdotically, this point was one where Bagehot and Hankey were in full agreement: see Hankey (1869), pp. 27-29.

any surplus bills they would have. This flight to safety would manifest itself through a liquidity squeeze. However, since the Bank of England did not pay interest on its deposits, this insurance came at a price and this price was controlled by the Bank. The opportunity cost of withdrawing balances from the market would be essentially the bank rate. On the other hand, the Bank itself could profitably recycle its deposits by lending generously. In the end, the use of high interest rates, which Bagehot insisted had to be used very early on, provided monetary authorities with a powerful tool to encourage banks to give up excessive timidity, and to prevent the complete collapse of inter-bank lending.

The high rate was really a penalty on those who stopped lending, and there would always be a rate high enough to make lending profitable even in a risky environment, forcing inter-bank lending to resume. On the other hand, the generous lending on good collateral ensured that long-term rates would remain unaffected by the crisis, thus preventing an increase in the cost of credit for all “real side” economic purposes.

This conclusion and interpretation of Bagehot’s third rule calls for a comparison with modern issues. In the current crisis, some observers have expressed concerns that low interest rates set by the Bank of England combined with its new policy of paying interest on banks’ deposits have done little to resuscitate the moribund money market. This has led them to recommend that the Bank should stop paying interest rate on its accounts.⁵² There are obvious reasons for resisting the temptation to give advice on the basis of historical evidence. Yet for the same reasons why the anachronistic use of economic concepts to understand the past can be creative, the anachronistic use of history can be theoretically inspiring. The implication from this, therefore, would be that, if modern authorities had wanted to follow Bagehot’s advice, they would have lent on good collateral only at penalty rates, instead of lending at very low rates on what some observers described as poor-quality

⁵² . Tim Congdon and Brandon Davies argued, in an article entitled “A Simple Plan to Unclog the Interbank Market” published in the *Financial Times* (22 October 2008), that “another contrast with the historical norm is that since 2006, UK banks have received interest on their balances at the central bank. For more than 300 years from its founding in 1694 the Bank had resisted paying interest on such balances [...] for each bank it is indeed true that the payment of interest on cash balances is good for profit. But a case can be made that the earning of these profits, which are in any case trivial relative to total profits, has undermined liquidity in the interbank market. The point is that if a particular bank's treasury executives know that interest can be earned in a balance at the central bank they are under less pressure to lend out that cash to other banks.”

financial products. Would that have worked? In the unlikely case economists ended up reading these pages, they should let us know.

Conclusions

This paper has reviewed the early formation of LLR operations at a time when modern ideas got shaped. As we indicated in the introduction, the matter may have interest for historians of economic thought, economic historians, macroeconomists, theorists and policymakers.

For historians of thought, our paper suggests that a lot of the Bagehotian wisdom articulated in *Lombard Street* was really a reflection of ideas and thoughts that had matured in the previous quarter of a century, in large part in response to the crisis of 1847 – during which the Bank of England had relied on credit rationing.

For economic historians, the analysis above shows that during the 1850s and 1860s the Bank of England (and some other prominent central banks such as the Bank of France) were on a learning curve and began to implement LLR lending along lines that anticipated on Bagehot's teachings. To macroeconomists, our study provides evidence of the strong effect that the development of LLR operations had on the stability of the price of “good collaterals”, as often hypothesized but not so often actually shown. While government debt and similar assets used to be the object of fire sales and their price thus highly volatile, they became steady and a source of stability in the financial system owing to the emergence of modern lending of last resort operations.

For theoreticians, our article presents a challenge and a puzzle. The challenge is to provide a model that would prove or disprove this following. We found that one possible rationalization of Bagehot's emphasis on high rates (consistent with both his writings and the empirical evidence of the time) is that the central bank ought to restore the normal functioning of the market by punishing agents who seek safety in holding their reserves at the central bank rather than lending them to the market. The intuition is that, given that balances with the central bank do not pay any interest, there must exist a threshold discount rate at which banks are led to resume lending. And since at the same time the Bank keeps lending on “good collateral” the incidence of this policy on the cost of credit,

better captured by the yields of long-term bonds, is moderate. We suggested that if this is true, then central banks have been erring on the wrong side of Bagehot's teaching during the recent subprime crisis.

We also uncovered a puzzle. Far from encouraging moral hazard, we saw that the development of LLR operations was accompanied by a quasi-complete disappearance of delinquent accounts at the Bank of England. We suggested that this may be rationalized in reference to greater guarantees that central banks took at the same time they started adopting more generous lending patterns. This important finding (it means that in the real world, lending of last resort and moral hazard are different subject matters) implies that something is missing in the modern theoretical literature.

References

Acharya, Viral V., Denis Gromb, and Tanju Yorulmazer (2008), "Imperfect Competition in the Interbank Market for Liquidity as a Rationale for Central Banking", manuscript.

Allen, Franklyn, and Gale Douglas (1998), "Optimal Financial Crises", *Journal of Finance* 53(4), pp. 1245-1284.

Andolfatto, David, Ed Nosal, and Neil Wallace (2007), "The Role of Independence in the Diamond-Dybvig Green-Lin Model", *Journal of Economic Theory* 137(1), pp. 709-715.

Antinolfi, Gaetano, Elisabeth Huybens, and Todd Keister (2001), "Monetary Stability and Liquidity Crises: The Role of the Lender of Last Resort", *Journal of Economic Theory* 99(1-2), pp. 187-219.

Bagehot, Walter (1873), *Lombard Street: A Description of the Money Market* (references are given to the online version: <http://www.econlib.org/library/Bagehot/bagLom.html>).

Bindseil, Ulrich (2004), *Monetary Policy Implementation*, Oxford: Oxford University Press.

Bordo, Michael D. (1990), "The Lender of Last Resort: Alternative Views and Historical Experience", *Federal Reserve Bank of Richmond Economic Review*, January/February, pp. 18-29.

Champ, Bruce, Bruce D. Smith, and Stephen D. Williamson (1996), "Currency Elasticity and Banking Panics: Theory and Evidence", *The Canadian Journal of Economics* 29(4), pp. 828-864.

Chari, V.V., and Ravi Jagannathan (1988), "Banking Panics, Information, and Rational Expectations Equilibrium", *Journal of Finance* 43(3), pp. 749-763.

Chatziioannou, Maria-Christina, and Gelina Harlaftis (2007), "From the Levant to the City of London: Mercantile Credit in the Greek International Commercial Networks of the 18th and 19th Centuries", in Philip L. Cottrell, Even Lange and Ulf Olsson (eds.), *Centres and Peripheries in Banking: The Historical Development of Financial Markets*, Aldershot: Ashgate, pp. 13-40.

Cooper, Russel, and Thomas W. Ross (1998), "Bank Runs: Liquidity Costs and Investment Distortions", *Journal of Monetary Economics* 41(1), pp. 27-38.

Collins, Michael (1992), "The Bank of England as Lender of Last Resort, 1857-1878", *Economic History Review* 45(1), pp. 145-153.

Diamond, Douglas W., and Philip H. Dybvig (1983), "Bank Runs, Deposit Insurance, and Liquidity", *Journal of Political Economy* 91(3), pp. 401-419.

Fetter, Frank W. (1965), *Development of British Monetary Orthodoxy, 1797-1875*, Oxford: Oxford University Press.

Flandreau, Marc (2004), *The Glitter of Gold: France, Bimetallism and the Emergence of the International Gold Standard, 1848-1873*, Oxford: Oxford University Press.

Flandreau, Marc (2008), "Pillars of Globalization: A History of Monetary Policy Targets, 1797-1997", in Andreas Beyer and Lucrezia Reichlin (eds.), *The Role of Money: Money and Monetary Policy in the 21st Century*, Frankfurt-am-Main: European Central Bank, pp. 208-243.

Flandreau, Marc, Christophe Galimard, Clemens Jobst, and Pilar Nogués Marco (2008), "The Bell Jar: Commercial Interest Rates between Two Revolutions, 1688-1789", in Jeremy Atack and Larry Neal (eds.), *The Origins and Development of Financial Markets and Institutions*, Cambridge: Cambridge University Press, pp. 161-208.

Freeman, Scott (1996), "The Payments System, Liquidity, and Rediscounting", *American Economic Review* 86(5), pp. 1126-1138.

Freixas, Xavier, Curzio Giannini, Glen Hoggarth, and Farouk Soussa (1999), "Lender of Last Resort: A Review of Literature", *Financial Stability Review*, November, pp. 151-167.

Freixas, Xavier, Bruno M. Parigi, and Jean-Charles Rochet (2004), "The Lender of Last Resort: A Twenty-First Century Approach", *Journal of the European Economic Association* 2(6), pp. 1085-1115.

Friedman, Milton, and Anna J. Schwartz (1963), *A Monetary History of the United States, 1867-1960*, Princeton: Princeton University Press.

Gilbart, James W. (1856), *A Practical Treatise on Banking*, 6th ed., London: Longman Brown Green and Longmans.

Goodhart, Charles E. A. (1987), "Why Do Banks Need a Central Bank?", *Oxford Economic Review* 39(1), pp. 75-89.

Goodhart, Charles A. E. (1988), *The Evolution of Central Banks*, Cambridge (Mass.): MIT Press.

Goodhart, Charles A. E. (1999), "Myths about the Lender of Last Resort", *International Finance* 2(3), pp. 339-360.

Goodfriend, Marvin, and Robert G. King (1988). "Financial Deregulation, Monetary Policy, and Central Banking", in William S. Haraf and Rose M. Kushmeider (eds.), *Restructuring Banking and Financial Services in America*, Washington DC: Lanham, pp. 216-253.

Gorton, Gary (1988), "Banking Panics and Business Cycles", *Oxford Economic Papers* 40(4), pp. 751-781.

Gorton, Gary, and Lixin Huang (2003), "Banking Panics and the Origin of Central Banking", in David E. Altig and Bruce D. Smith (eds.), *Evolution and Procedures of Central Banking*, Cambridge: Cambridge University Press, pp. 181-219.

Gorton, Gary, and Lixin Huang (2006), "Bank Panics and the Endogeneity of Central Banking", *Journal of Monetary Economics* 53(7), pp. 1613-1629.

Gorton, Gary (2008), "The Panic of 2007," in *Maintaining Stability in a Changing Financial System*, Proceedings of the 2008 Jackson Hole Conference, Fed. Reserve Bank of Kansas City, forthcoming.

- Green, John H. (1997), "Repurchase Agreements: Advantages and Implementation Issues", IMF Monetary and Exchange Affairs Department Operational Paper 97/03.
- Green, Edward J., and Ping Lin (2003), "Implementing Efficient Allocations in a Model of Financial Intermediation", *Journal of Economic Theory* 109(1), pp. 1-23.
- Hankey, Thomson (1867), *The Principles of Banking, Its Utility and Economy: With Remarks on the Working and Management of the Bank of England*, London: Effingham Wilson.
- Haupt, Ottomar (1894), *Arbitrages et Parités*, 8th ed., Paris: Truchy.
- Humphrey, Thomas M. (1975), "The Classical Concept of the Lender of Last Resort", *Federal Reserve Bank of Richmond Economic Review*, January/February, pp. 2-9.
- Humphrey, Thomas M., and Robert E. Keleher (1984), "The Lender of Last Resort: A Historical Perspective", *Cato Journal* 4(1), pp. 275-321.
- Jacklin, Charles J., and Sudipto Bhattacharya (1988), "Distinguishing Panics and Information-Based Bank Runs: Welfare and Policy Implications", *Journal of Political Economy* 96(3), pp. 568-592.
- Kaufman, George G. (1991), "Lender of Last Resort: A Contemporary Perspective", *Journal of Financial Services Research* 5(2), pp. 95-110.
- King, W. T. C. (1936), *History of the London Discount Market*, London: Routledge.
- Martin, Antoine (2006), "Liquidity Provision vs. Deposit Insurance: Preventing Bank Panics without Moral Hazard", *Economic Theory* 28(1), pp. 197-211.
- Martin, Antoine (2009), "Reconciling Bagehot and the Fed's Response to September 11", *Journal of Money, Credit and Banking* 41(2-3), pp. 397-415.
- Nishimura, Shizuya (1995), "The French Provincial Banks, the Banque de France, and Bill Finance, 1890-1913", *Economic History Review* 48(3), pp. 536-554.
- Postlewaite, Andrew, and Xavier Vives (1987), "Bank Runs as an Equilibrium Phenomenon", *Journal of Political Economy* 95(3), pp. 485-491.
- Plessis, Alain (1998), *Histoires de la Banque de France*, Paris: Albin Michel.
- Repullo, Rafael (2000), "Who Should Act as a Lender of Last Resort? An Incomplete Contracts Model", *Journal of Money, Credit and Banking* 32(3), pp. 580-605.
- Rochet, Jean-Charles, and Xavier Vives (2004), "Coordination Failures and the Lender of Last Resort: Was Bagehot Right after All?", *Journal of the European Economic Association* 2(6), pp. 1116-1147.
- Rouilleau, Gaston (1914), *Les règlements par effets de commerce en France et à l'étranger*, Paris : Société de Statistique de Paris.
- Schwartz, Anna J. (1992), "The Misuse of the Fed's Discount Window", *Federal Reserve Bank of St. Louis Review*, September/October, pp. 58-69.
- Seyd, Ernest (1868), *Bullion and Foreign Exchanges Theoretically and Practically Considered*, London: Effingham Wilson.
- Sheng, Andrew (1991), "Role of the Central Bank in Banking Crisis: An Overview", in Patrick Downes and Reza Vaez-Zadeh (eds.), *The Evolving Role of Central Banks*, Washington DC: International Monetary Fund, pp. 193-217.
- Sleet, Christopher, and Bruce D. Smith (2000), "Deposit Insurance and Lender-of-Last-Resort Functions", *Journal of Money, Credit and Banking* 32(3), pp. 518-575.
- Summers, Bruce J. (1991), "Clearing and Payment Systems: The Central Bank's Role", in Patrick Downes and Reza Vaez-Zadeh (eds.), *The Evolving Role of Central Banks*, Washington DC: International Monetary Fund, pp. 30-45.

Svensson, Lars E. O. (2006), "Social Value of Public Information: Comment: Morris and Shin (2002) is actually Pro-Transparency, Not Con", *American Economic Review* 96(1), pp. 448-452.

Vitu, Auguste (1864), *Guide financier: Répertoire général des valeurs financières et industrielles cotées sur les bourses françaises et sur les principaux marchés de l'Europe, de l'Amérique et des Indes*, Paris: Hachette.

Wallace, Neil (1988), "Another Attempt to Explain an Illiquid Banking System: The Diamond and Dybvig Model with Sequential Service Taken Seriously", *Federal Reserve Bank of Minneapolis Quarterly Review* 12, pp. 3-16.

Williamson, Stephen D. (1998), "Discount Window Lending and Deposit Insurance", *Review of Economic Dynamics* 1(1), pp. 246-275.

Williamson, Stephen D. (2004), "Limited Participation, Private Money, and Credit in a Spatial Model of Money", *Economic Theory* 24(4), pp. 857-875.

Withers, Hartley (1909), *The Meaning of Money*, London: Smith Elder & Co.

Ziegler, Dieter (1990), *Central Banking, Peripheral Industry: The Bank of England in the Provinces, 1826-1913*, Leicester: Leicester University Press.

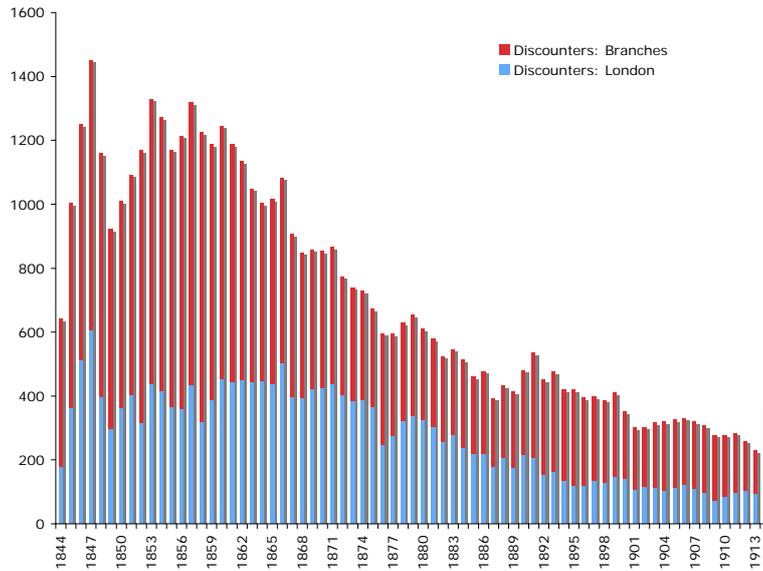
Table 1: Interest rates and maximum maturities at the Bank of France, 1800-1863

8. Variations de l'escompte.

Années.	Jours.	Mois.	Echéances.	Escomptes.	Années.	Jours.	Mois.	Echéances.	Escomptes.
VIII	20	ventôs.	60 jours.	6 1/2				90 jours.	10 1/2
XI	5	vend.	75 —	6 1/2	1857	11	novem.	60 —	9 1/2
1806	—	—	80 —	5 1/2				30 —	8 1/2
"	14	décem.	90 —	5 1/2	"	26	novem.	60 —	8 1/2
1807	—	—	90 —	4 1/2				30 —	7 1/2
1813	29	avril.	60 —	4 1/2	"	7	décem.	90 —	8 1/2
"	2	décem.	75 —	4 1/2	"	21	décem.	90 —	6 1/2
1814	6	janvier.	90 —	5 1/2	"	29	"	90 —	5 1/2
1816	7	novem.	75 —	5 1/2	1858	6	février.	90 —	4 1/2
1817	16	janvier.	60 —	5 1/2	"	18	"	90 —	4 1/2
1818	15	octobr.	60 —	5 1/2	"	16	juin.	90 —	3 1/2
"	29	"	45 —	5 1/2	1859	23	septem.	90 —	3 1/2
"	12	novem.	60 —	5 1/2	"	3	mai.	90 —	4 1/2
"	19	"	70 —	5 1/2	1860	5	août.	90 —	3 1/2
"	3	décem.	75 —	5 1/2	1861	12	novem.	90 —	4 1/2
1820	17	"	90 —	5 1/2	1861	2	janvier.	90 —	5 1/2
1847	—	—	90 —	4 1/2	"	8	"	90 —	7 1/2
"	—	janvier.	90 —	5 1/2	"	14	mars.	90 —	6 1/2
"	—	décem.	90 —	4 1/2	"	21	"	90 —	5 1/2
1852	—	mars.	90 —	3 1/2	"	26	septem.	90 —	5 1/2
1853	7	octobr.	90 —	4 1/2	"	1	octobr.	90 —	6 1/2
1854	20	janvier.	90 —	5 1/2	"	22	novem.	90 —	5 1/2
"	12	mai.	90 —	4 1/2	1882	21	janvier.	90 —	4 1/2
1855	4	octobr.	75 —	5 1/2	"	6	février.	90 —	4 1/2
"	18	"	75 —	6 1/2	"	27	mars.	90 —	3 1/2
1856	14	février.	90 —	6 1/2	"	6	novem.	90 —	4 1/2
"	1	août.	90 —	5 1/2	1883	28	janvier.	90 —	5 1/2
"	25	septem.	90 —	6 1/2	"	12	mars.	90 —	4 1/2
"	13	octobr.	60 —	6 1/2	"	26	"	90 —	4 1/2
"	25	decem.	75 —	6 1/2	"	7	mal.	90 —	4 1/2
1837	27	février.	90 —	6 1/2					
"	27	juin.	90 —	5 1/2					
"	13	octobr.	60 —	6 1/2					
"	21	"	90 —	7 1/2					

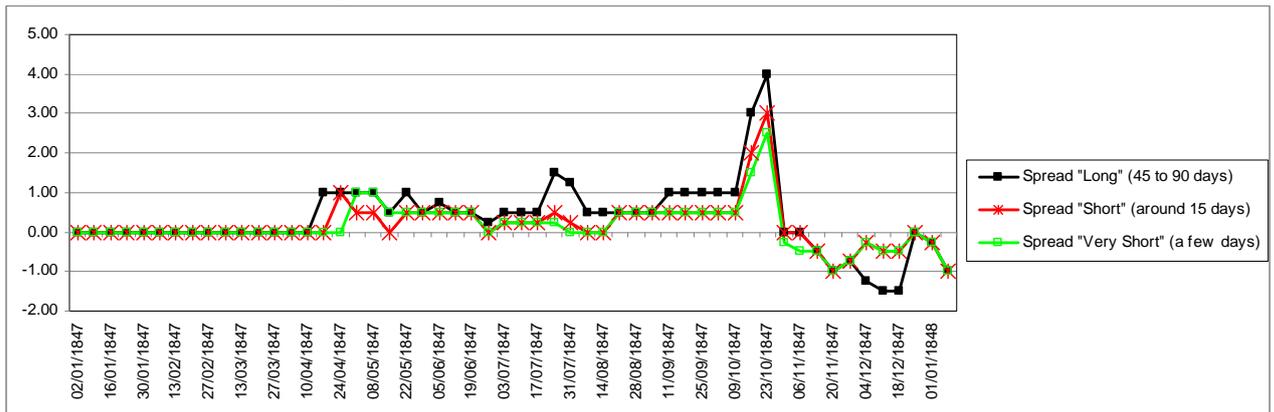
Source: Vitu (1864), p. 305.

Figure 1. Number of discounters at the Bank of England



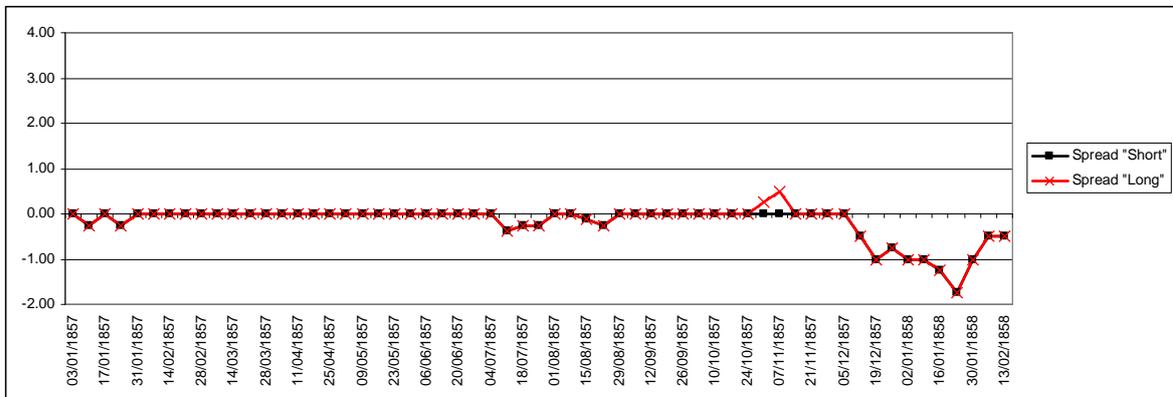
Source: Bank of England Archive, C30/3

Figure 2a. Credit rationing and the crisis of 1847



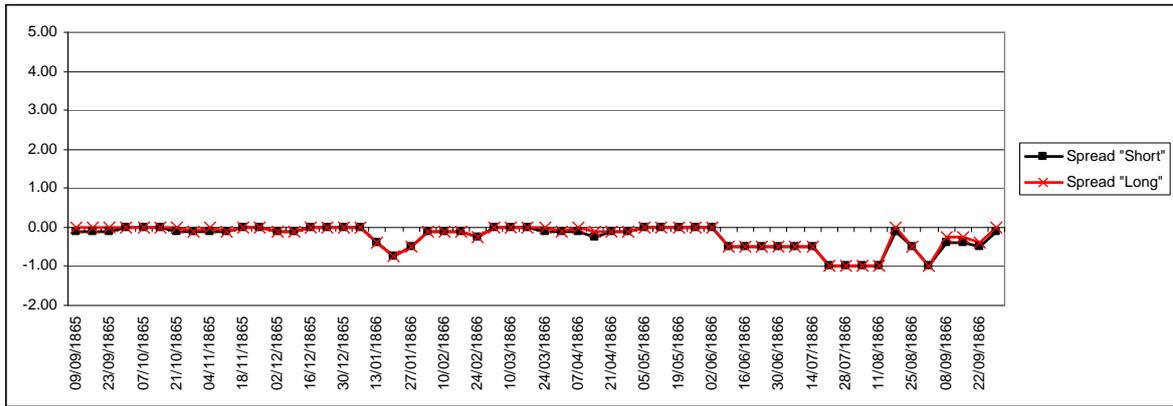
Source: Authors, from *The Economist*.

Figure 2b. Credit rationing and the crisis of 1857



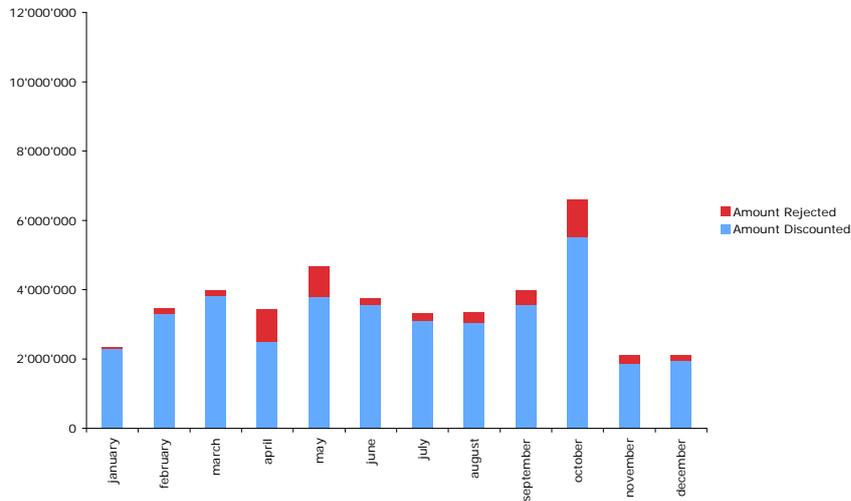
Source: Authors, from *The Economist*.

Figure 2c. Credit rationing and the crisis of 1866



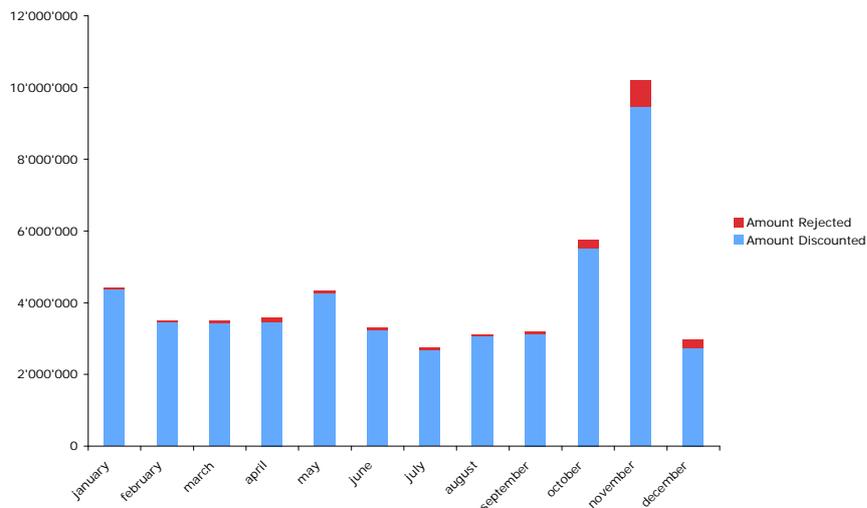
Source: Authors, from *The Economist*.

Figure 3a. Monthly totals for bills discounted and rejected: 1847



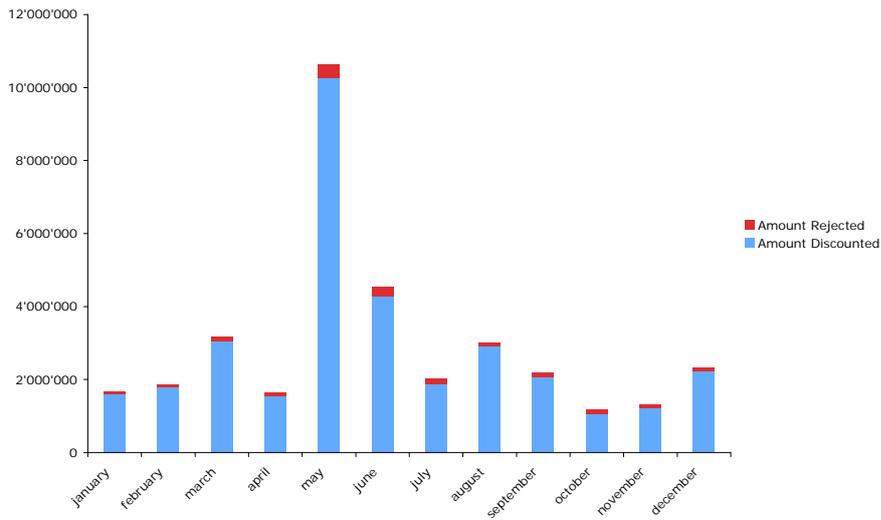
Source: Authors' computations, Bank of England Archive, C28/7

Figure 3b. Monthly totals for bills discounted and rejected: 1857



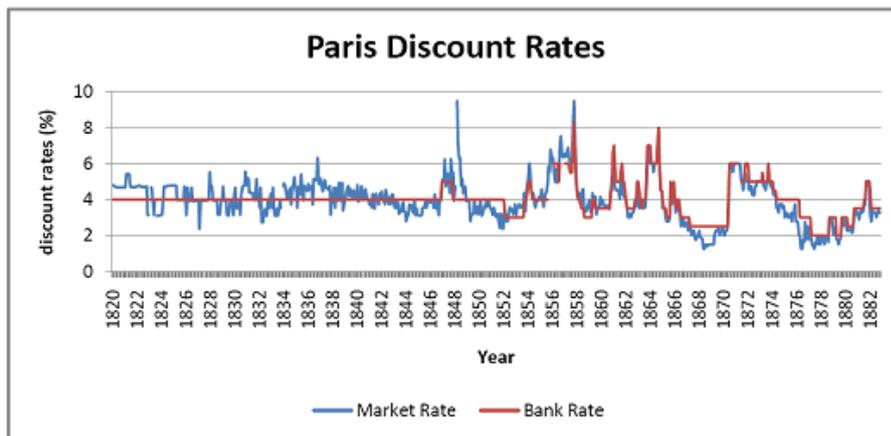
Source: Authors' computations, Bank of England Archive, C28/17

Figure 3c. Monthly totals for bills discounted and rejected: 1866



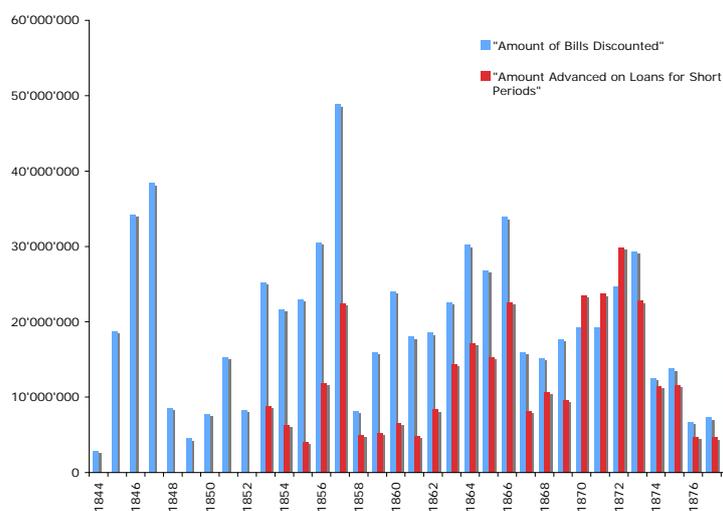
Source: Authors' computations, Bank of England Archive, C28/26

Figure 4: Market and bank rates in Paris, 1820-1882



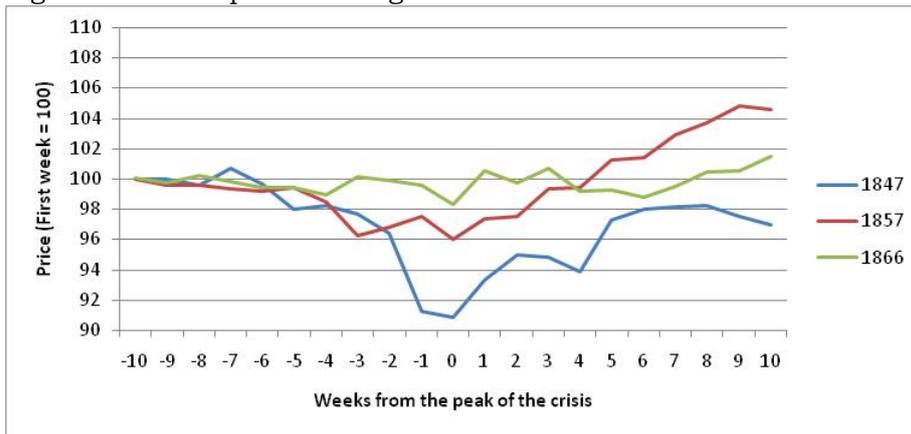
Source: Authors' computations on a variety of sources.

Figure 5. Bills discounted and advances for short periods



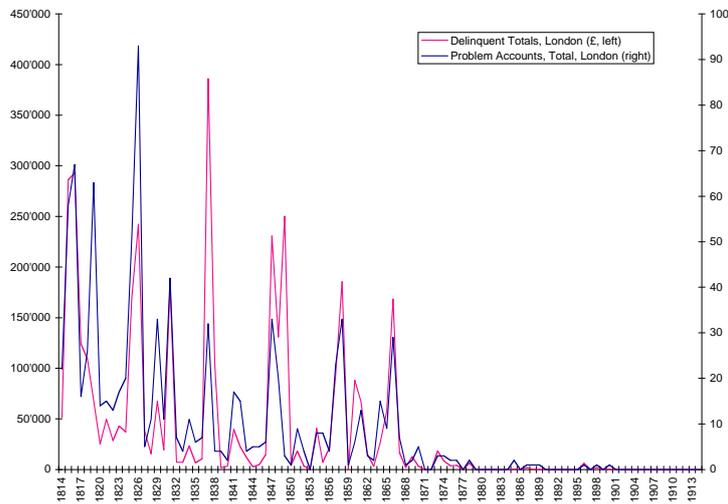
Source: Authors' from Bank of England Archive C30/3, "Amounts advanced for short periods" (pre-1853 not available).

Figure 6: Consol prices during three crises



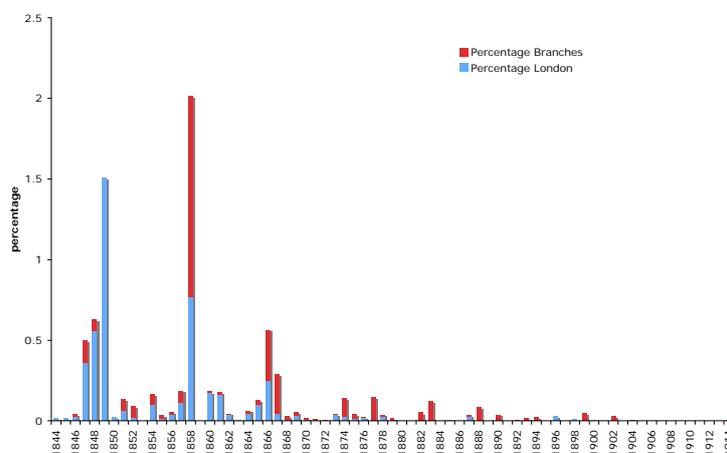
Source: Authors, from *The Economist*. Note: Peak of the crisis: week before Peel's Act suspension.

Figure 7. Delinquent accounts and amounts in London, 1814-1914



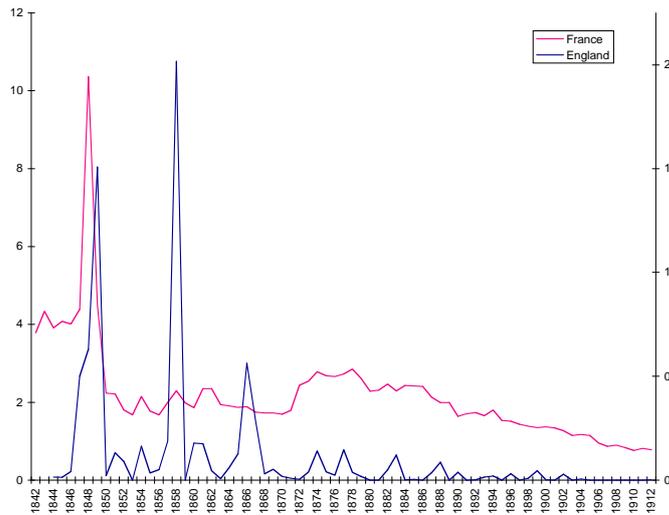
Source: Bank of England Archive, C 34/4.

Figure 8. Delinquent amounts: London and Branches (% of total discounts), 1844-1914



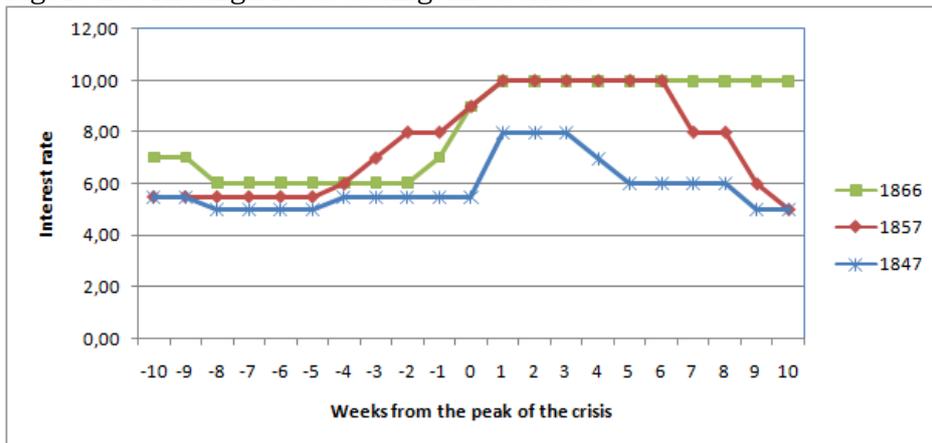
Source: Bank of England Archive, C 30/3, C 33/5, C 34/4, and C 34/5

Figure 9. Amounts at risk (% of discounted bills), 1842-1914



Source: Authors, from same sources as in Figure 7 and 8 (England) and Roulleau (1914) (France).

Figure 10. The high rates during three crises



Source: Authors, from *The Economist*.