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Bagehot for beginners: the making of lender-of-last-resort operations in the mid-nineteenth century[1]

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In this article we develop new tools to survey the development of lending-of-last-resort operations in the mid-nineteenth century. One finding 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 is that the extension of the Bank of England's lender-of-last-resort function went along with a reduction of its exposure to default risks, in contrast with accounts that have associated lending of last resort with moral hazard. Finally, we provide a new interpretation of the 'high rates' advocated by Bagehot. We suggest they were meant to prevent banks from free-riding on the safety offered by the central bank, and were aimed at forcing them to keep lending during crises so as to maintain a critical degree of liquidity in the money market.

The recent sub-prime crisis, described by some observers as a run on banks that manifested itself as a liquidity crisis, has aroused renewed interest in Bagehot's famous rules, which are encapsulated in a set of principles for successful lending-of-last-resort operations.[2] These principles were described in Walter 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. 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. The problems of the nineteenth-century money market were not unlike those of today. This market was a place where banks traded short-term debt obligations, then known as 'bills' and originating in either commercial or financial transactions. Banks sold their certification of the bills for a fee, and this made them liable for payment. Vast amounts of such securities were exchanged during normal times, but the market froze during panics. A triggering

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[2] Gorton, 'Panic', pp. 2–3.

factor may have been doubts cast upon the quality of banks' assets, which occurred during commodity price crashes (in 1866, for instance, the collapse of the price of cotton raised doubts about some agents' ability to repay their debts). 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 spiralled down in a desperate attempt to bottom out.

Like earlier writers in the *Economist*, Bagehot felt that such emergencies called for the creation of a mechanism that 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, which is now accepted by economic historians,[3] upset top Bank of England officials. Thomson Hankey (a Bank director and former governor) countered that, should a policy like that ever be acknowledged, the world would fall apart in an orgy of moral hazard.[4] The exchange has come to be seen among economic historians and historians of economic thought as the mother of all controversies on the challenges of lending of last resort, 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, which were undertaken at high interest rates. He never formally distinguished between these principles, and he never said there were three. But subsequent commentators have enshrined this idea by distinguishing among three principles: 'free lending', use of 'good collateral' only, and reliance on 'penalty rates'—wording Bagehot *never* used. As of today, the significance of Bagehot's ideas is still disputed. There has been and still is discussion on the meaning of free lending, good collateral, and high rates.

Bagehot's work can be assessed in different ways that are not mutually exclusive. His theory can be discussed with respect to the wording and language actually used in *Lombard Street* and previous articles published by the *Economist*, to infer what the author had in mind, as historians of economic ideas do. 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 universe(s) support Bagehot's recommendations, as theoreticians do.[5] Finally, it can be discussed with respect to actual policies and actions that prevailed at the time Bagehot wrote. The latter is the approach privileged by economic historians, but economists interested in hypothesis testing and empirical assessment of the performance of lending-of-last-resort operations should also prefer our approach.

Previous studies of central banks' behaviour during the era when lending-of-last-resort policies were shaped usually start with historical doctrines, and use them to interpret archival evidence. They focus on a number of important qualitative features. With respect to the Bank of England, previous scholars have analysed the contributing role of important policy doctrines (Banking vs. Cur-

[3] Sayers, *Bank of England*, p. 1, acknowledges that 'when Bagehot wrote *Lombard Street* in 1873 . . . [t]he Bank had in fact, though not explicitly, accepted its position as the ultimate source of cash in a crisis'.

[4] Hankey, *Principles*, pp. 25–38; Bagehot, *Lombard Street*, pp. 168–87.

[5] We prefer 'subsequent' to 'modern' because, by definition, modern theories always change.

rency School), institutional changes (the adoption of the gold standard in 1821, and the Bank Charter Act of 1844), debates among bank directors, policy tools, and constraints.[6] A controversial matter is the precise timing of the Bank's acknowledgement of its wider 'public responsibilities' for maintaining money market stability. Collins argues that in the 1830s, a debate about 'public interest' caused a rift among Bank directors.[7] There is consensus among economic historians that by 1873 the need for the Bank of England to support the market in periods of crises was well recognized, and that the subsequent era marks the heyday of British monetary orthodoxy.[8]

In this article our guiding thread is Bagehot's principles, which we seek to translate into quantitative indicators of policy behaviour. Specifically, we have gathered primary and secondary material bearing upon the issue of lending of last resort as it presented itself around the mid-nineteenth century. Working with both the teachings of Bagehot and modern theory on the one hand, and with the actual experience of two leading central banks of the time (the Bank of England and the Bank of France) on the other, we provide a picture of crisis management in the era of Bagehot. Our goal is narrowly positive: we seek to trace, with the help of novel statistical data, the incorporation of Bagehot's rules into the practice of crisis management, focusing on the succession of financial emergencies that hit the monetary and financial systems of the two countries around the mid-nineteenth century.[9] We are not the first to remark that lending-of-last-resort policy developed de facto before Bagehot,[10] but the novelty of this article is that we use modern theoretical concepts to identify relevant tests of central banks' behaviour, we relate our findings explicitly to Bagehot's rules, and we report findings that suggest that the principles encapsulated in *Lombard Street* were not unknown on the other side of the Channel either. The use of these more precise concepts and measurement, we believe, can go a long way towards improving 'classic' narratives and their occasionally frustrating lack of precision.[11]

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 find, 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 is legitimate, supports the notion of a pan-European transformation. This similarity is intriguing and suggests that at one broad level, the development of lending-of-last-resort operations does not owe much to country-specific factors,

[6] Morier Evans, *Commercial crisis*; Sayers, *Bank of England*; Wood, *English theories*; Morgan, 'Railway investment'; Clapham, *Bank*; Mints, *History*; Matthews, *Study*; Fetter, *Development*; Goodhart, *Evolution*; Hughes, *Fluctuations*. See also the four parliamentary inquiries into the crises of 1847 and 1857: *Secret Committee on the Causes* (P.P. 1847–8), *Secret Committee of the House of Lords* (P.P. 1847–8), *S.C. on the Operation of the Bank Act* (P.P. 1857), and *S.C. on the Operation . . . and Causes* (P.P. 1857–8).

[7] Collins, 'Langton papers', p. 59.

[8] Sayers, *Bank of England*; Fetter, *Development*.

[9] Focus on long-run trends in crisis management does abstract from short-term fluctuations in policy views and controversies on the principles of crisis lending. For instance, King, *History*, pp. 193–216, devotes a long discussion to controversies over crisis policy reversals after 1858, eventually laid to rest in the midst of the 1866 crisis.

[10] Sayers, *Bank of England*; Collins, 'Lender of last resort'.

[11] For instance, compare King, *History*, p. 166, with the findings summarized in this article.

nor to specific exchange rate regimes such as the one that was in place in Britain from 1821. Our findings suggest that the gold standard and the Act of Peel may have less to do with the transformation we observe than earlier research has suggested.

Second, we find that, contrary to a popular view 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. We explain it by noting that the extension of liquidity support was not accompanied by the relaxation of prudential standards—much to the contrary. Using material from the Bank of England Archive, we discover that at the time when lending-of-last-resort policies emerged, there was a decreasing quantity of problem bills, suggesting that standards were being tightened, rather than relaxed. The standard criticism of Bagehot's rule as an encouragement to rogue behaviour is thus inadequate and misleading from a historical vantage point. We note that the making of lending-of-last-resort operations was parallel to the making of a high-quality London bill market, certified by 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 lending-of-last-resort policy—as proceeding from a robust knowledge of the operation of the money market by the central bank, and from the use of prophylactic devices during intercourse between the bank and the market—sheds a new light on the third and least 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 recently met in restoring confidence by lowering interest rates and becoming what one observer has called the 'money market makers of last resort'.[12] 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 disappear and banks are happy to let the money market 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 article is organized as follows. Section I provides a brief survey of the Bagehotian legacy in modern lending-of-last-resort theory, outlining central themes. Section II describes the historical background, outlining the operation of the money market and its relationship with the central bank in Britain in the mid-nineteenth century. Section III discusses free lending. Section IV discusses collateral. Section V discusses moral hazard. Section VI discusses penalty rates. Section VII concludes.

I

In order 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

[12] W. Buiter, 'The central bank as a market maker of last resort', *Maverecon* (http://blogs.ft.com/maverecon), 12 Aug. 2007.

resort in the literature owe a lot to the way panics arise in economic models. Diamond and Dybvig were the first to formalize the occurrence of bank runs as a possible outcome.[13] The run they imagine emerges because agents coordinate on the 'wrong' equilibrium, thus producing a self-fulfilling collapse which turns out to be rational *ex post*.[14] Some papers have criticized the underlying hypotheses of such models, showing that they are quite contingent on the set of contracts that agents are allowed to make.[15] Gorton has studied the panics of the US National Banking Era and concluded that crises were predicted by indicators of the business cycle, suggesting that self-fulfilling bank runs are empirically irrelevant.[16]

Goodhart has emphasized the role of balance-sheet mismatches—which brings more real-life insights to the analysis.[17] In his view, banks are intermediaries that use short-term nominal deposits (redeemable on demand) to finance long-term projects. Since the price of deposits is fixed, it is not possible to adjust to an asset-side shock by devaluing the liability side of the balance. Given this, depositors understand that some of them will not be reimbursed in the event of a run. Bank runs occur because the quicker agents remove deposits, the more likely they are (individually) to get their money back. But a run impacts negatively the economic welfare of those depositors who are not reimbursed and of those debtors who are 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'.[18] Economists have remarked that other institutions can fulfil the same purpose. For instance, Gorton and Huang have shown that liquidity provision during a crisis can be run by the private sector, through a coalition of banks issuing redeemable claims backed by the assets of all member banks.[19] A governmental or state-owned central bank (which neither the Bank of England nor the Bank of France was in the nineteenth century) 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 disruption of the national payment system.

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 emergency liquidity is provided. It is fair to say that the answer to these questions critically depends on the environment in which banks operate. Goodfriend and King dismiss any role for central banks in allocating funds to

[13] Diamond and Dybvig, 'Bank runs'. More recent variants include Cooper and Ross, 'Bank runs', and Green and Lin, 'Implementing'. A variant of the Diamond and Dybvig explanation of bank runs in terms of sunspots is provided by Postlewaite and Vives, 'Bank runs', introducing information asymmetry and uncertainty about the fundamentals.

[14] In this perspective, bank runs are described as a result of a 'psychological' phenomenon (sunspots), rather than poor financial management.

[15] Wallace, 'Another attempt'; Green and Lin, 'Implementing'; Andolfatto, Nosal, and Wallace, 'Role'.

[16] Gorton, 'Banking panics'. This result has been formalized in the literature on information-based bank runs: Chari and Jagannathan, 'Banking panics'; Jacklin and Bhattacharya, 'Distinguishing panics'; Allen and Gale, 'Financial crises'.

[17] Goodhart, 'Banks'.

[18] Ibid., p. 88.

[19] Gorton and Huang, 'Bank panics'. In their model, bank panics (that is, runs on deposits) are rational in that they constitute a way for uninformed depositors to monitor banks' behaviour.

illiquid banks.[20] They argue that in well-functioning financial markets, a solvent institution cannot be illiquid. They conclude that the only role for central banks is providing the *market* with the aggregate liquidity and letting the market distribute it to individual banks. In other words, open-market operations are useful, but the discount window or targeting of help to specific banks is redundant or nefarious. Yet Repullo notes that the same informational reasons which made banks' loans illiquid in aggregate can imply that one individual bank may not be able to borrow the required funds from the others.[21] This may be amplified by strategic considerations. In some situations, some participants in the money market are unwilling to lend to others, as this may weaken competitors—differently said, banks may seek to amplify other banks' liquidity problems to force their liquidation. This can arise when some assets are bank-specific, which means that the market for them is easy to manipulate.[22] Some economists have suggested that, during the sub-prime crisis, banks engaged in predatory lending.[23] Since the central bank is involved in periodic operations with the market, it is in a favourable position to monitor such behaviour.[24]

Another important issue is whether a discount window stimulates moral hazard. Martin suggests that a lender of last resort does not encourage risk taking, provided that it does not suffer from a severe informational disadvantage with respect to commercial banks' activities.[25] This result is also obtained if the central bank has priority over the assets of the banks to which it lends.

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 high rates, the theoretical literature has generally argued in favour of lending at a zero interest rate.[26] The reason is that, in models where the rationale for a lender of last resort is a coordination problem preventing commercial banks from lending to one another, the interest rate of the discount window should be sufficiently low to guarantee the continuation of liquidity provision. It is also likely that, following Friedman and Schwartz's critique of the Fed's handling of the aftermath of the 1929 stock market crash, the consensus has moved to the general notion that in the event of crises central banks should swamp the market with money.[27]

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

[20] Goodfriend and King, 'Financial deregulation'. Also see Bordo, 'Lender'; Kaufman, 'Lender'; Schwartz, 'Misuse'.

[21] Repullo, 'Lender', p. 580.

[22] V. V. Acharya, D. Gromb, and T. Yorulmazer, 'Imperfect competition in the interbank market for liquidity as a rationale for central banking', INSEAD working paper 2011/41/FIN.

[23] For instance, F. Giavazzi, 'Why does the spread between LIBOR and expected future policy rates persist, and should central banks do something about it?', Vox column, 2 June 2008, http://www.voxeu.org/index.php?q=node/1188.

[24] Rochet and Vives, 'Coordination failures'.

[25] Martin, 'Liquidity provision'.

[26] Champ, Smith, and Williamson, 'Currency elasticity'; Freeman, 'Payments system'; J. H. Green, 'Repurchase agreements: advantages and implementation issues', IMF Monetary and Exchange Affairs Department operational paper, 97/03 (1997); Allen and Gale, 'Financial crises'; Williamson, 'Discount window lending'; Antinolfi, Huybens, and Keister, 'Monetary stability'; Martin, 'Liquidity provision'; Rochet and Vives, 'Coordination failures'; Williamson, 'Limited participation'.

[27] Friedman and Schwartz, *Monetary history*.

risks, as this will increase the cost of emergency refinancing.[28] Sleet and Smith provide an example in which the central bank must set its rate at a very high level in order to compensate for the losses it may incur 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 for increased moral hazard.[29] Freixas, Parigi, and Rochet also suggest that a penalty rate can be optimal when the main source of banks' moral hazard lies in faulty *ex ante* screening of borrowers. A penalty rate reduces this kind of risk taking, as it discourages insolvent banks from appealing to refinancing facilities.[30] Finally, in a different vein, Martin shows that a penalty rate can help to allocate central banks' funds to the most needy banks, as this eliminates the incentive for sound lenders to withdraw too early from the market.[31]

II

The simplest way to understand central bank operations during the mid-nineteenth century is to start from a description of the money market. Money markets in Europe, unlike in the US, operated along common general principles. The staple instrument of these markets was the bill of exchange. 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 in the marketplace. The operation was known as 'accepting', and the prime instruments in this market were the 'acceptances'—as accepted bills were called. Leading 'merchant banks' (as modern investment banks were called in England) accepted huge amounts of bills annually in a manner that bears similarities to 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 prestigious banker, could be discounted in the market.[32]

The accepting banker bore responsibility for payment. So did all subsequent discounters (purchasers) who bought the bill from the original debtor, endorsed it, and then put it back into circulation. If the acceptor failed, endorsers were called in. In some legal systems, the holder of the bill could call in any name on the list of endorsers, leaving it up to the summoned party to recoup their claim. In others, creditors had to go by order of endorsement with the acceptor first, the last endorser second, and so on, following the chronology of endorsements in reverse.

Bills were packaged in aggregate instruments called 'parcels' that could be swapped across the market. Parcels bore the guarantee of the packer. In some

[28] Sheng, 'Role'; Summers, 'Clearing'.

[29] Sleet and Smith, 'Deposit insurance'. 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 rates is profitable, then there must be others for which it is not. The authors also provide an example in which the advantage of financing risky operations does not outweigh the cost of liquidation and foreclosure.

[30] Freixas, Parigi, and Rochet, 'Lender'.

[31] Martin, 'Reconciling Bagehot'.

[32] For a description of the workings of the nineteenth-century bill market, see, for example, Gilbart, *Practical treatise*; Seyd, *Bullion*; Withers, *Meaning*.

places, such as in England, the practice of bill broking developed. Banks needing cash and banks with a surplus of cash traded positions on a daily basis through the agency of bill brokers. Bill brokers thus lived from surplus funds from the banking system, which were taken on call and invested in parcels and bills. 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 has yet to be made.[33] Sources such as Haupt state that the prime paper, accepted by the Haute Banque (France's equivalent of London's most prestigious merchant banks), was always negotiated on favourable terms and found ready buyers.[34]

To a not inconsiderable extent, central bank operations were not significantly different from those of other regular commercial banks.[35] 'Banks of issue', as they were initially known (that is, privileged banks with a more or less exclusive right to issue and circulate bank notes), became involved in both originating (accepting) and discounting (purchasing) bills.[36] Towards the middle of the nineteenth 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 the Bank of England's 'discount accounts' active around 1850, one finds such names as 'Blackwell, publishers'.[37] Some authors argue that as time passed, the activity of banks of issue became more focused on financial intermediaries. Several central banks retained substantial commercial activities and some (such as the Bank of France or the Austro-Hungarian Bank) even expanded it, creating more branches.[38] The commercial activities of central banks must be separated from their crisis lending. Sayers explains that from 1878 onwards the Bank declared itself not bound to adhere to its official rate when discounting fine bills for its regular customers, and started commercial ('normal times') discounting below the 'Bank rate'—which thus became the rate at which the Bank would 'help the market in a crisis'.[39]

Figure 1 shows the evolution of the number of discounters at the Bank of England between 1844 and 1914.[40] After an initial increase (the number of discounters reached a peak of more than 1400 in 1847), figures began to decline steadily—they were below 400 after 1900. Pending the construction of rigorous statistics for the demographics of the Bank of England's discounters, we get a sense

[33] Haupt, *Arbitrages*, states that towards the late nineteenth century bill brokers in Paris were used as intermediaries to trade parcels across banks in an over-the-counter inter-bank market.

[34] Haupt, *Arbitrages.*

[35] Goodhart, *Evolution*, pp. 37–46.

[36] Plessis, *Histoires*.

[37] Bank of England Archive (hereafter BofEA), C29/13, 'Rating book, showing each discounter's credit limit'. More generally, see C29/11 to 18 for 1827, 1845, 1850, 1856, 1860, 1874, and 1882, the latter being updated until the 1920s.

[38] Jobst, 'Gouverner'.

[39] Sayers, *Bank of England*, p. 4. See also King, *History*, pp. 291–6. BofEA, C30/3 provides statistics on discounts below the bank rate.

[40] BofEA, C30/3. The source is silent as to the precise significance of this concept and as to how much it may differ from the number of customers that actually borrowed from the Bank (as in fact many accounts were dormant). In principle, however, the two notions should be related to one another.

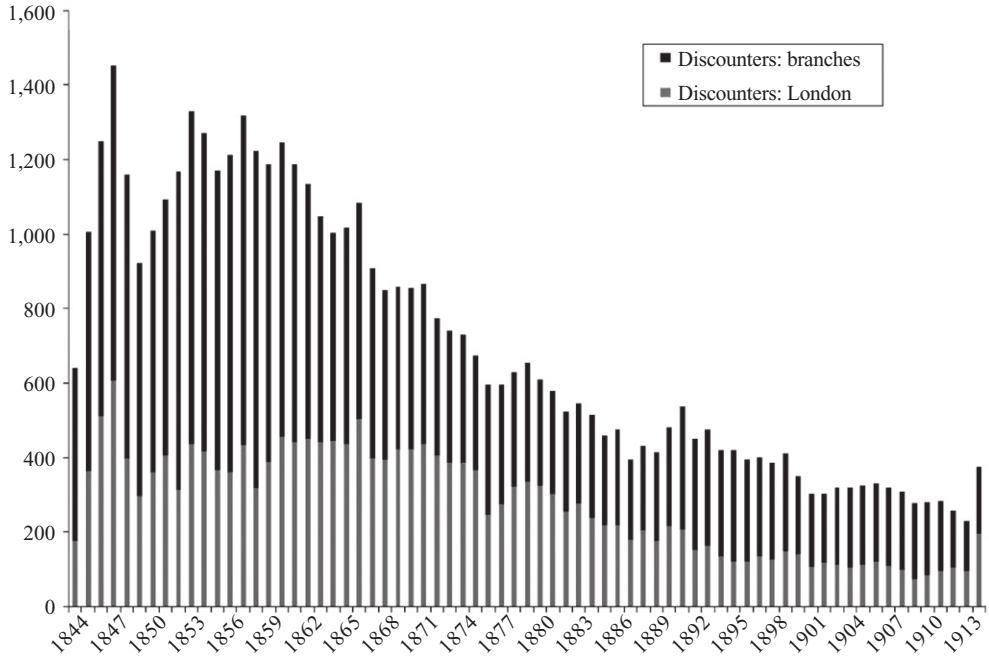

Figure 1. *Number of discounters at the Bank of England*
Source: BofEA, C30/3.

of what was going on by leafing through the ledgers. 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 evolution of the Bank of England towards dealing with specialist intermediaries.

The discounting of bills was an outright purchase in the market. If the bill was paid at maturity, there were no more interactions between the holder and the discounter, previous endorsers, or the primary debtor. Only when a bill was returned unpaid from the acceptor did the holder turn to the other intermediaries—first and foremost, the discounter. Thus bill discounting was 'secured' by the credit of the acceptor *and* the discounter. As a result, the credit of the discounter was subjected to severe scrutiny. One had to be 'introduced' to the Bank of England, and its books bear a mention of the person who had fathered each account. Some names appear frequently: insiders of the Bank of England (governors, members of the board), prominent merchant bankers, and so on, supporting the view that discounters belonged to a club.[41]

However, a good introduction was not enough. Sometimes, especially for private banks where liability was unlimited, knowledge that the discounter owned some valuable estate was considered a sufficient guarantee, but evidence on unpaid bills shows that a variety of additional securities was sometimes required as a pledge against discounts. Discounters could be asked to issue promissory notes on them-

[41] This is supported by inspection of BofEA, C29/4, Discount Office, 'List of discounters, giving name, trade, and by whom introduced [. . .], 1804–1899'. Flandreau and Ugolini, 'Where it all began', provide a discussion.

selves for a larger amount than the bills to be discounted, and deposit them as collateral. With these notes, the discounter recognized himself as liable towards the Bank of England should the discounted bill not be paid. Registers provide indications of limits per discounter.

Another type of operation consisted of advances, comparable to today's 'repos': a security was pledged at the bank and then repurchased by the debtor at a given date. One difference between modern 'repos' and nineteenth-century 'advances', however, is that the amount of security taken was more substantial. Central banks could take 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 adequate compensation for risk when the collateral was a financial security subjected to large price volatility, but is also observable in the Bank of France's fully secured business of lending on gold and silver.[42]

III

The first of the three Bagehotian 'rules' is the most straightforward. From both text and context, 'free lending' is an argument about credit rationing. This is obvious from many parts of *Lombard Street*, for instance, in those passages in which Bagehot blames the timidity of the Bank of England during earlier panics.[43] 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 made by the newspaper was that the Bank engaged in policies that discriminated against longer bills through both price and non-price mechanisms. Price mechanisms 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'.[44] Similar statements would be frequently read until the crisis finally reached its apex and, on 25 October, the Act of 1844 was suspended to permit the Bank to do away with its statutory constraints and lend more generously.

The news published in the *Economist* reflected information that was available in the market, which itself learnt from the Bank through daily interactions with its discount window. The rapidity with which news about rationing was made 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 encouraged (in fixing the rate of discount on bills of exchange) 'to take into consideration the periods the bills have to run—as also

[42] Flandreau, *Glitter*, pp. 230–1, discusses the terms and conditions of collateralized loans on gold and silver at the Bank of France.

[43] Bagehot, *Lombard Street*, pp. 64–6.

[44] *Economist*, 24 April 1847, p. 479. 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'; *Economist*, 1 May 1847, p. 507.

the position of the accounts of the discounters', and so on.[45] 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 consequence has been, that they have rejected large quantities of paper falling due after this month.'[46] 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 into 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 credit rationing. If a central bank behaves as a lender of last resort, its interest rate (for any given quality) ought to be always above, or equal to, the market rate (for the same quality). The same asset cannot have two different prices in a well-functioning market—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. Thus it is that the central bank's rate cannot be lower than the rate prevailing in 'Lombard Street' (the market rate).[47] A simple test of whether the central bank behaves like a lender of last resort (which formally tests whether we can accept the null hypothesis that the Bank does not ration credit) 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 lender of last resort (and accept the alternative that there is credit rationing).[48]

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-nineteenth century, namely, in 1847, 1857, and 1866.[49] The magazine makes it possible to distinguish between two maturities,

[45] An internal Bank of England memorandum filed under Nov. 1857 reviews (with some omissions) the Bank's policy regarding the maturity of the bills it discounted from 1821. BofEA, G15/97, 'Memorandum in regard to the *échéance* of bills discounted at the Bank, filed under November 1857' ('*échéance*' is French for 'maturity').

[46] *Economist*, 17 April 1847, p. 450.

[47] By contrast, King, *History*, pp. 109–17, argues that a Bank Rate below the market is indicative of the Bank's competing against the market. This need not be inconsistent with our interpretation, since a central bank competing against the market may be tempted to ration competitors (see Goodhart, *Evolution*, pp. 37–46, for a discussion of the conflict of interest that had to be addressed for modern central banking to emerge). However, King does miss the important implication that a lender of last resort performing free lending cannot have its rate below that of competitors. Relying on official testimonies, he fails to see that it is just not possible that 'the practice of placing absolute restrictions upon discounts in times of pressure . . . was virtually abandoned [after 1844]' (p. 111).

[48] A hasty comparison with today's situation, in which market rates fluctuate around and thus occasionally above the official Bank Rate, should not delude the reader. In the nineteenth century, by offering unlimited access to central bank funds at a publicly set price, central banks' standing facilities (the discount window) provided an upper limit to market interest rates. Today, the official central Bank Rate is *not* the rate on a standing facility and thereby *not* an upper bound for market rates, but the level at which the Bank wishes to keep inter-bank rates. A standing facility analogous to the nineteenth-century discount window still exists today, but the interest rate on this facility is set well above the official Bank Rate (typically +100 basis points). See Bindseil, *Monetary policy implementation*, pp. 103–44, for an overview.

[49] Building on Collins, 'Langton papers', p. 59, one might hypothesize that the adoption of the Bank Charter Act of 1844 caused a reversal of policies in the 1840s, so that the Bank of England's behaviour in 1857 would have been a mere return to earlier practices. However, data for bank and market rates published by Wood, *English theories*, pp. 92–3, suggest that the crisis of 1847 displayed a similar pattern to those of 1825, 1836–7, and 1839–40—during all of which the market rate climbed above the Bank Rate.

'long' and 'short'—and for 1847, 'very short' as well.[50] In order to test this hypothesis, we compute the difference between the market rate and the Bank Rate for a given maturity, and check whether the spread is positive (which would lead us to reject the hypothesis that the central bank acts as a lender of last resort). The outcome is shown in figure 2a–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 Peel's Act of 1844. During the crisis of 1866, no credit rationing is visible.

Another way to look at discrimination by the central bank (the opposite of free lending) is to explore the relation between applications for discounts and the actual amounts discounted. The Bank of England Archive contains some evidence that makes it possible to document this for the three crisis years.[51] It consists of reported monthly total applications and actual discounts, shown in figure 3a–c. Total rejection rates suggest a change of behaviour between 1847 (11 per cent) on the one hand, and 1857 and 1866 on the other hand (3.5 and 4.5 per cent, respectively). Moreover, the rejection rate at the peak of the crisis declined over time. It was 16 per cent in October 1847, 7 per cent in November 1857, and only 3.5 per cent in May 1866. Such figures would not prove anything by themselves, as a lot of unobservable strategic behaviour was probably at work. Agents, understanding that the Bank would not discount them anyway, might have reduced their applications. However, in conjunction with the earlier evidence from price data on the lack of credit rationing during later periods, the evidence on rejection rates provides strong suspicion that a revolution was going on.

Reinforcing evidence can be found by observing the increase in discounts at the peak of each crisis. It becomes much stronger for each subsequent crisis. The average ratio between the amount of discounts during non-crisis months and the crisis month is 54 per cent in 1847, 38 per cent in 1857, and only 23 per cent 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 favourably. The evidence strongly suggests that there was an increase in the liberality and elasticity of the supply of credit by the Bank of England during financial emergencies.

The last piece of evidence we report here concerns events on the other side of the Channel at about the same time. France went through three major crises: it experienced more or less the same financial turmoil as England and the rest of the world in 1847–8 and 1857, and avoided the problems of 1866, but experienced a crisis of its own in 1881–2. We have collected material for the setting of the interest rate, looking for evidence of maturity rationing. Interest rate data for the Bank of France are from Vitu, which provides the maximum maturity and, for each maturity, the corresponding interest rate.[52] As can be seen in table 1, during

[50] The articles run by the magazine and the data it published can be used to reconstruct the succession of policy changes. We have organized this material in figure 2a. We report, according to the *Economist*, the spread between market and bank rates for 'very short' (a few days), 'short' (between a few days and two months), and 'long' (close to three months) bills. If we are to believe the reports from the *Economist*, the use of price and non-price discrimination against long-term bills were correlated with one another.

[51] BofEA, Discount Office, Daily Registers, C28/7, C28/17, and C28/26.

[52] Vitu, *Guide financier*, p. 305.

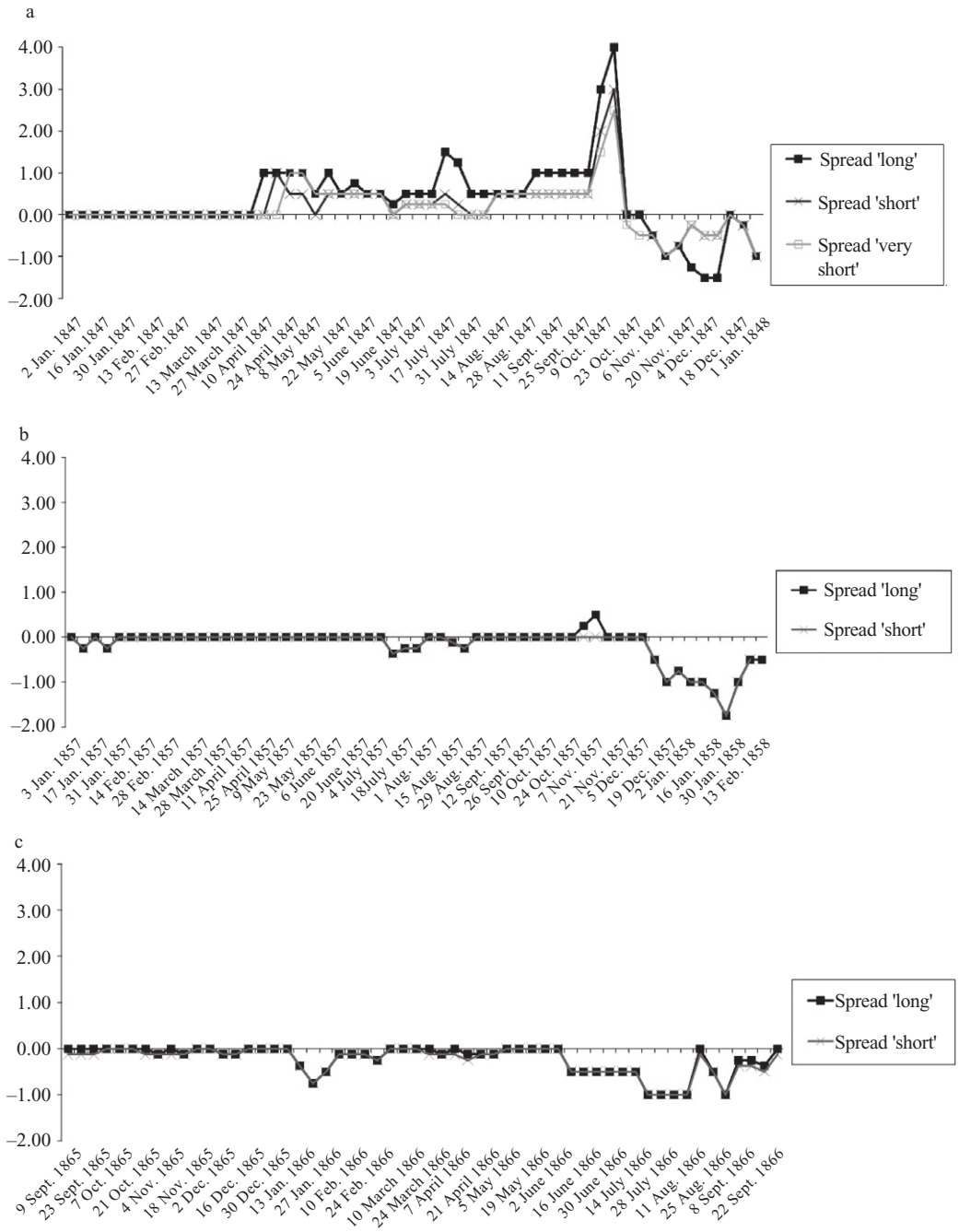

Figure 2. *(a) Spread between market and bank rates during the crisis of 1847; (b) The same, during the crisis of 1857; (c) The same, during the crisis of 1866*

Source: Authors, from the *Economist*.

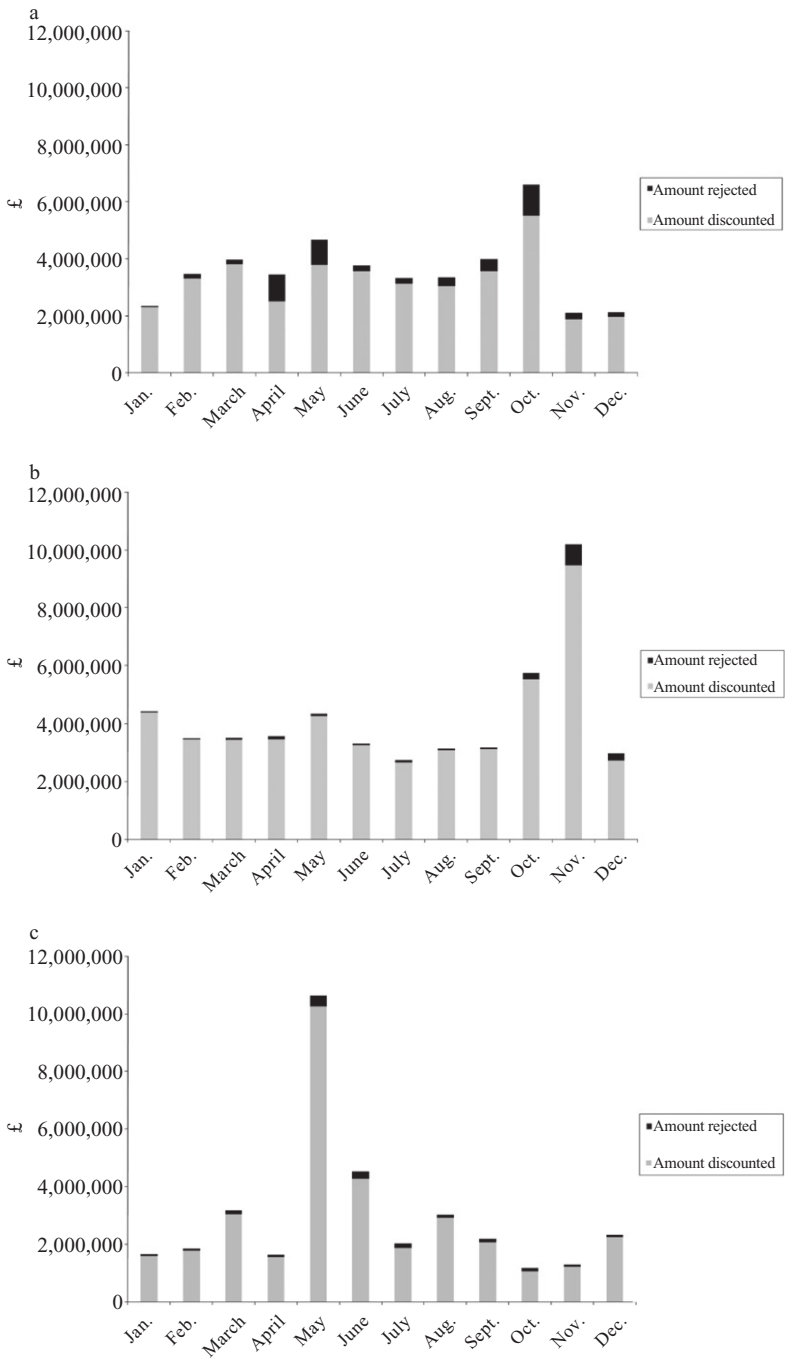

Figure 3. *(a) Monthly totals for bills discounted and rejected, 1847; (b) Monthly totals for bills discounted and rejected, 1857; (c) Monthly totals for bills discounted and rejected, 1866*

Sources: Authors' computations, BofEA, C28/7, C28/17, C28/26.

Table 1. *Interest rates and maximum maturities at the Bank of France, 1800–63*

Variations de l'escompte

es.	Jours.	Mois.	Échéances.	Escomptes.	Années.	Jours.	Mois.	Échéances.	Escomptes.
VIII	20	ventôs.	60 jours.	6 °/o				90 jours.	10 °/o
XI	5	vend.	75 —	6 °/o	1857	11	novem.	60 —	9 °/o
1806	—	—	60 —	5 °/o				30 —	8 °/o
»	14	décem.	90 —	5 °/o				90 —	9 °/o
1807	—	—	90 —	4 °/o	»	26	novem.	60 —	8 °/o
1813	29	avril.	60 —	4 °/o				30 —	7 °/o
»	2	décem.	75 —	4 °/o				90 —	8 °/o
1814	6	janvier.	90 —	5 °/o	»	7	décem.	90 —	7 °/o
1816	7	novem.	75 —	5 °/o				90 —	6 °/o
1817	16	janvier.	90 —	5 °/o	»	21	décem.	90 —	6 °/o
1818	15	octobr.	60 —	5 °/o	»	29	»	90 —	5 °/o
»	29	»	45 —	5 °/o	1858	6	février.	90 —	4 1/2
»	12	novem.	60 —	5 °/o		18	»	90 —	4 °/o
»	19	»	70 —	5 °/o		10	juin.	90 —	3 1/2
»	3	décem.	75 —	5 °/o		23	septem.	90 —	3 °/o
»	17	»	90 —	5 °/o	1859	3	mai.	90 —	4 °/o
1820	—	—	90 —	4 °/o	»	5	août.	90 —	3 1/2
1847		janvier.	90 —	5 °/o	1860	12	novem.	90 —	4 1/2
»		décem.	90 —	4 °/o	1861	2	janvier.	90 —	5 1/2
1852		mars.	90 —	3 °/o	»	8	»	90 —	7 °/o
1853	7	octobr.	90 —	4 °/o	»	14	mars.	90 —	6 °/o
1854	20	janvier.	90 —	5 °/o	»	21	»	90 —	5 °/o
»	12	mai.	90 —	4 °/o	»	26	septem	90 —	5 1/2
1855	4	octobr.	75 —	5 °/o	»	1	octobr.	90 —	6 °/o
	18	»	75 —	6 °/o	»	22	novém.	90 —	5 °/o
1856	14	février.	90 —	6 °/o	1862	21	janvier.	90 —	4 1/2
»	1	août.	90 —	5 °/o	»	6	février.	90 —	4 °/o
»	25	septem.	90 —	6 °/o	»	27	mars.	90 —	3 1/2
»	13	octobr.	60 —	6 °/o	»	6	novem.	90 —	4 °/o
»	25	décem.	75 —	6 °/o	1863	28	janvier.	90 —	5 °/o
1857	27	février.	90 —	6 °/o	»	12	mars.	90 —	4 1/2
»	27	juin.	90 —	5 1/2	»	26	»	90 —	4 °/o
— »	13	octobr.	60 —	6 1/2	»	7	mai.	90 —	4 1/2
»	21	»	90 —	7 1/2					

Source: Vitu, *Guide financier*, p. 305.

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. Before 1861, when the *Economist* started reporting it, there is no series for the Paris inter-bank market. Explorations of 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.[53] In order to deal with this

[53] 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.

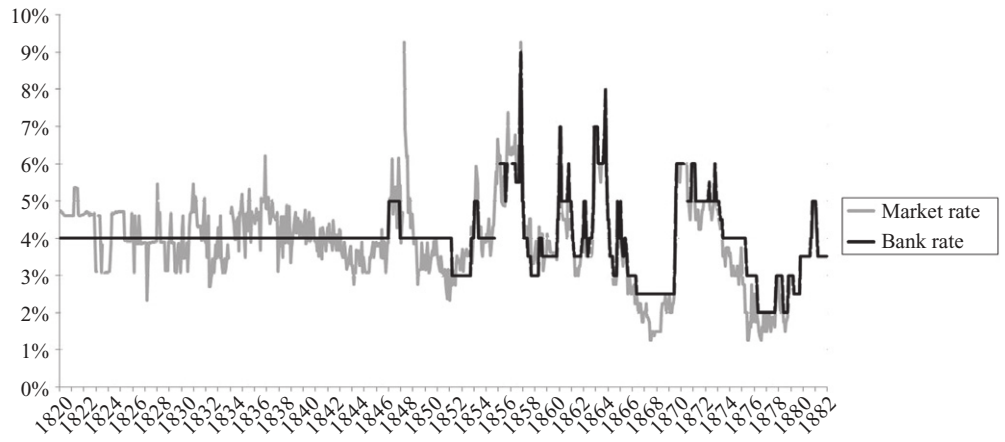

Figure 4. *Market and Bank Rates in Paris, 1820–82*

Sources: Bank Rates until 1863 from Vitu, *Guide financier*, p. 305; Bank Rates post-1863 from the *Economist*; market interest rates 1820–61 computed from sight and three months exchange rates on Paris from the *Course of the Exchange* (1820–46), and the *Economist* (1846–61); after 1861, 'open market' interest rates as reported by the *Economist* (1861–82).

problem, 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.[54] This is used for the years before which the material in the *Economist* is available. The indications for the early phase are thus estimates only, although probably reasonable ones (when the true series of the Paris market rate becomes available, it turns out to be fairly close to the estimated one).[55] This must be borne in mind since, by contrast, the material we had for the London money market provides 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 crisis years, we present the long-run evolution of both the Bank of France Rate and the money market rate, estimated (pre-1861) or measured (post-1861). As can be seen, credit rationing and violation of the Bank of France 'ceiling' were routine events in the first part of the century. In effect, the Bank of France initially behaved as if it had an interest rate target of 4 per cent and let the market rate hover above it from time to time. The crisis of 1847–8 exhibits some spectacular violations, which are not unlike what we observed for the Bank of 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 not have occurred, had the Bank of France stood willing to discount an unlimited amount of these. Finally, we see that violations declined over time. There were still some in 1857, but just as we saw earlier for the Bank of England, violations tended to recede over time. In the end,

[54] Flandreau, Galimard, Jobst, and Nogués-Marco, 'Bell jar', pp. 176–81.

[55] The results of this exercise are reported by S. Ugolini, 'The international monetary system, 1844–1870: arbitrage, efficiency, liquidity', Norges Bank working paper, 2010/23 (2010), p. 26.

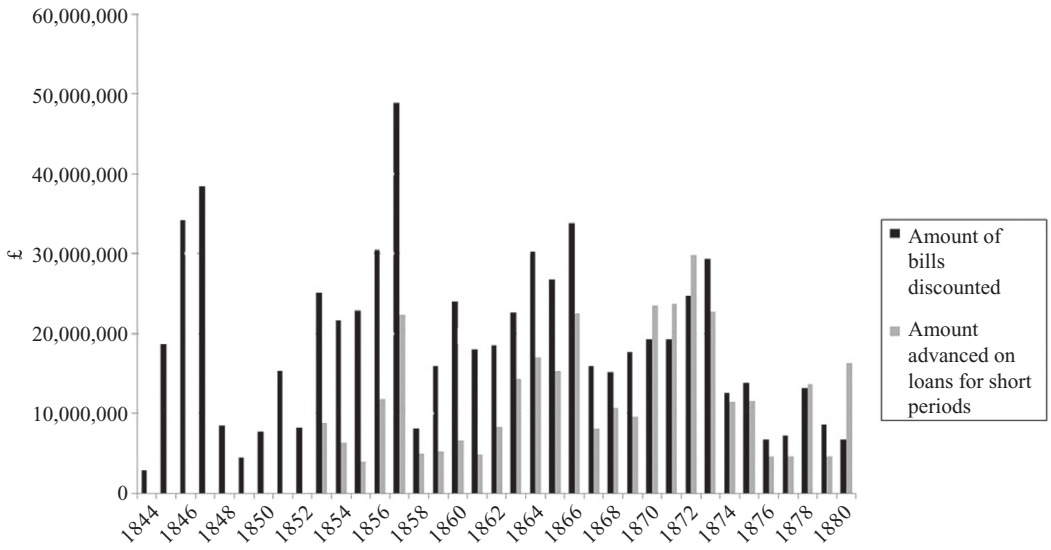

Figure 5. *Bank of England: bills discounted and advances for short periods, 1844–80*
Source: Authors' computations, BofEA, C30/3. Amounts advanced are not available before 1853.

the Bank of England and the Bank of France appear to have obeyed the same laws of motion.[56]

IV

The question of 'good collaterals'—those eligible for advances—is the next we examine. One difficulty with addressing this is the circularity in the effects of successful lending of last resort: *ex post*, those who deserved to be saved were 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.

In the case of bills, good collateral meant bills bearing prestigious names as acceptors, bills brought in by sound discounters, or bills on which serious guarantees were taken. This, however, hardly closes the matter, and we shall return to it in section V. In the case of collateralized loans (or repos-cum-haircut operations) known as 'advances', the list of eligible securities changed over time.[57] Figure 5

[56] According to Flandreau, *Glitter*, p. 116, after 1857 a greater degree of freedom was granted to the Bank of France through the abolition of usury laws.

[57] Bagehot, *Lombard Street*, p. 202, quotes a very famous statement by Bank officials about their behaviour 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'.

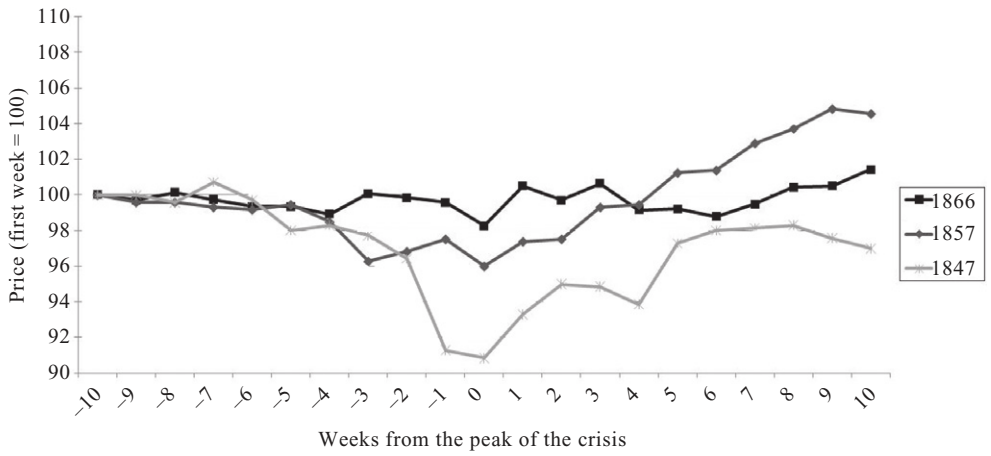

Figure 6. *British Consol prices during the crises of 1847, 1857, and 1866*
Note: The peak of the crisis is defined as the week preceding the suspension of Peel's Act.
Source: Authors, from the *Economist*.

shows (for London) the amounts discounted and the total advanced to the market on an annual basis from 1844 (counterpart figures for the branches of the Bank of England could not be found). As can be seen, advances increased during crises, as did bills discounted.

Thus, we may wonder, what were the good securities on which a proper central bank would be expected to lend freely? According to Bagehot, 'standard' securities were British government (and some colonial) bonds.[58] Consequently, we suggest here an original test of the evolution of lending-of-last-resort operations that uses the good collateral as a 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 lending-of-last-resort 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 behaviour of the 'good security' par excellence, namely, British Consols, during the three crises under study. As before, we have associated the climax of each crisis with the suspension of the Act of Peel (relieving the Bank of its convertibility obligation), which we take as a benchmark, looking at the price of Consols in the 10 weeks before and after it. We see that the 1847 crisis seriously depreciated Consols, but the two subsequent crises did so to a lesser extent. The 1847 crisis saw a peak in depreciation of about 9 per cent at the apex, while this

[58] '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, I 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 authorized reason for saying that it would. And there are many other such securities'; Bagehot, *Lombard Street*, pp. 205–6.

was reduced to 4 per cent during the 1857 crisis, and to just 2 per cent 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 nicely complements the regression of credit rationing documented in the previous section.[59]

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 later be encapsulated in Bagehot's *Lombard Street*. One feature of this crisis that caught the attention of observers was that price declines occurred across asset classes and infected top securities too. When in late September it was reported that the Bank of England was 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.[60] Historians of economic thought will recognize the existence of a fair deal of pre-Bagehotian wisdom in this criticism. In any case, when *Lombard Street* was published, it really reflected existing views on crisis management, as advocated by the *Economist* for a quarter of a century and as practised by the Bank of England since the crisis of 1866.

V

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.[61] The previous sections strongly suggest that the 'triumph' must have been limited to the ideological field, not to the intellectual one. What occurred after 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 between Bagehot and Hankey, sparked by the publication of *Lombard Street*. 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

[59] As for other features discussed in this article, qualitative sources provide anecdotal evidence backing our finding. For instance, King, *History*, p. 243, emphasizes that at the apex of the 1866 crisis, it was the Bank of England's announcement that 'loans on government securities would be available at 10%' that restored liquidity in the market for Consols.

[60] *Economist*, 2 Oct. 1847, p. 1141: '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'.

[61] Fetter, *Development*, pp. 257–83.

and bureaucratic significance: the Bank of England did not want to lose any degree of freedom by committing itself to any pre-specified policy.[62]

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 Bank of England Archive for information on delinquency rates. The information on this matter is organized in two registers that record the number of delinquent accounts and corresponding amounts on a yearly basis.[63] 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.

In the Bank of England files, delinquency is organized on a per-discounter basis, not on a per-bill basis. Within the mass of bills that the Bank of England discounted, some were being returned unpaid, but the guarantees that had been taken prevented troubles from reaching the books of the Bank. The bill was thus 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 did not manage to make ends meet, he would lose access to the discount window.[64]) 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 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, from the acceptor, or from endorsers and the primary debtor if these were different individuals than the discounter) came as an offset: while a number of write-offs were made, the account started producing a revenue. Measuring the actual losses is long and painful. Random draws found that the amounts lost were a trifle of initial sums. The eventual return outperformed early write-offs.

We conclude from the 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

[62] A parallel that comes to mind is the modern emphasis on what the European Central Bank calls 'constructive ambiguity' (see, for example, 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 Oct. 1999, http://www.ecb.int/press/key/date/1999/html/sp991026_1.en.html) and the large economic literature on opacity (for example, Svensson, 'Social value').

[63] BofEA, C 30/3 and C 34/4.

[64] 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. The House of Lords established that the discounter, not the Bank of England, was responsible for ensuring the quality of bills; Chatziioannou and Harlaftis, 'From the Levant', pp. 38–9.

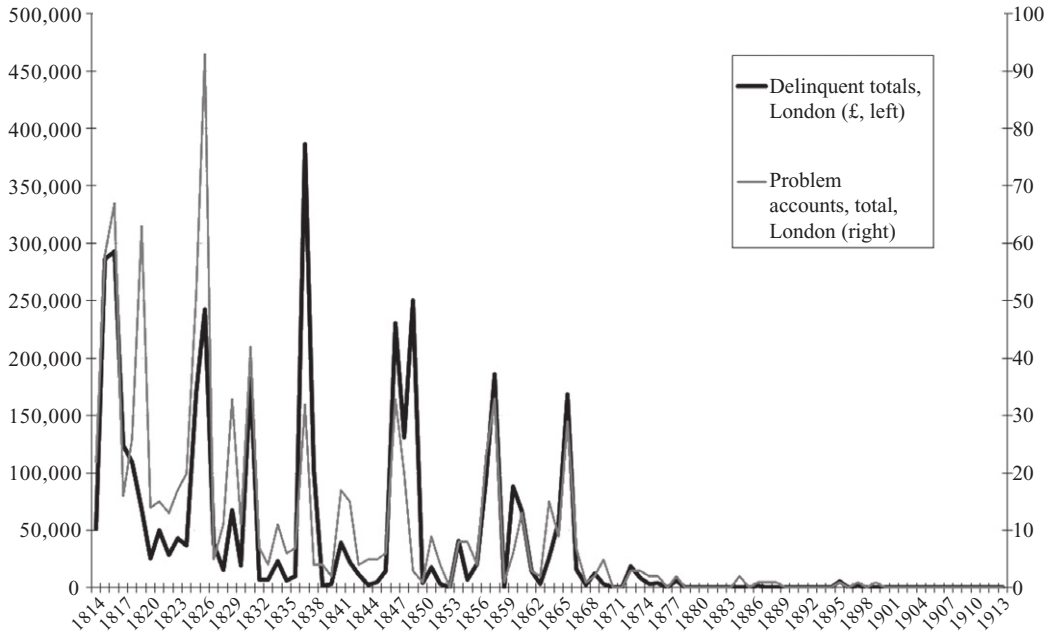

Figure 7. *Delinquent accounts and amounts in London, 1814–1914*
Source: BofEA, C34/4.

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. The results are represented in figures 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 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 aspect illustrated by the charts is the geography of problems. As can be 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.[65]

However, 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 fewer problems around.

[65] Ziegler, *Central bank*, pp. 38–50; King, *History*, pp. 188–9.

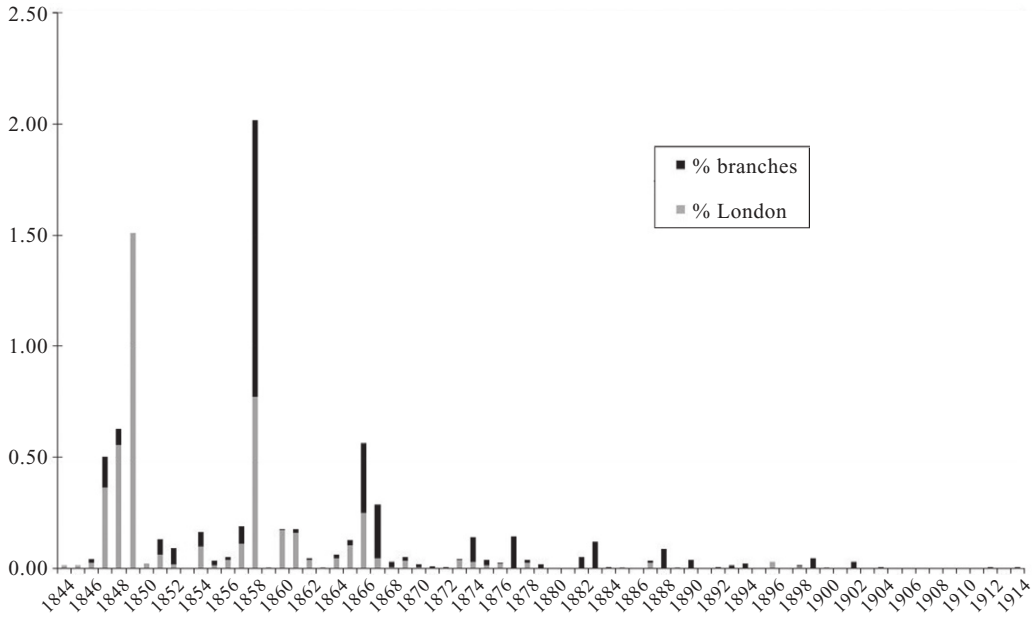

Figure 8. *Delinquent amounts: London and branches (% of total discounts), 1844–1914*

Source: BofEA, C 30/3, C 33/5, C 34/4, and C 34/5.

This in itself would run against the moral hazard story, because it suggests that the development of lending-of-last-resort operations was followed by an improvement rather than a deterioration in credit quality. A more credible alternative, however, is that as the Bank of England extended its crisis management operations, it also became increasingly demanding regarding its requirements for 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 lending of last resort had, as a companion feature, a greater emphasis on quality.

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 the origination of commercial paper, purchasing paper of which it was a discounter and thus in effect taking more exposure.

Figure 9 compares the evolution of amounts at risk for both central banks. The pattern observed for the Bank of England obtains to the Bank of France as well,

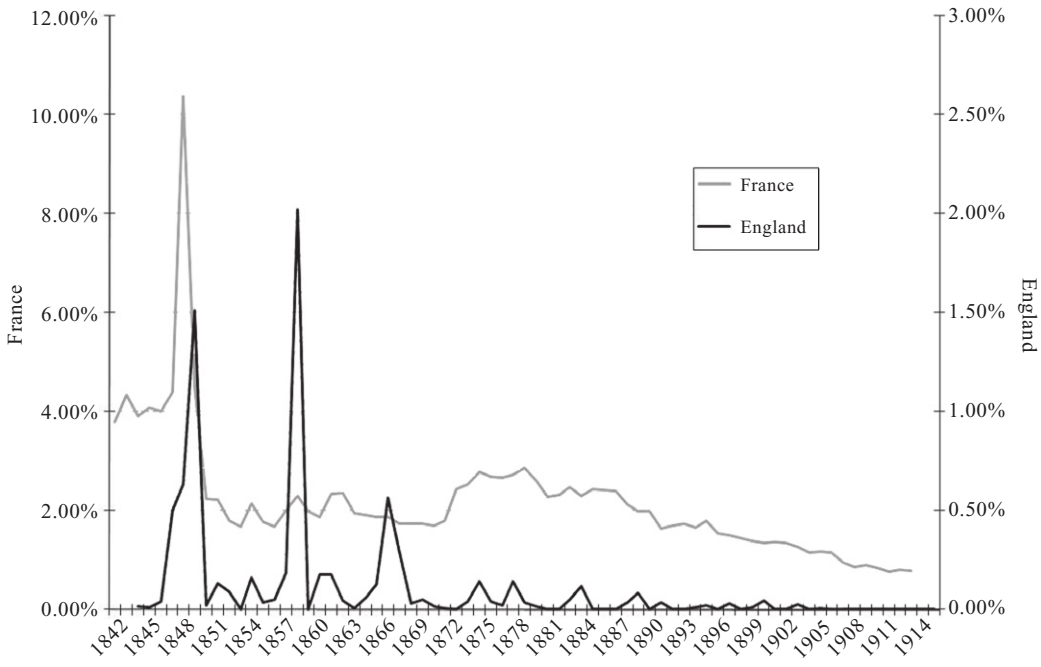

Figure 9. *Amounts at risk (unpaid bills as % of discounted bills), 1842–1914*
Source: Authors, from same sources as in figs. 7 and 8 (England) and Roulleau, *Les règlements* (France).

with the amount of unpaid bills as a percentage of total discounts declining steadily over time.[66] Along with the material already reported—indicating 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 crises—this evidence 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 an almost perfectly risk-free market, whereby losses were entirely transferred to market participants. In the French system, by contrast, risks (however small) were taken and had to be managed on a case-by-case basis.[67] To what extent the English situation 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 that future research will have to address.

[66] This decline is obtained in a context of rising aggregate default in France, as measured by the bankruptcy rate of firms (the number of firms going bankrupt, normalized by the numbers of existing firms). This rate increased steadily from about 0.15% in the 1820s to 0.6% in the 1890s; V. Bignon, 'Financial crises, business cycles, and bankruptcies in the very long run: France during the 19th century', mimeograph (2011) http://www.cepr.org/meets/wkcn/1/1730/papers/bignon.pdf, p. 10. This suggests that the central bank was able to *reduce* its exposure when overall risks were *rising*, and reinforces our conclusions. Collins and Baker, *Commercial banks*, p. 247, report 0.19% average losses for a sample of 3,010 industrial loans covering the period 1875–1914.

[67] On the Bank of France as an originator of bills, see Nishimura, 'French provincial banks', pp. 543, 547.

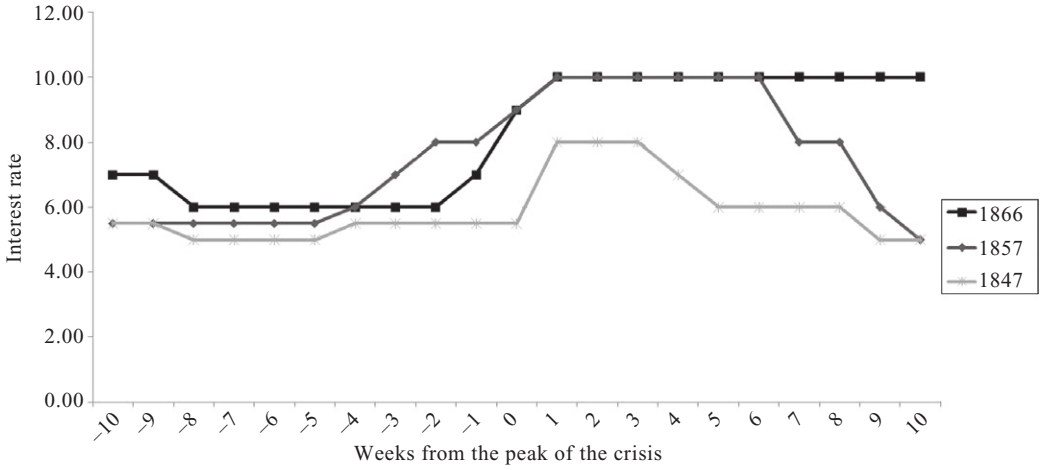

Figure 10. *Bank rates during the crises of 1847, 1857, and 1866*
Source: Authors, from the *Economist*.

VI

The last of the three Bagehotian rules 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 been made,[68] but the reference to 'penalty' rates is an enduring one. Of course, the notion that rates rise during a crisis is consistent with different views. First, during a panic, the number of suppliers of short-term credit declines while demand increases. This situation makes the central bank the market maker of last resort. The recommendation to use high rates could thus be taken as an encouragement not to 'sterilize' the effect of the crisis and could be motivated by extraneous objectives. An alternative (not exclusive) interpretation would emphasize the role of higher rates in sorting debtors. Principal-agent theory suggests that with imperfect information, reward is proportionate to effort. The clear announcement that, in the event of a crisis, the financial houses seeking support will face high funding cost may have a disciplinary effect.

In *Lombard Street*, the 'high rates' (shown in figure 10) are motivated in three ways.[69] The first is with 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'.[70] 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

[68] See, for example, Goodhart, 'Myths', p. 341.
[69] The third one, which is discussed in various places (for example, pp. 113–15, 319–20), has to do with the need for the Bank Rate to be located above the market rate, as already indicated, and in this sense is 'higher'.
[70] Bagehot, *Lombard Street*, pp. 56–7.

system and high rates to defend the parity.[71] If this is the justification for the 'high 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.

However, *Lombard Street* contains a second interpretation. Here it is better to quote Bagehot verbatim:

> First. That these loans should only be made at a very high rate of interest. 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.[72]

As can be seen, the notion that the banking reserve should be protected is mentioned again, but it is accompanied by 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 of sorting debtors. It is about preventing those financial intermediaries who are not in desperate need from drawing resources from the central bank. The resulting 'fine' (a concept that gets as close to penalty as Bagehot ever did) 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' element therefore has to do with correcting the behaviour of those who have available 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.[73]

Bagehot's argument may be understood better in the light of some technical background elements. 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 seek cash by parking good securities with the Bank of England or sell to the Bank any surplus bills they had. This flight to safety would manifest itself through a liquidity squeeze. The insurance came at a price controlled by the Bank: since the Bank of England did not pay interest on its deposits, the opportunity cost of withdrawing balances from the market would essentially be the Bank Rate. In the end, the high interest rates—which Bagehot insisted had to be used very early on—could provide monetary authorities with a powerful tool to prevent the complete collapse of inter-bank lending.

This conclusion and interpretation of Bagehot's third rule calls for a comparison with modern issues: anachronistic use of history can be inspiring. In the recent

[71] 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 (ibid., pp. 47–57). The already quoted Bank of England Memorandum (BofEA, G15/97) 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'. This interpretation is consistent with a number of earlier papers, including Humphrey, 'Classical concept'; Humphrey and Keleher, 'Lender'; Martin, 'Reconciling Bagehot'.

[72] Bagehot, *Lombard Street*, p. 197. It is not really echoed in other parts of the book, nor is it discussed again later.

[73] On this point, Bagehot and Hankey were in full agreement: see Hankey, *Principles*, pp. 27–9.

crisis, some observers 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.[74] Our analysis suggests that if modern authorities had wanted to follow Bagehot's advice, they should have lent at very high rates, instead of lending at very low rates or at least they should have used forceful means to revitalize the money market instead of substituting to it. Would that have worked? If economists end up reading these pages, they should let us know.

VII

This article has reviewed the early formation of lending-of-last-resort operations at a time when modern ideas were being shaped. As we indicated in the introduction, the matter may be of interest to historians of economic thought, economic historians, macroeconomists, theorists, and policy-makers.

For historians of economic thought, our article suggests that much 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 crises of 1847 and before—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 (just like some other prominent central banks, such as the Bank of France) was on a learning curve and began to implement lending of last resort along lines that anticipated Bagehot's teachings. That they did so in step casts doubt on attempts at relating the transformation in policy-making to domestic factors, institutions, and exchange rate regimes.[75] We want to flag this for future research.

For macroeconomists, our study provides evidence of the strong effect that the development of lending-of-last-resort operations had on the stability of the price of 'good collaterals', as often hypothesized but not so often actually shown. While government securities used to be the object of fire sales and their price thus highly volatile, they became steady and a source of resilience in the financial system owing to the emergence of modern lending-of-last-resort operations.

For policy-makers, our article presents a challenge. 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

[74] Tim Congdon and Brandon Davies argued, in an article entitled 'A simple plan to unclog the interbank market' published in the *Financial Times*, 22 Oct. 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'.

[75] On the other hand, relevance should not be dismissed out of hand either: there may have been something 'natural' in the development of lending of last resort in a system where the central bank is private since, as emphasized by Flandreau, 'Pillars of globalization', pp. 224–5, lending of last resort is really profit making.

market. The implication is that there must exist a threshold discount rate at which banks are led to resume lending. Since at the same time the Bank keeps lending on 'good collateral', the effect 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 sub-prime crisis.

Finally, for theoreticians, we discovered a puzzle. Far from encouraging moral hazard, we saw that the development of lending-of-last-resort 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 to adopt more generous lending patterns. This important finding—which 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.

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