Political Foundations of the Lender of Last Resort: A Global Historical Narrative

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Abstract: This paper offers a historical perspective on the evolution of central banks as lenders of last resort. Countries differ in the statutory powers of the lenders of last resort (LOLRs) they establish. The LOLR is an outcome of a political bargain, not just a technical systemic risk management solution. Creating a collateralized lending authority as envisioned by Bagehot (1873) requires five key legal and institutional preconditions, all of which require political agreement. LOLR mechanisms evolved to include more than collateralized lending, and the extent of the use of new mechanisms also varied over time and across countries, reflecting differing political environments. Political constraints explain why some central banks were established later or with constrained statutory powers.

LOLRs established prior to World War II, with few exceptions, followed policies that can be broadly characterized as implementing "Bagehot's Principles": seeking to preserve systemic financial stability rather than preventing the failure of particular banks, and limiting the amount of risk absorbed by the LOLR as much as possible when providing financial assistance. After World War II, and especially after the 1970s, generous deposit insurance and ad hoc bank bailouts became the norm. The focus of bank safety net policy changed from targeting systemic stability to preventing depositor loss and the failure of banks.

Statutory powers of central banks were not prone to change over time. Persistent cross-country differences in central banking legislation are not predictable on the basis of simple country characteristics, such as GDP per capita, size of the financial system, or polity scores, but rather reflect idiosyncratic political histories that shaped countries' willingness to vest political power in central banks. Countries that initially chose to create more powerful central banks were slower to enact generous deposit insurance, suggesting substitutability between broad LOLR powers and generous deposit insurance.

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1. Introduction

The modern view on the role of the LOLR holds that the LOLR preserves the ability of banks to maintain depositor confidence, either by assisting banks in converting their non-cash assets into cash, or by providing junior funding to the banks (i.e., assistance in a form other than collateralized lending). That ability, in turn, allows banks to continue to provide transaction services through the payments system and to provide credit to bank-dependent borrowers.

Two key features of banks are highly relevant in understanding the need for a LOLR. First, banks fund themselves largely with money market instruments, and these instruments (whether they take the form of bank notes, deposits, acceptances, repos, or commercial paper) are held predominantly by highly risk-intolerant investors. Money market investors do not simply demand a higher interest rate when bank default risk rises; they demand repayment, and they are able to do so because their claims on the bank are of very short-term duration. There is a large theoretical literature explaining this aspect of banking, but for our purposes, the key fact is that the funding sources of banks withdraw funds from banks when their default risk rises, long before the bank is suspected of being insolvent.[1]

Second, because banks specialize in lending to borrowers, and create private information about borrowers ("delegated monitoring") that enables them to lend profitably, the public is not well informed about the details of the risks of individual bank loans. This asymmetric-information problem means that an observable shock to the economy or financial

[1] See Goodhart (1988), Gorton and Pennacchi (1990), Calomiris and Kahn (1991), Calomiris, Himmelberg and Wachtel (1995), Calomiris and Longhofer (2009), Dang, Gorton and Holmstrom (2012). The recent crisis also provided further empirical evidence of the intolerance of money market investors (see for, example, Covitz, Liang and Suarez 2012, Heider, Hoerova, and Holthausen 2015, Gorton and Metrick 2012). For similar evidence with respect to the Penn Central Crisis of 1970, see Calomiris (1994).

system (e.g., evidence of a decline in export demand, or the observed failure of a foreign financial institution that is a counterparty to domestic banks) can raise default risk for all banks, whether or not they are actually substantially affected by the observable shock. Contractual inter-relationships among the banks add to this problem, because if one of them is adversely affected, others may be affected by virtue of their counterparty exposures to one another.[2]

In combination, the reliance on risk-intolerant money market funding and the opacity of bank lending make banks particularly susceptible to liquidity risk in response to observable adverse shocks. Of course, diversification of risk, adequate equity capital, and sufficient holdings of cash reserves can substantially mitigate, and in some circumstances, eliminate liquidity risks associated with observable shocks. But in general, such risks will always exist, and can give rise to substantial disruptions of the payments system and the supply of bank credit.[3] The point of LOLR interventions therefore is to avoid the disruptions to payments and credit intermediation that result from liquidity risk. Obviously, monetary policy alone cannot solve this problem because changes in the riskless rate of interest or rate of inflation have limited and indirect effects on the elevated insolvency risk of banks.

The delegation of powers to central banks so that they can act as lenders of last resort (LOLR) may seem to be a purely technical question that should provide a univocal answer to the question of what determines when LOLRs are founded and how much power is vested in them. Yet economists who think of the LOLR as a technical solution to a common centuries-

[2] For empirical evidence that such problems can become systemic, see Carlson, Mitchener and Richardson (2014), Mitchener and Richardson (2015) and Calomiris and Carlson (2015).
[3] On ways to mitigate risks, see Calomiris, Heider and Hoerova (2015). Regarding disruptions to credit supply from banking crises, see Bernanke (1983), Bernanke and Gertler (1989), Bernanke and Lown (1991), Peek and Rosengren (1997), Calomiris and Mason (2003b), and Calomiris and Wilson (2004). On the effects of banking crises on asset prices through fire sales pressures, see Anari, Kolari and Mason's (2005) study of the Great Depression.

old problem of systemic risk might be surprised to learn that central banks with LOLR responsibility were founded at very different dates in different countries, and with very different statutory powers, which also have changed over time.

Britain and France had established fully operational LOLRs by the middle of the 19th century, and these LOLRs enjoyed broad and relatively unconstrained discretionary authority to act as they saw fit. They undertook a variety of interventions, ranging from collateralized lending to offering credit guarantees to coalitions of banks during crises in the latter quarter of the 19th century.

In contrast, the U.S., Canada and Australia did not establish long-lasting and fully-fledged central banks until 1913, 1935, and 1959, respectively. When they did, those central banks sometimes possessed narrowly defined powers. In the cases of the U.S. and Canada, the central bank was constrained to provide collateralized lending; in Australia, the Reserve Bank of Australia, like the Bank of England, operated with broad authority to intervene without such statutory constraints.

In Canada, the delay in establishing a LOLR may have reflected the absence of severe banking crises and the efficacy of existing bank coalitions in arranging coordinated responses to the threats of banking crises, under the leadership of the Bank of Montreal. But the U.S. was the most crisis-prone economy in the world during the 19th and early 20th centuries, and Australia suffered one of the worst banking crises of the pre-World War I era in the early 1890s. Clearly, there was more driving delay than the absence of necessity.

This paper is the first comprehensive attempt of which we are aware to measure and explain differences in countries' statutory histories for creating and empowering LOLRs.[4] We show that the answers to puzzling questions about cross-country differences in the statutory histories of LOLRs often revolve around idiosyncratic differences in the political environments of particular countries. We do not argue that the political environment is the sole driver of the emergence of LOLR but rather that it is a key driver.

The LOLR is a locus of political power, and as such, its creation should be viewed as the outcome of a political bargain (Calomiris and Haber 2014). When considered in that light, it is not surprising that countries differed in their propensity to create LOLRs, and in the powers with which they chose to endow them. We also consider how LOLRs' statutory powers have changed over time, and how other developments in the public policy toward banks have been influenced, or have influenced the statutory powers of LOLRs. In particular, we consider the relationship between the statutory powers of the LOLR and the generosity of bank safety nets in the form of deposit insurance, a policy innovation that spread throughout the world in the 20th century.

In Section 2, we review the early history of the development of the LOLR. We begin with the history of the successful development of LOLR policies in an important early innovator – 19th century Britain – and show that the critical institutional aspects of its evolution were not only followed in other countries within Europe but sometimes were

[4] Existing research focuses mostly on LOLR experience in a single country and for a shorter period than analyzed here (e.g., Holland and Toma (1991) for the case of the United States, and Bordo and Redish (1987) for the case of Canada) or develops theoretical models to analyze tradeoffs among LOLR policies. For instance, Repullo (2000) develops a model that considers the tradeoffs involved when assigning LOLR responsibilities to a central bank or deposit insurance agency, and Freixas et al. (2000) models LOLR policies in the context of systemic risk in the interbank market.

adopted simultaneously. In fact, the transformations were much more coincidental than has been recognized before, and are properly understood as a response to worldwide increases in the sizes of financial systems – although, owing to a set of political, administrative and legal factors, different countries ended up with different ways to cope with resulting episodes of financial stress.

Focusing on the Bank of England, but enriching the narrative with references to other experiences in Europe, we identify five key political, legal and economic conditions that had to be satisfied in order for the Bank of England (and other European LOLRs) to become a fully-fledged LOLR, able to respond with increasing success to banking crises or to the risks of crises, and able to sustain political approval of its actions. The institutional changes that gave the Bank of England necessary LOLR powers and responsibilities were controversial and contested.

We conclude Section 2 with a discussion of the founding of LOLRs in the U.S., Canada, and Australia. Each differed from the LOLR history of the U.K. in unique ways, despite many similarities and shared traditions connecting these countries with the U.K. The development of a LOLR was delayed in the United States as a result of political opposition, and when the Federal Reserve System was created, its structure and powers were circumscribed by restrictive legislation. The Fed's powers were narrowly confined to engaging in rediscounts and advances related to certain activities. In contrast, the Bank of England was permitted a large margin for improvisation.

The experiences of Canada and Australia also illustrate unique central bank chartering outcomes, which reflect their unique political histories. Canada's classically liberal political environment eschewed central banking until 1935. Instead, Canada relied on

interbank coordination to avoid banking crises. It did so quite successfully, and the establishment of the Bank of Canada in 1935 reflected monetary goals rather than any perceived failings due to the absence of a LOLR. Australia did not create a full-fledged central bank until 1959, which was the culmination of a protracted six-decade political struggle over the appropriate allocation of power over money and credit.

In Section 3, we trace changes over time in the approaches used by central banks and governments to deal with financial crises from the late 19th century to the late 20th century. In particular, we identify a shift in the approach of LOLRs away from a narrow reliance on collateralized lending as the exclusive tool for LOLR interventions.

Despite these cross-country differences and innovations, we categorize the period until roughly World War II as one during which LOLRs implemented an approach that we broadly characterize as following "Bagehot's Principles" – which we conventionally name after Walter Bagehot, the editor of *The Economist* who theorized about "modern" lending of last resort as part of his description of the crisis of 1866 in his celebrated essay *Lombard Street* (Bagehot 1873). Under what we define as Bagehot's Principles, central banks were encouraged to focus on the health of the financial system, rather than on the fate of individual banks. Failure of financial institutions was permitted unless there was a credible systemic risk associated with their failing. During episodes of high systemic risk, powerful LOLRs were willing to take on some default risk as a necessary part of their role in assisting the banking system, but only within limits: banks as a whole had to bear most (sometimes all) of the risk from such assistance. The participation of banks in risk sharing ensured that assistance would be selective (only truly systemic risks would be addressed). In countries

like Britain or France, the structure of LOLR operations also limited the exposure of the government to losses.

While effective LOLR interventions necessarily involved LOLR risk taking, they usually turned out to be profitable – at least when measured on an ex post, cash-flow basis -- because support was provided at a high price and with limited risk, taking advantage of the central bank's monopoly position in the provision of liquidity. A similar pattern is visible in instances of central bank cooperation under the gold standard, which almost always turned a profit (Flandreau 1997).

After World War II, and especially after the 1970s, a very different approach toward bank safety net policy became the norm – one characterized by (virtually) "Unlimited Protection." Unlimited Protection eliminates the risk of depositor loss (even small losses to depositors in banks that fail without any systemic consequences) and prevents any bank of significant size from failing, regardless of whether the bank poses a true systemic risk. Unlimited Protection is achieved via a combination of deposit insurance and ad hoc government bailouts of banks through injections of taxpayer funds.

The trend in favor of increasing democracy generally is understood to have been associated with greater myopia in government policy, which likely contributed to the increasing government protection of banks. Protecting risky banks from the discipline of deposit withdrawals keeps bank credit flowing, which can be particularly beneficial to politicians anticipating an election, even if such protection encourages risk taking that magnifies long-term bank losses and ultimately results in a more severe credit crunch.

The movement toward flexible exchange rates also may have contributed to the new policy of unlimited protection through the creation of a new fiscal safety valve (the inflation

tax) and the diminution of concern about maintaining the budgetary disciplinary necessary to support a fixed exchange rate; but the movement toward flexible exchange rates itself has been argued to reflect the spread of democracy (Bernhard and Leblang 1999, Eichengreen 2008); thus, a political trend toward greater democracy may account for both the changes in exchange rate and safety net policies. Nevertheless, some highly democratic countries – notably, the UK, Australia, Canada, New Zealand and Norway – were slow to adopt generous deposit insurance systems. This suggests that, as Demirguc-Kunt, Kane and Laeven (2008 show, more than just the spread of democracy matters for understanding the evolution of deposit insurance protection.

Worldwide, the costs of generous deposit insurance and bank bailouts have been very high since 1970; indeed, the frequency and severity of banking crises during this time period has been unprecedented, and the literature explaining these changes has identified the increasing protection of banks as the primary cause of the greater frequency and severity of banking crises (Laeven and Valencia 2013, Calomiris and Haber 2014).

Section 3 concludes with a discussion of the LOLR mechanisms employed in the case of the Eurozone, and the management of the recent banking crises within the Eurozone during the period 2008-2014. Political constraints that reflect the allocation of political power within the Eurozone have played an important role in defining and limiting LOLR actions to deal with banking crises within the Eurozone.

In Section 4, we analyze some of the important differences across countries in current LOLR policies and their changes since 1960. We perform a detailed comparison of 40 countries' statutory provisions for central bank lending circa 1960, and follow the changes in LOLR legislation in 12 of those countries from 1960 to 2010. The samples of 40 and 12

countries are diverse groups of developed and developing countries from various continents, with varying banking and political histories. We measure differences in central banks' LOLR powers across several dimensions and consider possible explanations of those differences.

We find that commonly measured economic and political differences across countries do a poor job in explaining cross-country differences in choices about the extent of LOLR powers. Instead, statutory differences in LOLR provisions reflect idiosyncratic historical factors. With regard to changes within countries over time, we find that LOLR powers change little over time, except sometimes in response to severe crises. Even then, the direction of change in response to crises is not uniform.

We consider how differences in countries' central banks' statutory powers co-vary with other institutional choices about financial policy, including the generosity of deposit insurance. We develop a new measure of the generosity of deposit insurance protection, and consider how it covaries with the statutory powers of the LOLR. We find that deposit insurance generosity tended to be lower in countries that had historically created the most powerful LOLRs (such as Australia, New Zealand, and the UK). This suggests that powerful LOLRs and generous deposit insurance were substitute policy mechanisms in the late 20th century.

Section 5 concludes.

2. LOLRs Are Political Outcomes

2.1. In the Beginning: Benefits and Requisites of a LOLR

The earliest commercial banks operating as private businesses existed in the ancient Greek and Roman world, beginning in Athens around the 6th century B.C. The earliest example of a

recorded LOLR intervention to address a banking crisis was by Emperor Tiberius in 33 A.D. Tacitus summarizes the causes of the banking crisis, its consequences, and the salutary effects of the Emperor's intervention to address it. Tacitus describes a systemic crisis, precipitated by a sudden and unexpected change in regulatory policy. In response to pressure from some bank debtors, the Roman Senate decided to enforce a long-dormant usury ceiling on lending, and to also impose a new collateral requirement on bank lending, requiring the greater use of land as backing for loans. Although these changes were intended to advantage politically powerful land-owning borrowers by reducing their cost of credit, the adverse systemic consequences of these government-induced shifts in the supply of lending produced a dramatic contraction of bank credit and a decline in land values. Tiberius responded by granting large, three-year interest-free loans from the Roman Treasury to Rome's banks, which brought the crisis to an end.[5]

As this early example illustrates, and as bankers and government officials have understood for millennia, an adverse shock to banks that reduces banks' net worth or that, in the case of Rome in 33 A.D., reduces the profitability of supplying loans, results in a contraction in the supply of credit, and consequent declines in economic activity and risky asset prices. As Schnabel and Shin (2004) show in their study of the crisis of 1763, and as Luckett (1992) demonstrates more generally, the systemic consequences of such shocks – and the vicious cycle of crisis propagation connecting credit and money contraction, asset

[5] Tacitus, *Annals of Rome*, Book VI. Although Tacitus provides the only source material on this crisis, there is also a detailed but fictitious narrative of the crisis, which probably originated as a joke by a University of Minnesota Professor of History (who was also an author of historical fiction) seeking to attract attention to the history of ancient Rome in the immediate aftermath of the Panic of 1907. In that narrative, Professor William S. Davis (in *The Influence of Wealth in Imperial Rome*, 1910) constructs a comical, Roman version of the Panic of 1907, based on fictitious names of bankers and merchants. Unfortunately, many readers (who access this narrative via multiple internet sites) treat the account as authentic.

price declines, and the failures of banks and their borrowers – were just as visible to market participants and government officials in the 18th century as they were in Roman times.

One thing that soon emerged was the understanding that a LOLR policy, not yet known as such, was distinct from monetary policy. Monetary policy, as we define it, involves a purposeful change in the supply of liquid assets (e.g., the issuance of central bank liabilities which can take the form of currency or reserves), which are issued through market transactions at prevailing market prices. So-called "open market operations" probably were first initiated by the Wisselbank of Amsterdam in the 18th century as part of its conscious attempt to vary the supply of fiat currency to control market liquidity, much as central banks do today (Quinn and Roberds 2005, 2009, 2014).

But while it is almost always possible for a central bank to vary the money supply through such market transactions, that may not be sufficient to achieve some important goals of financial policy that arise when the insolvency risk of banks rises significantly. In times of heightened insolvency risk, banks may have a difficult time preserving their funding sources. Without an ability to liquidate some of their assets (which reduces both the solvency and liquidity risk of banks) or raise additional funding that is junior to existing debt, banks may face significant withdrawal or balance sheet pressures that threaten their very survival, or at least their ability to function normally as providers of transactions services and loans.

From an early date, observers of banking crises saw the benefit of finding a way to coordinate responses to crises that would nip the problem in the bud. For example, Luckett (1992) describes efforts of bankers to prevent fire sales of assets during crises by agreeing on a nominal price for clearing contracts in each commodity being traded. He also describes the case of the Caisse d'Escompte – an early prototype of the bank clearinghouse – established in

France in 1776. French Finance Minister Jacques Necker sought to persuade the French King to expand the role of the Caisse d'Escompte and endow it with powerful instruments to deal with crises, but to no avail. Eventually, under changed political circumstances, Napoleon established the Banque de France (of which he made sure to be a leading shareholder). The Bank de France was to emerge as a provider of LOLR services. This arose because, while other banks of issue were also created in other French cities, the Banque de France became the main provider of liquidity to the system and, after it absorbed the regional banks of issue following the crisis of 1848, the Banque de France emerged as the one institution dedicated to coping with financial stress (Leclercq 2010). As an examination of contemporary discussions going back to the founding of the Caisse d'Escompte shows, by the late 18th century people understood, at least in broad terms, what it would take to establish a viable institution charged with operating as a LOLR. The British reformer Henry Thornton (1802) is credited for having articulated rules quite similar in spirit to Bagehot's later discussion of "modern" LOLR guidelines, demonstrating that the core principles of Bagehot have been advocated among financial experts for more than two centuries.

Creating an effective LOLR, however, was not just a matter of understanding its virtues. To be successful, a LOLR had to possess adequate skills and powers. To be politically viable, it had to exercise those powers in a way that satisfied the executive and his constituents. In part, that meant preserving fiscal discipline (as was most obviously apparent in the cases of several central banks created after 1815, which were launched as part of stabilization programs). Of course, as the experience of the Bank of England during the French wars reminds us, central banks also served the executive by enabling the contingent weakening of fiscal discipline (through the effective monetization of government debt and

suspension of the specie standard). While occasionally necessary, this power needed to be contained in order to avoid moral hazard. As a result, a major question during the nineteenth century (anticipating on late 20th centuries debates) was the optimal degree of central bank independence – enough to provide governments with a sufficient degree of flexibility in extreme circumstances, while ensuring prudent conduct during normal times (Levy 1911, Conant 1915, Flandreau, Le Cacheux and Zumer 1998). More broadly, to engender widespread political support, as the extent of democracy increased, the LOLR had to be perceived as having a credible commitment to socially beneficial goals, which ensured that it would be both effective and fair. These simple requirements for creating LOLR capacity that would be perceived as credibly exercised in the public interest were not easy to fulfill, even in the early stages of the evolution of central banks, as Goodhart (1988) emphasizes.

In particular, central banks like the Bank of England arose from privately owned banks of issue. Private ownership was an important and often neglected constraint on central banks' ability to credibly promote financial stability. It's not that LOLR lending was inherently unprofitable. On the contrary, LOLR lending tended to be naturally profitable (at least on a ex post, cash-flow basis): during crises, more money was lent, typically at a higher rate than the one prevailing in tranquil times. Provided that adequate collateral could be taken, the risk of loss seems to have been more than compensated for by the interest earned.

The concern that captivated contemporaries was not so much that a central bank would be leery to act, but that its course of action might not be optimal from a social welfare perspective. A bank endowed with powers sufficient to permit it to act as LOLR might use those powers to its own advantage, either to increase its short-term profit (by setting interest

rates too high during a crisis), or to increase its long-term market share (by confining its lending to its own network of business associates).

These were not hypothetical concerns. Many contemporary observers complained that vesting the preexisting banks of issue with the LOLR function was rife with conflicts of interest (Fazy 1826, Blasco-Martel, Nogues-Marco and Sudria 2013). In particular, observers worried that conflicts of interest between the Banque de France and the mid-19th century industrial finance-universal banking pioneer, the Credit Mobilier, and conflicts between the Bank of England and Overend & Gurney, might have encouraged the two LOLRs to allow their rivals to fail, in 1866 and 1867, respectively (Gille 1970, Goodhart 1988). Those concerns were visible in the long series of parliamentary investigations and committees (public and secret) that reviewed Bank of England policies following the major crises of the 19th century (such as in 1847, 1857, and 1866). The massive multi-volume "Inquiry on the Monetary Question" published in France during the 1860s also bears witness to the qualms contemporaries about privately owned crisis managers (Ministère des finances de l'agriculture du commerce et des travaux publics (1867-1869)).

The institutional solution to the problem of LOLR conflicts took the form of a contingent and multi-faceted political deal between the LOLR and the government, which ensured that the LOLR would meet criteria of effectiveness, prudence, and fairness. This deal established a complex partnership between the government and a preexisting bank of issue. The LOLR was granted special powers and was permitted substantial latitude in exercising those powers. At the same time, the LOLR was constrained to act in the public interest, and in a way that would engender confidence that the LOLR was in fact acting in the public interest. This deal did not take the form of detailed legislation specifying all of the actions to

be undertaken and the powers to be granted. Rather, the deal took the form of a partly explicit, partly implicit, contingent contract written between the state and the bank of issue.

2.2. Five Key Preconditions for the Contingent Contract between the LOLR and the State

We emphasize five key aspects of that arrangement. A LOLR had to have the capacity to create liquidity in sufficient amount. The key to that capacity was making the notes of the private bank of issue a legal tender. Indeed, the crucial need for a LOLR to issue large amounts of currency during a crisis is precisely the reason that modern day central banks tended to evolve from institutions known in the 18th or 19th century as "banks of issue" (that is, banks whose liabilities consisted primarily of bank notes).

The amount of notes issued by a bank of issue that did not enjoy legal tender authority was constrained by the bank's balance sheet – specifically, by the composition (riskiness) of its assets and the extent of its equity capital. Bank notes would not be acceptable as currency if their risk of default were not sufficiently low (Gorton and Pennacchi 1990, Calomiris and Kahn 1991). A bank issuing non-legal tender notes to purchase bills or make loans during a crisis would be increasing its own leverage in doing so, and thus increasing the default risk on those notes for any given amount of equity capital it maintained to finance its activities and any given amount of cash assets it held. Without legal tender authority, the value of the notes of a bank of issue would fall as the quantity issued increased, and at some point (given the reliable risk intolerance of the market for bank notes) the notes would cease to be accepted in the market.

As Smith (1776) and Knapp (1905) recognized, legal tender solved this problem. A bank of issue that possesses legal tender authority enjoys the backing of government tax

receipts, which provides yet another line of defense and foundation of value, after the bank's own equity and cash assets cease to do so.[6] However, in the British context of the first half of the 19th century, as a check against abuse of this privilege, the Bank of England was forced to maintain convertibility of its notes into gold, and further was required to maintain (after 1844) a 100 percent specie reserve against its outstanding notes. Some observers saw athis as a means for preventing the occurrence of crises. At the same time, power was given to the executive (the Exchequer) to relieve the Bank from its obligations in times of emergency (Wood 1939).

Second, in addition to the capacity to issue liquidity, the LOLR needed a mandate to guide its actions under crisis circumstances. In the context of the Bank of England, the mandate to act was a bit vague initially, but became increasingly clear over time. Public statements by influential government officials were one way to clarify a LOLR's mandate, by specifically stating what was expected. This was particularly meaningful in the case of the Bank of England because its charter was subject to revocation. During the debate over the 1833 statute that created the legislative power to revoke the charter, legislators specifically noted that the failure to provide adequate protection during crises would be one reason to revoke the charter. That action would signal that a crisis was occurring in the eyes of the government and that the government expected the LOLR to address it. In other words, in the case of the Bank of England, the "Treasury letter" gave both the means and the mandate. Finally, actions taken during crisis periods were subject to subsequent review, and the Bank faced the possibility of being censured if it was found to have behaved wrongly.

[6] Holders of legal tender notes are aware that they can use them to pay taxes in lieu of specie at a pre-defined parity, which creates effective tax backing for the notes, and keeps them trading at their par value in specie, so long as the present value of future taxes relative to bank notes was sufficiently high (Calomiris 1988a).

Third, in addition to possessing necessary powers and a clear mandate to act, the LOLR had to have the latitude to vary the interest rates it was willing to pay on loans and discounts according to market circumstances, and in a way compatible with prudent LOLR behavior. For example, complying with Bagehot's Rule, which calls for lending freely against good collateral at a high rate, required that the LOLR set rates high at some times. As Bignon, Flandreau and Ugolini (2012) show, raising interest rates during crises not only had moral-hazard mitigating benefits, it also increased the supply of credit by other lenders in the market (by augmenting the opportunity cost of parking cash as a safe but zero interest deposit with the Bank of England).

Raising interest rates, however, was not always permitted under prevailing usury laws. In the 18th and early 19th century, usury laws typically were binding. For example, during the 18th century, a low-risk interbank interest rate implicit in the bill of exchange market typically varied around 3-4%, while usury limits were only a few percentage points higher, leaving little room for risk compensation (Flandreau, Flores, Gaillard and Nieto-Parra 2010, Jobst and Nogues-Marco 2013, Temin and Voth 2013).

The extent to which usury ceilings were binding on private lenders has been the subject of debate (Campbell 1928). However, it would have been particularly difficult for an officially chartered bank, whose actions were visible and which operated under a framework of government delegation, to openly flout official regulations.[7] An examination of interbank interest rates in France until the relaxation of usury laws supports the view that chartered banks charged stable short-term interest rates that conformed with the letter of the law

[7]On this topic see also Calomiris and Haber (2014, Chapter 4, pp. 96-97). The late historian Alain Plessis insisted verbally to one of us that he had found evidence that the Bank of France could occasionally charge "commissions" which enabled it to stay within the remit of the law while enjoying some leeway.

(Bignon, Flandreau and Ugolini 2012). During late 19th century crises, unconstrained LOLR lending would occur at more than double the typical usury ceilings of 5 or 6 percent, suggesting that ceilings must have mattered in earlier periods. The relaxation of usury laws, therefore, was a necessary precondition to the effective operation of the LOLR under Bagehot's Rule.

Fourth, bestowing a monopoly over liquidity provision to a bank through the legal tender privilege on its note issues raised the possibility that the privileged bank of issue might use its power during crisis periods to maximize profit rather than to set lending policies in keeping with the maximization of social objectives (that is, finding the appropriate balance between assistance and prudence implicit in the choice of a "high" lending rate and "good" collateral under Bagehot's Rule). To encourage LOLRs to internalize social objectives, governments increasingly resorted to taxing windfall profits earned by LOLRs during crises, usually taking advantage of a renewal of the LOLR's charter to incorporate such a stipulation (Levy 1911). This ex post taxation policy helped to create public support for employing high loan rates during crises. Taxation of profits meant that supplying liquidity in a crisis at a high interest rate was no longer a source of high private profit for the LOLR, and therefore, it was more defensible as a social objective. In other words, taxation of profits served to clothe an otherwise unpopular high interest rate lending rule during crises in the mantle of the common good.

Doing so also encouraged the LOLR to set rates with social or political tradeoffs in mind rather than its own profits, because the effects of its lending choices on its own profits net of loan losses during crises was limited (Flandreau 2008). We do not claim that this policy achieved an "optimal" amount of LOLR lending. An ex post tax, if set too high, could

reduce the incentive for the LOLR to lend in a crisis. After all, why suffer the risk of a loss if there is no potential gain? An optimal ex post tax on a privately owned LOLR, therefore, had to balance the need of retaining social support for the LOLR by limiting profits and the need to preserve strong incentives to act. At the same time, the risk of inaction was mitigated by the mandates encouraging central bankers to "do what it takes." The press and the parliament ensured that their actions would be closely monitored.[8]

Fifth, to avoid discriminatory treatment of some borrowers (e.g., those connected to the LOLR) it was important to establish procedures for central bank lending that would credibly limit favoritism during crises. This required the establishment of lending standards, and the embodiment of those standards in a pre-existing assessment of the risks of the various debtors and acceptors in the market. This took the form of the "rating book," which described the lending limits associated with each borrower or acceptor.

It must be admitted that such attempts to establish independent ex ante standards are subject to questions about the extent to which evaluations were biased, and the biases of such evaluations were in fact questioned.[9] Nevertheless, the existence of credit risk assessment standards that pre-dated a crisis, while certainly not unbiased, were a source of some

[8] Of course, today, the profits of LOLRs accrue to the state, not to private owners. Today, windfall profits from LOLR activities by central banks are taxed in the same way as their ordinary profits in the form of a dividend to the Treasury, although the timing of such payments differs across central banks depending on statutory and accounting regimes.

[9] Precisely because the assessment of the signature in the rating book was not anonymous and included a considerable element of discretion, such a pre-existing system of grades was vehemently criticized as biased, excessively conservative and sometimes simply incompetent. The few papers that have discussed the matter empirically such as Blasco-Martel, Nogues-Marco and Sudria's (2013) study of the Bank of Catalonia, and Accominotti's (2012) study of the relation between merchant banks, the Bank of England and the sterling crisis of 1931 have confirmed the clubbish quality of central bank-produced credit assessment. Qingyuan Yue, Luo and Ingram (2013) identified a similar pattern in the context of the New York clearinghouse before WWI at a time when US clearing houses fulfilled "proto" lending of last resort functions.

discipline and inter-temporal bureaucratic consistency. At least they prevented unlimited ad hoc favoritism during the crisis.

During the early and mid-19th century, these five key aspects of the political preconditions necessary for a LOLR were established for the Bank of England and for other major European LOLRs. In what follows, we briefly trace the adoption of these political and legal changes, with a focus on the case of the Bank of England.

2.3. The Early Evolution of the Bank of England and Other Banks of Issue as LOLRs

Throughout the Bank of England's history there had been calls within England and Wales for the chartering of additional banks. Prospective borrowers complained about the scarcity of credit and the relative instability of English banking (which were permitted to operate only as small partnerships, and therefore, had limited scale and ability to diversify). This was particularly apparent to British observers because of the successful operation of Scottish banks which pioneered many modern inventions in banking, including branch banking, small-denomination banknotes, bank clearing houses for exchanging notes, commercial credit lines, and interest bearing deposits. It was understood and frequently stated that the Scottish system provided abundant, low-cost credit with less risk of bank distress.[10] The government resisted calls for reform in England and Wales for many years because the maintenance of the Bank of England's monopoly rents made those rents available to be shared by the government when it experienced surges in war funding needs, as it did, for example, as late as 1797-1815.

[10] See Calomiris and Haber (2014), pp. 89-104.

Once Britain had defeated the French in 1815, however, there was little remaining justification for preserving the monopoly position of the Bank of England, especially given the political attacks to which the Bank of England had been subjected during the French wars for its cozy relationship with the British state. Within a few years, major changes were made. The spirit of the times was first visible in various governance reforms, such as those limiting government funding practices in 1817 and 1819 (Calomiris and Haber 2014, pp. 108-119). Additional pressures for reform emerged after the severe banking crisis of 1825 in which many small English banks failed (Neal 1998), exposing the Bank of England to significant losses (Bignon, Flandreau and Ugolini 2012).

There were three lessons the British public learned from the crisis of 1825. First, the Bank of England was not playing a reliable role as LOLR; it had permitted a severe contraction in liquidity to take place. Second, the Bank's status as a profit-seeking enterprise was seen as contributing to its failure to act sufficiently as a LOLR. The Bank of England was accused of having behaved pro-cyclically, providing excess liquidity during the boom and then amplifying the panic through restrictive monetary policy when the market reversed (Doubleday 1847). Third, the fragility of the banking system, especially in the countryside, was seen as a consequence of an excessive centralization of banking in London, due to the Bank of England's monopoly charter and the regulatory prohibition on more than five partners in a banking enterprise. In 1826, Parliament passed the Country Bankers' Act, which effectively forced the Bank of England to establish branches outside of London, and which also permitted for the first time the chartering of competing banks within England and Wales outside of a 65-mile radius of London.

In 1833 – importantly, on the heels of the significant 1832 electoral reform that broadened the voting franchise – the Bank of England's charter was up for renewal. This re-chartering was used as the opportunity for enacting sweeping reforms of the structure of the banking system and for imposing changes in the Bank of England's powers and mandates, all of which had important consequences for the evolution of the Bank as a LOLR. With respect to the structure of the English banking system, the law swept away existing limits on competition by permitting the chartering of joint stock banks even within London, a bitter pill for the Bank that it opposed vigorously.

With respect to the Bank of England's powers and responsibilities, the 1833 act was a watershed. It made the Bank of England's notes a legal tender and eliminated usury ceilings for discounting bills of three months or less maturity, effectively eliminating the constraints from usury ceilings in the discount market. The parliamentary discussion of the decision to make the Bank's notes a legal tender made it clear that legal tender status was intended to empower the Bank to act as an effective LOLR. The leading advocate of making the notes a legal tender specifically pointed to the advantage of freeing the Bank from the limits of its own balance sheet capacity during crises. Parliament also enacted a new provision allowing it to revoke the charter of the Bank at will (after an initial period), which was understood to be a warning to the Bank against failing to use its new powers for the public good (Calomiris and Haber 2014, pp. 116-117). Thus, the 1833 Act addressed three of the five political/legal requirements listed above for an effective LOLR –the creation of substantial capacity to lend via legal tender authority, the ability to raise rates without limit via the relaxation of usury ceilings, and the creation of some kind of expectation that the Bank would act as a LOLR, all made credible by the threat of charter revocation in case of ill use of its privileges.

The Peel Act of 1844 was the next step in the evolution of the Bank as a LOLR. Under this act, the Bank was constrained to maintain a 100% specie reserve against its note issues (beyond a 14 million £ "free" issue). This effectively capped the Bank's profits accruing from its notes' legal tender status. If enforced strictly, this law would have also prevented the Bank from expanding its note issues as needed during crises, and therefore, would have hobbled the Bank's actions as a LOLR. But the Peel Act was not enforced strictly. Although one cannot find in the Act any provision for crisis management, the Act routinely was relaxed by the government (technically, by the Chancellor of the Exchequer) during banking crises, specifically to signal to the Bank the need to act as a LOLR.

Specifically, in 1847, 1857, and 1866, in response to banking crises, the Peel Act was temporarily suspended. Interestingly, in each case, the Bank of England opposed the relaxation of the Peel Act. Each time the Peel Act was suspended, Parliament also tracked the note issues that had resulted from LOLR credit expansion (that is, note issues in excess of the amount of notes backed by 100% gold reserves – see Levy 1911, Flandreau 2008), and taxed the profits that arose from relaxing the note issuance limit. Taxing the profits associated with extraordinary lending during crises ensured that the fourth political foundation of the Bank's role as a LOLR would be satisfied, and that the Bank could reasonably argue that its lending policy had been set in accordance with the public interest.

The fifth and final political/legal requirement (sufficient impartiality in lending) was satisfied by reliance on the Bank of England's rating book and discount records, which served as a check on both the quality of the paper it discounted and its exposure to individual banks. The Bank of England established, as part of its normal business operations, a list of borrowers and acceptors with the maximum amount it was willing to lend to each (Flandreau

and Ugolini 2013, 2014). This "rating book" became the basis for risk assessments on which lending during crises would be based. These judgments (biased though they may have been) served in practice as the basis for what would constitute "good collateral."

Indeed, while references to "free" lending abound in the literature, the Bank of England never stopped monitoring its exposure to both discounters (who presented paper to the Bank) and acceptors (who had endorsed this paper) and would have doubtless stopped lending had any of its limits (to individual discounters or acceptors) been reached (Flandreau and Ugolini 2013). Evidently, an enormous amount of discretion must have been involved in setting those limits, although it is striking that from 1866 onwards complaints about preferred treatment abated.

Many other LOLRs evolved along different paths to arrive at similar solutions to satisfy the five key political/legal requirements of a LOLR. In particular, rating books like that of the Bank of England existed in all other LOLRs of which we are aware (see Blasco-Martel, Nogues-Marco and Sudria 2013 on Catalonia, Prunaux 2008 on France, Schiltz 2006 and Okazaki 2007 on Japan). And usury laws were relaxed by many countries – including France, Austria-Hungary, several Swiss cantons, Norway and Belgium – to facilitate lending by a LOLR after the experience of having to violate those usury laws in emergency lending during the worldwide Panic of 1857 (Bignon, Flandreau and Ugolini 2012). The chronological coincidence of this key transformation in national monetary policy making reflects the international connections that existed in this early age of financial "globalization," which calls for a less nation-centric history of the LOLR.

Despite all of this institutional progress, however, LOLR actions remained controversial and it took time to establish confidence in the impartiality and public purpose

of LOLRs.[11] For example, the Bank of England's decision to allow its rival, Overend & Gurney, to fail in 1866 has been the subject of continuing debate. Some see that decision as an opportunistic act, while others see it as reflecting the insolvency of Overend & Gurney and its prior abuse of the Bank's protection. The Bank had assisted Overend & Gurney in 1857, but partly out of concern for the moral-hazard consequences of anticipated assistance, the Bank of England adopted new lending standards in March 1858. Those standards limited the extent to which it was willing to accommodate bills brokers in non-crisis times (Calomiris and Haber 2014, pp. 119-125).

Likewise, the extent to which the Bagehot principles were actually adopted by the Bank of England remained limited, as the controversy that developed between Bagehot (a journalist) and Thomson Hankey (an director of the Bank of England and former governor) shows (Bignon, Flandreau and Ugolini 2012). Several recommendations by Bagehot were simply rejected by the Bank. For instance, Bagehot suggested extending the remit of liquidity provision to the debentures of "great railways," famously providing a favorable comparison with India stock – the "strange Empire of India" was his chosen turn of phrase -- which the Bank of England took as collateral (Bagehot 1873). In practice however, during the heyday of the "age of Bagehot" (1873 until World War I), the Bank of England persistently resisted calls to take railway securities as collateral even when the preferred stocks of railway companies became eligible trustee investments in 1882 (meaning that their soundness was so widely acknowledged that Parliament was prepared to lift the liability of trustees who would invest in them).[12] The difference in the view of the Bank was that the India Stock bore the

[11] For a review of the literature on the parallel experience of France, see White (2007, 2014), pp. 75-76.

[12] We are grateful to Matthieu Chavaz for having discussed this point with us.

signature of the British government, and it was understood that, while the government of India may experience a fiscal crisis, the British government would nonetheless stand behind it. In other words, solvency was not an issue for India Stock, while it was a potential issue for even the greatest railway.[13]

The change in policy in 1858 was applauded as a means of preventing excessive lending booms during normal times, while not unduly limiting lending to solvent borrowers during crises. Under the new policy, once a crisis began, the Bank was willing to freely discount to all market participants. Overend & Gurney had led the lending boom that predated the crisis – apparently, it did not take the new limits established by the Bank in 1858 to heart (perhaps believing that they were too big to fail). After the Bank allowed Overend & Gurney to fail, and the government signaled the need for it to act as a LOLR (through suspension of the Peel Act) the Bank lent generously to other market participants in 1866 to a similar extent and on similar terms as it had done during the Panic of 1857.

Interestingly, 1866 marked the end of any serious banking panics in Britain (despite some significant disturbances in 1878, 1890 and 1914). From that perspective, one could argue that the decision to permit Overend & Gurney to fail was a helpful discipline against the moral hazard of risk taking by large financial institutions (see also Capie 1998). Such a favorable view, however, does not disprove the view that in denying aid to Overend & Gurney the Bank of England may have been acting opportunistically to rid itself of a rival. In fact, the two interpretations should be combined rather than contrasted: by failing to support Overend & Gurney, the Bank of England demonstrated both its power and its determination

[13] Below we discuss why a LOLR that resists taking any risk may not be able to do much good during a crisis, although its strict attitude will encourage banks to be more conservative in their security holdings during normal times.

to control risk taking in the financial system. Allowing its rival to fail limited moral hazard behavior going forward in part because "punishing" Overend & Gurney's excesses consolidated the financial power of the Bank of England.

By the 1870s, the Bank of England had adopted, in reaction to the legislative history reviewed above, a contingent action rule for its behavior as a LOLR, which made use of its powers to vary interest rates, issue legal tender, and restore order to markets. This behavior was subject to broad Parliamentary (and cabinet) oversight, which sought to ensure that the Bank employed its powers in the public interest, acted fairly, and did not seek to profit excessively from its LOLR status or use its authority to punish rivals.

The successful transformation of the Bank of England from a chartered bank to a LOLR was assisted by the legislated changes in the competitive landscape that accompanied the legislative changes that established the Bank's powers and mandates. Prior to 1826, the Bank of England was the only chartered bank in England and Wales. The laws chartering joint stock banks – especially the 1833 law permitting entry even in London – resulted in an increasingly unified and consolidated British banking system in the mid-to-late 19th century (Collins 2012, Calomiris and Haber 2014, pp. 126-128). Although these changes eliminated the monopoly rights of the Bank of England, at the same time, they created new opportunities for it to play a unique role as a banker's bank in an increasingly large and integrated system. As we shall see, the consolidation of the banking system also made it easier for the Bank to act as a LOLR in new ways – in particular, as a coordinator of private banks' actions, and as a guarantor of private bank coalitions, rather than simply as an ad hoc discounter of paper or lender during crises.

2.4. Political Constraints on the LOLR: The United States and Canada

In the United States, commercial banks were chartered by the states after the American Revolution, and in 1791, the Bank of the United States (BUS) – designed and championed by Treasury Secretary Alexander Hamilton – was chartered by the national government. In 1792, as the BUS was being organized, the first incipient American banking crisis was addressed by the timely intervention of Hamilton, who responded to the crisis by having the U.S. Treasury provide collateralized loans to banks (Cowen, Sylla, and Wright 2006). Hamilton's approach to collateralized LOLR lending was an early example of an approach that conformed to "Bagehot's Rules." Hamilton's actions, however, were a one-time intervention; they were not institutionalized as a policy mandate either for the Treasury or for the newly created Bank of the United States.

The chartering of the Second Bank of the United States (SBUS) in 1816 was perhaps the first time that a U.S. financial institution was charged – albeit only vaguely and implicitly – with the responsibility of maintaining order in the U.S. banking system. This was done through the creation of a conflicted political mandate that required, on the one hand, the SBUS to serve as a source of market discipline by monitoring the activities of other banks (by transporting and redeeming other banks' notes at the issuing bank's headquarters, thus preventing excessive issuance of those notes) and also, on the other hand, as a source of assistance to those same banks, including by endorsing acceptances, notably during crises.

The SBUS's role involved, as elsewhere where central banking was developed, an element of conflict of interest, which conjured up political opposition. Not surprisingly, during the crisis of 1819, the SBUS was accused of intentionally failing to provide sufficient support to the banking system, a criticism that contributed to the opposition to the re-

chartering of the SBUS. Later it also was accused of being self-serving and excessively powerful (Catterall 1902, Temin 1969, pp. 44-48).

Despite such accusations, there is convincing empirical evidence that the SBUS did, in fact, help to stabilize the financial system. Bernstein, Hughson and Weidenmier (2009) find that the SBUS's presence was associated with reduced seasonality of the cost of credit. Nevertheless, the successful opposition to the SBUS by President Andrew Jackson and others led to its breakup after 1832. Between the 1830s and the founding of the Fed in 1913, there was no institution in the United States charged with acting as a LOLR during crises, although the U.S. Treasury did occasionally manage its own accounts in a manner that was designed to offset problems of market illiquidity to some extent (Friedman and Schwartz 1963, pp. 149-155, Timberlake 1978).

The United States was the most banking crisis-prone economy in the world from the 1830s to the 1930s (Bordo 1985, Calomiris and Haber 2014). Using the Laeven and Valencia (2013) definition of a banking crisis – a moment either of significant negative net worth of failing banks, or of significant sudden withdrawal pressures on banks, or both – the U.S. experienced major banking crises in 1837, 1839, 1857, 1861, 1873, 1884, 1890, 1893, 1896, 1907, the 1920s (in agricultural states), and 1931-1933. These crises differed from one another in their particulars. Some exhibited protracted bank suspension or severe rates of bank failure (1837, 1839, 1857 in the North, 1861 in the North, the 1920s in agricultural states, and 1931-1933), other episodes displayed scattered bank insolvency and severe withdrawals from banks culminating in widespread but short-lived suspensions of convertibility (1873, 1893, and 1907), and still others showed significant withdrawal

pressures that were not severe enough to force widespread suspensions of convertibility (1884, 1890, and 1896).[14]

The unique crisis-prone nature of the U.S. banking system cannot simply be ascribed to the absence of a LOLR in the United States. Regulations limiting branching produced a peculiarly fragile "unit" (single-office) system of banks, which lasted until these laws were relaxed during the 1980s and 1990s.[15]

In contrast, Canada – a country without a central bank until 1935, and with a more volatile national income than the United States, owing to its reliance on primary commodity exports – has never suffered a severe banking crisis, and experienced only two short-lived suspensions of convertibility, which occurred in 1837 and 1839, in reaction to the ramifications of the U.S. crises of those years.

Canadian stability without a LOLR reflected a combination of influences, including the ability of nationwide branching banks in Canada to avoid crises through better ex ante diversification, greater competitiveness and efficiency, and better ex post coordination of collective actions by banks in response to shocks (Calomiris 2000, 2010 and Calomiris and Haber 2014). The U.S. unit banking system created barriers to entry (especially in sparsely populated areas that could support the activities of several banks' branches, but not several banks). Those barriers resulted in a less competitive, less diversified system that was unable

[14] See Sprague (1910), Wicker (1996, 2000), Gorton (1985), Calomiris (1988b), Calomiris and Gorton (1991), Calomiris and Schweikart (1991), Calomiris (1990, 1992), Calomiris and Mason (1997, 2003a), Carlson (2005, 2013), Bruner and Carr (2007), Calomiris and Carlson (2015), and Calomiris and Haber (2014, Chapter 6).
[15] Unit banking also begat unique adaptations of information processing. In the absence of nationwide bank networks, the U.S. developed an original way of gathering information that relied commoditization of credit reporting through intermediaries (the mercantile agencies). This structure was second-best because agencies did not have skin in the game that suffered losses when they made inaccurate credit reports (Flandreau and Geisler Mesevage 2013).

to coordinate the behavior of its many thousands of small, geographically isolated banks to forestall or address banking crises through collective action. Coordination requires the physical ability and economic incentives of banks to monitor each other's actions to prevent free riding. In a system of thousands of geographically isolated banks, this monitoring was not feasible or incentive-compatible. In contrast, Canada's nationwide branching banks were small in number and overlapping in location, and therefore, were able to coordinate their actions more effectively.

Canadian banks – under the leadership of the Bank of Montreal – made use of collective action to remove depositors' incentives to run banks during times where asymmetric information about bank exposures to a failure might have had systemic consequences for remaining banks. This occurred twice – in 1906 to prevent systemic consequences from the failure of the Bank of Ontario, and in 1908, to protect the system from the consequences of the failure of the Sovereign Bank of Canada. In these cases, the Bank of Montreal orchestrated takeovers of the assets and operations of the failed banks, and losses associated with the takeovers were spread among surviving banks.[16]

Importantly, this was not done routinely; many Canadian banks failed without being bailed out by survivors. Only when the banks agreed – on the basis of their knowledge of each other's circumstances – that systemic risk (related to asymmetric information about potential exposures of survivors) was sufficiently great did they choose to intervene. The fact that they were using their own funds to prevent systemic risk, made those systemic risk assessments credible.

[16] See Calomiris and Haber (2014), pp. 305-306.

In the United States, when the number of banks in a local coalition were small enough and geographically coincident, banks also coordinated to provide mutual liquidity assistance and interbank monitoring, but this sort of coordination was localized and limited to isolated sub-groups of U.S. banks. Such sub-groups included the state-level mutual-guarantee-system banks of Indiana and Ohio (Golembe and Warburton 1958, Calomiris 1989, 1990) – which were among the only banks in the North to avoid suspension of convertibility during the Panic of 1857. The branch banking systems of the antebellum South – which also fared well during the Panic of 1857 (Calomiris and Schweikart 1991) – were another example, as were the bank clearing houses operating in major cities. Clearing house members provided mutual insurance through joint liability among members for clearing house loan certificates (Cannon 1910, Timberlake 1984, Gorton 1985). None of these groups, however, could coordinate national flows of funds or national resolution policy privately (in contrast to Canadian banks), and so these arrangements were not able to avoid costly nationwide panics.

2.5. The Political Economy of U.S.-Canadian Banking Differences

If Canada's regulatory choices were so beneficial for producing stability, then why did the U.S. persist in choosing unit banking? Canada's colonial history produced a very different political structure and Constitution from that of the United States – one that is better designed to limit populist control of banking legislation. The result has been a consistent record of success for Canadian banking measured in greater stability, efficiency, and competitiveness.

Unlike the U.S., Canadian economic policy-making – including policies regarding banking – were highly centralized. That meant that any attempt to impose unit banking

restrictions had to win the day as a national economic policy, rather than as a state-level initiative. In the U.S. state-level power to regulate the structure of banking not only empowered agrarian interests that favored unit banking, it also rendered virtually impossible the establishment of a nationwide branch banking system.

Furthermore, the Canadian Constitution established a powerful appointed Senate, which remains to this day a bulwark of resistance to populist capture of banking policy. There were attempts to introduce legislation that would have transformed Canada's nationwide branch banking system into a unit banking system, but these, along with many other populist banking proposals, consistently ran aground in the Senate (Calomiris and Haber 2014).

2.6. The Fed's Early Role as a LOLR

The destabilizing effects of unit banking in the U.S. meant that even the Founding of the Federal Reserve System in 1913 – which established a central bank able to make collateralized loans and to engage in discounting for a limited range of financial instruments – had a limited effect on preventing banking crises. Its main positive contribution was the role of the discount window in limiting systemic liquidity risk associated with seasonal swings in loan demand (Miron 1986; Hanes and Rhode 2013).

The availability of the discount window allowed banks to sell loans to the Fed at seasonal peaks. The option of doing so entailed a reduction in liquidity risk, and actually using one's access to the discount window to sell loans at seasonal peaks also reduced bank asset risk and leverage, thereby reducing default risk. Prior to the creation of the Fed, banks had to absorb all seasonal increases in lending on their own balance sheets, which implied

substantial seasonal variation in bank default risk and liquidity risk (as both leverage and asset risk rose in the fall and spring).

The reduction in seasonal risk via the founding of the Fed was a significant contribution to financial stability, as it resulted in observable reductions in the seasonality of monthly averages of interest rates and reductions in the seasonality of monthly interest rate and stock return volatilities, as well as increases in seasonal loan supply.[17] It succeeded in laying the foundation of a thriving acceptances market which further bolstered liquidity and reduced the liquidity spread that had once existed between New York and London (Ferderer, 2003, Eichengreen and Flandreau 2012). But this reduced liquidity risk did not address the heart of the problem of banking system instability – unit banking – and therefore proved insufficient to prevent major banking crises from resulting when large shocks buffeted the economy in the 1920s and 1930s. The fundamental inability of the American banking system to diversify ex ante and to coordinate behavior ex post simply remained politically infeasible.

The problems of U.S. agricultural banks that caused localized waves of bank failures in the 1920s worsened in the early 1930s, as agricultural prices and incomes collapsed. U.S. banks that failed in the 1930s generally were fundamentally insolvent (Calomiris and Mason 1997, 2003a). That experience was in sharp contrast to Canada, where despite similar collapses in prices and incomes, systemic banking crises were avoided as the result of nationwide branching banks' diversification and efficiency (even in the absence of a central bank). The founding of the Bank of Canada did not reflect an absence of a LOLR but rather was the result of inflationist pressures of western commodity producers (Cain 1996, Calomiris and Haber 2014).

[17] See Miron, Mankiw and Miron (1987), Bernstein, Hughson, and Weidenmier (20010), Calomiris (2000, 2013), Bordo (2006), Calomiris and Haber (2014), and Calomiris, Jaremski, Park, and Richardson (2015).

The founders of the Fed were aware of the special challenges the U.S. faced as the result of unit banking. The National Monetary Commission had studied every major country's banking system in great detail, and had drawn attention to the structural defects in the U.S. system. Although that recognition might have led them to make bolder recommendations – either to end unit banking, or to increase the Fed's tools to battle systemic risk, political constraints forced the Fed's founders to settle for an approach that mitigated seasonal liquidity risk rather than addressing deeper problems.[18]

The Fed also was severely limited in what it could do to assist banks during panics. The establishment of the Fed occurred despite headwinds of strong political resistance to creating a powerful "central bank." As Meltzer (2003) notes, Senator Carter Glass, one of the Fed's founders', bristled at the suggestion that he had helped create a central bank, proudly insisting on the decentralized character of the Federal Reserve System. American resistance to centralization of banking authority resulted in a system of twelve Federal Reserve Banks with a great deal of autonomy in setting their regional lending policies – an autonomy that survived until the centralizing reforms of the 1930s. Furthermore, consistent with the dominance of the "real bills doctrine," the Fed was constrained to discount or lend against only a narrow range of financial instruments (for a discussion of this doctrine, see Meltzer 2003, Calomiris 2010, 2013).

[18] The Fed's founders, especially Paul Warburg, wanted to make membership in the Fed mandatory for all banks, partly in recognition of the positive systemic externalities associated with broader membership (which meant broader access to the discount window, and reduced liquidity risk). But even this effort was met with great resistance (Calomiris, Jaremski, Park and Richardson 2015). In the 1930s, non-member banks' exposures to liquidity risk substantially exacerbated the illiquidity problems in the banking system (Mitchener and Richardson 2015).

The detailed legislative limits on the powers and dealings of the Fed stand in sharp contrast to the absence of such guidelines for the Bank of England and many other LOLRs. The Fed was constrained by a fractional gold reserve requirement, and unlike the Bank of England, that requirement was not suspended during crises. There was no U.S. equivalent to the treasury letter whereby the central bank was enabled to suspend the application of statutory limits on the issue of banknotes. That meant that the Fed could not lend freely without limit. Although Friedman and Schwartz (1963) argue that the Fed never was actually limited by this constraint, the prospect of hitting the constraint may have affected Fed thinking and actions and encouraged the deflationary bias that Friedman and Schwartz deplored.

Furthermore, collateralized lending is a limited tool for addressing illiquidity risks that result from heightened insolvency risk of banks; indeed, collateralized lending can increase the riskiness of deposits. During the 1930s, some observers argued that collateralized lending was backfiring -- fueling rather than preventing depositor withdrawals. When the Fed made collateralized loans to banks, the best quality assets were removed from the banks' balance sheets, effectively subordinating depositors and increasing the riskiness of deposits. In recognition of that fact, weak banks stood to gain little from increased lending, either from the Fed or from the newly established Reconstruction Finance Corporation (RFC), which beginning in 1932 also became an additional source of collateralized lending against low-risk assets.

Note that this mechanism is similar to that which prevailed when the Bank of England took the "good paper" of financial institutions such as the Agra and Masterman Bank, one of the largest discount clients of the Bank of England in 1866, and one that was soon to fail. In

effect, the Bank had taken the best assets for discount, assets that were no longer available to claimholders when the Agra and Masterman failed.[19]

2.7. Australia's Protracted Process for Establishing a Central Bank

In the early 1890s Australia suffered what was perhaps the most devastating banking crisis in the world during the latter quarter of the 19th century. More than half of the banks of issue suspended during the crisis. Some of those reopened after converting some of their deposit liabilities into equity. Roughly one third of the banks closed and never reopened (Cornish 2010, p. 1). Although this banking collapse and the depression that accompanied it served to galvanize support for establishing a central bank with LOLR authority, it took some six decades to resolve some of the most important disputes about the structure and powers of a central bank.

The Australian parliament established the Commonwealth Bank of Australia (CBA) in 1911, but this was constituted as a commercial bank, albeit one with multiple responsibilities, and a mandate to provide banking services to the government. Those responsibilities grew to include providing credit subsidies for mortgages and rural credit, and the administration of credit controls over other banks during World War II. Eventually the CBA was transformed into a central bank, the Reserve Bank of Australia (RBA). The political struggle over the structure and functions of Australia's central bank was embodied in various legislative acts (most notably, 1911, 1924, 1941, 1945 and 1959), Parliamentary debates, advice from representatives of the Bank of England (who in the 1920s advised the Australian government that the commercial banking operations of CBA were inappropriate

[19] Data on Bank of England discount clients is from Flandreau and Ugolini (2013)

for a properly constituted central bank), the findings of an important Royal Commission in the mid-1930s, and 1940s court battles.

The RBA was tasked with serving only the public interest; its overarching statutory goals are to pursue "the greatest advantage of the people of Australia" by contributing to "(a) the stability of the currency of Australia; (b) the maintenance of full employment in Australia; and (c) the economic prosperity and welfare of the people of Australia"(Section 10, Reserve Bank Act 1959).

As a political creation that took form slowly over the first half of the 20th century, its structure and mandates were shaped by two world wars, a global Great Depression, and a struggle between traditional financial interests that had governed banking policy in the past and the growing political power of labor interests that sought and won increasing influence over economic and financial policies. Its monetary policy orientation was philosophically Keynesian. Its LOLR powers were unconstrained statutorily. After all, the 1940s and 1950s were an era when the aggressive use of government policy to control production and credit had become commonplace. If not for a court battle that prevented it, Australia's Parliament would have nationalized the entire banking system in the 1940s. It is likely that in the absence of the trend toward centralized government control over the economy and the ascendance of the Labor Party during the first half of the 20th century, the goals, structure and powers of the RBA would have been quite different (Giblin 1951, Schedvin 1992, Bell 2004, Cornish 2010).

The political environment in which the RBA was created had a lasting influence on its charter, which contained none of the statutory limits on its activities that are present in the charters of the Federal Reserve System or the Bank of Canada. In that respect it was more

similar to the charter of the Bank of England, an institution whose discretionary latitude to act as a LOLR has never been enumerated or limited by statute. But that similar outcome was the result of a completely different, 20th-century political struggle.

3. Beyond Bagehot's Rule

3.1. The Bank of England's Response to the Barings Crisis

Although early LOLR policy focused on collateralized lending, this changed in the latter quarter of the 19th century. In 1890, the London investment bank Barings looked like it might fail, owing to its exposure to Argentine waterworks securities it had underwritten, which proved unsalable as a result of Argentina's earlier sovereign default and investors' anxiety towards Latin American securities. Barings was big in the market of acceptances (Chapman 1984) and its failure might wreak havoc in a market that the entire banking system relied upon as a staple of liquidity. Furthermore, Barings' failure might produce worry about clearing banks' health, especially given that their exposures to Barings were unknown. Depositors in London's clearing banks, not knowing which bank was exposed to what degree, might withdraw from all banks.

To avoid this negative externality, the clearing banks approached the Bank of England and asked it to help prevent Barings from failing. The Bank of England told the clearing banks to put together a bailout fund for Barings, and offered to provide support to the coalition that established that fund.

This was, in essence, the form of support that the Bank of England had suggested in 1866 – except that back then commercial banks had rejected the idea of supporting Overend, Gurney (Flandreau and Ugolini 2013). The method had also been implemented by the Bank

of France in 1882, when it had provided assistance to the Paris Bourse and in 1889 when it stemmed a banking crisis that involved the Comptoir d'Escompte (White 2007, 2011, 2014). Indirect liquidity support of that kind also had previously occurred in instances of support offered by one central bank to another, such as in the provision of bullion between the Bank of France and the Bank of England in 1847 and later. In such cases, private bankers sometimes were asked to provide the help to one official institution but were then seconded by support from the other (Flandreau 1997).

In effect, in its response to the Barings Crisis, the Bank of England was agreeing to provide a guarantee – a form of senior support to a rescue fund – so long as the other banks were willing to take on junior positions. This structure gave credibility to the coalition and ensured minimal exposure to loss for the Bank of England. Furthermore, because the clearing banks were placing their own funds at risk, the Bank could be confident that the systemic risk associated with the externalities claimed by the clearing banks was a real concern, at least in their minds. This creative form of LOLR assistance was possible because the clearing banks themselves were able to form a coalition and agree on how to share prospective costs. The design of the arrangement also signaled the clearing banks' commitment to work collectively and thus revealed important positive information to depositors. It is important to emphasize that the ability to act in this way reflected the consolidated structure of the banking industry (the small number of banks involved), which facilitated such coordination. As we noted before, the voluntary coordinated bailouts of 1906 and 1908 in Canada would again illustrate this same advantage of a consolidated banking system.

Why was the creation of a bailout fund for Barings superior to the traditional mechanism of collateralized lending? Like collateralized lending, the exposure of the Bank to

loss was limited. And, as in the case of collateralized lending, the cost due to moral hazard (encouraging future risk taking) was limited by forcing the clearing banks to contribute to the fund.

But the new approach had an advantage. The creation of the guarantee fund nipped the problem of liquidity risk in the bud, rather than trying to address liquidity problems after they arose. Rather than just lending to each of them individually, the creation of the fund and the backing of the Bank of England credibly demonstrated to the market that the banking system as a whole would share in Barings losses if it became insolvent. Doing so ensured that no one bank would be brought down by counterparty risk related to those losses. The Bank of England's backstop for this scheme further ensured that, on the remote chance of the "bad equilibrium" of systemic collapse threatening to emerge, the Bank of England's further liquidity support would be available. That added protection made it clear that banks would be able to meet any deposit withdrawal requests that would be made out of generous discounting. These features removed the incentive of individual depositors to rush to the head of the line, and thus, quashed the risk of a systemic run before it became a possibility.

This was not the only action of its kind by the Bank of England over the course of its history. In 1973-1975, a similar intervention occurred in response to the so-called "Secondary Banking Crisis", a real estate crash which threatened to bankrupt a number of smaller "secondary" lenders. The Bank of England worked once again with a coalition of private banks to assemble assistance packages in support of weak financial institutions.[20]

[20] In this case, the nature of risk tranching was less clear. It seems that the Bank of England may have taken a more junior role in assisting the 1970s bailout (Capie 2010, p. 12).

3.2. Constrained LOLR Support in Russia and Mexico

Not all countries enjoyed the same latitude to provide LOLR that Britain and France enjoyed. The experiences of Russia and Mexico illustrate how limitations inherent in some countries – in particular, peripheral countries governed by autocracies that were adhering to the gold standard in the pre-World War I era – led them to choose somewhat different approaches to LOLR assistance during crises.

Russia and Mexico both were ruled by dictators (General Porfirio Diaz and Tsar Nicholas II). Both countries faced major liquidity shocks associated with externally generated banking crises – in 1900 in Russia, and in 1907 in Mexico. Neither country had established an independent central bank. After all, creating an independent locus of financial power that was delegated to act in the public interest was not exactly considered de rigueur among autocrats. Such institutions might challenge the authority of autocrats or dilute their ability to allocate rents as they see fit.

As a result, Russia's "central bank" was a state-owned bureaucracy. In Mexico, there was a retinue of "private" banks, which were part of the long-term rent sharing arrangement with the government (visible in their boards of directors, and their borrowers, who were often the same, and who were part of a broader network of intermarriage, etc., of the people running the government, the major industrial firms, and the banks). LOLR assistance in Russia and Mexico, therefore, was determined by the Finance ministers working for the dictators, Sergei Witte and Jose Limantour, not by central bankers. Intervention openly favored the coalition in power. In democracies, powerful interests also may "capture" the LOLR, but this is not done as openly, as universally or to the same degree as in crony-capitalist autocracies.

For countries like Mexico and Russia around the turn of the 20th century, emergency liquidity provision required the government to secure liquidity in international capital markets (through short term borrowing or the issue of foreign bonds) and pass the proceeds on to their banks. Fortunately for autocrats, capital markets did not discriminate against autocracies (contrary to the view of more recent practices found in Schulz and Weingast 2003). Indeed, dictators were seen by lenders as valuable partners for long-term, relationship banking precisely because dictators had limited options and desperately needed to rely on external help to fund their repressive policies (Flandreau and Flores 2012). But unlimited access to assistance from the autocrat could not be taken for granted. If the approach adopted by an autocrat had been too generous toward his banks – thus exposing him to substantial losses – that could have undermined his ability to access global markets. Argentina's "triplet crisis" experience in 1890 had illustrated how the fiscalization of banking losses through unlimited government guarantees of banks' mortgages (which in Argentina took the form of so-called cedulas – government guaranteed mortgages) could cause an exchange rate collapse so extreme that it made servicing the external debt impossible. Likewise, if Russia and Mexico had tried to bear too much of the banks' risks, they might not have been able to deliver any liquidity assistance through access to external markets.

This need to limit assistance helps to explain how Witte and Limantour tackled their respective crises. Rather than adopting Bagehot's Rule of free discounting, using the legal tender of a bank of issue, and letting the central bank recognize good collateral as it saw fit, Witte offered a limited amount of assistance to a limited number of banks. He personally examined the affairs of the major banks and decided which were sufficiently sound to warrant a loan. In doing so, he allowed several banks to fail (resulting in the suicide of a

prominent Russian banker). This sort of discretionary favoritism would have been much more difficult to sustain in a democracy. But autocratic Russia retained the ability to make politically unconstrained discretionary choices about who would survive and who would fail, meaning that financial crises might also be an opportunity to settle political disputes.

Limantour also used sovereign access to global markets to assist Mexican banks, again with limited aggregate exposure to loss for the sovereign. In doing so, it might be said that he invented securitization. Mexican banks combined a certain amount of good loans into a common pool, the newly chartered Caja de Prestamos. The banks retained the junior tranche of the pool, the government effectively retained a middle tranche, and foreign funding sources effectively received the most senior tranche. The fact that the government had skin in the game, and much to lose from absorbing excessive losses, made the scheme credible. The shares in the Caja de Prestamos ended up returning substantial profits to the Mexican banks that had contributed to it.[21]

3.3. U.S. Preferred Stock Purchases of 1933-1934

The banking collapse of 1930-1933 in the U.S. brought a host of changes to banking policy, including new Fed discretionary authority (under section 13(3)) to make emergency loans to non-banks, the creation of federal deposit insurance for small deposits, and the transformation of the Reconstruction Finance Corporation (RFC) from a collateralized lender to a new kind of LOLR, making preferred stock investments in U.S. banks.

The use of preferred stock reflected the belief that collateralized lending would be counterproductive because its subordinated the position of depositors. Preferred stock

[21] For a review of this experience, see Calomiris and Haber (2014), pp. 343-344.

investments of the RFC in banks gave priority to the RFC over shareholders but were junior to depositors and not collateralized; therefore, unlike loans collateralized by the banks' best assets, they did not produce the potential for depositor runs by subordinating depositors claims against banks' assets.

After the nationwide closure of banks in March 1933, only banks that had been examined and deemed solvent could reopen. Within that group, those believed to be weak were encouraged to apply for RFC assistance. Despite the advantages of preferred stock, its use also created a potential problem: the possibility of large losses for taxpayers if banks were unable to repay the preferred stock investments. In the event, the RFC did not suffer losses overall on its preferred stock investments (on a cash flow basis), although there is no doubt that in economic terms it absorbed significant ex ante bank risk at a subsidized interest rate relative to the market rate. Mason (1996, 2001a, 2001b, 2003), Calomiris and Mason (2004), and Calomiris, Mason, Weidenmier and Bobroff (2013) study the effectiveness of RFC preferred stock purchases. They find that preferred stock issues were quite effective in assisting weakened, but not insolvent, U.S. banks in recovering after March 1933. They also find that preferred stock investments promoted increased supply of credit in the market.

Several features of the RFC's administration were crucial to that success. The RFC screened applicants and did not lend to deeply insolvent banks. Screening seems to have been credible, and there is no evidence of political influence over RFC funding. Banks that received preferred stock funding were constrained in their payments of common dividends, and were required to develop capital raising plans that soon resulted in substantial improvements in their financial positions. The RFC's approach to selective, disciplined assistance and to limited risk absorption made it a model for successful bank assistance

programs in environments of severe systemic shocks to bank insolvency risk, where collateralized lending may not be very helpful.[22]

3.4. When Collateralized Lending Is Not the Optimal LOLR Policy

Conventional collateralized lending to the banks against "good" collateral can be helpful in responding to liquidity risk because the LOLR absorbs some of the solvency risk of the bank when it lends cash to the bank against good (but not riskless) assets. Doing so reduces banks' asset risks, which reduces their default risk, which in turn reduces their liquidity risk. An open question is whether a LOLR that is unwilling to absorb any risk can do any good. As noted before, if collateralized lending targets only the lowest risk assets it will effectively subordinate deposits, and thereby increases their riskiness, encouraging rather than discouraging deposit withdrawals. Our prior discussion of Bagehot's calls for extending collateral status to railway securities suggests that he understood this point.

Given the purpose of LOLR assistance (preventing systemic disruptions to payment systems and credit markets), it is clear that collateralized lending may not always be the most effective tool for preventing a systemic crisis in the banking system. Most obviously, lending against good collateral can only provide a limited credit risk subsidy from the LOLR to the banks, which implies that it can have only a limited effect on reducing the risk of depositor withdrawals. If depositors' perceptions of default risk increases are greater than the implied subsidy from LOLR lending, such lending may not be enough to stop massive withdrawals. Furthermore, such lending can create moral-hazard problems for banks (sometimes called the "debt overhang" problem). A bank with sufficiently high default risk that receives cash from

[22] For reviews of other countries experiences, not all of which were so successful, see Calomiris, Klingebiel and Laeven (2005).

a LOLR may optimally choose to gamble for resurrection by increasing asset risk, in a bid to restore its solvency. For both these reasons, collateralized lending will be an inadequate remedy for a particularly severe shock to banks' default risks.

Furthermore, as we saw in our discussion of LOLR guarantees (as in the case of the Bank of England's approach to the Barings Crisis), guarantees can be structured to have the same incentive and risk-sharing advantages as collateralized lending, but may be better able to prevent liquidity crises from happening by changing depositors' perceptions of default risk, thus removing the incentive of depositors to run their banks.

Finally, the unlimited "lending freely" requirement of Bagehot's Rule may threaten a fragile commitment to maintain a fixed exchange rate (although in Bagehot's view, it is worth noting that one motivation for charging high rates appears to have been precisely the desire to prevent capital flight). A central bank's or government's commitment to maintaining a fixed exchange rate is dependent both on its cash reserves and the fiscal policy stance of the government. A LOLR willing to undertake an unlimited amount of risk transfer by "lending freely" to many banks may undermine market confidence in its exchange rate commitment. Likewise if fiscal resources are used to support the banking system, then there is a risk that "lending freely" will undermine market confidence in government debt (a concern we saw at work in the Russian and Mexican autocrats' bail out packages).

To summarize, in some cases, Bagehot's Rule may be a relatively ineffective or costly LOLR tool compared to other mechanisms, depending on the circumstances of the particular crisis that the LOLR faces. Viewed from this perspective, it is no wonder that many countries occasionally chose alternative LOLR mechanisms.

3.5. Bagehot's Principles: Beyond Collateralized Lending

The various alternative approaches to assistance that LOLRs employed in the pre-World War II era included guarantees, securitization, and preferred stock purchases – in addition to traditional collateralized lending. Although these mechanisms differ from Bagehot's advocacy of lending freely to market participants against good collateral at a high rate, there are common principles that underlie all of these interventions, which make them similar in spirit to Bagehot's Rule. As Fetter (1965) understood in his description of what he called the "Development of British Monetary Orthodoxy," the "Bagehot Principle" has been embedded into policy in a variety of ways. For that reason we refer to those common guiding principles as "Bagehot's Principles."[23]

In all cases, assistance was designed to address systemic problems, not to prevent particular banks and borrowers (those that are deeply insolvent) from failing per se. Assistance rules were set from the standpoint of the needs of the banking system and the economy. To limit moral hazard and adverse selection, some form of screening (either of collateral quality or of borrowers) was established to minimize the immediate costs of providing assistance and to address the incentive problems for the future created by assisting banks today. For the same reasons, the central bank or sovereign LOLR took the most senior position possible while addressing systemic risk.

The specific mechanism chosen reflected the nature and size of the shock buffeting the banking system. In the case of large systemic shocks, preferred stock investments are potentially desirable (to avoid depositor subordination from collateralized lending), and one could argue that in still more serious cases, when the value of bank equity is extremely low,

[23] See also Martin (2008).

debt overhang problems associated with the fixed payment obligations of preferred stock coupons may make other methods of systemic assistance desirable, even though they require greater risk absorption than preferred stock investments (Caballero 2009, Calomiris 2009, Calomiris and Khan 2015). Those riskier alternatives, however, were avoided when a more senior approach to assistance that satisfactorily addressed systemic problems was feasible.[24]

After World War II, however – and especially after the 1970s – a new set of policies were implemented in most countries, which combine various LOLR interventions with new, generous blanket support for banks in the form of deposit insurance or government bailouts of banks. Another change, which differentiates markedly the previous era from the current one, is the switch from crisis lending at high rates to the modern approach which favors the lowering of interest rates. Likely related to these differences, banking crises used to be violent and brief. They now often tend to create situations where the vulnerability of the financial system lingers, and losses compound, sometimes over years.

This new approach to crisis management has been propelled by changes in the political economy of banking that favors virtually unlimited protection of banks, particularly of large banks (the so-called "too-big-to-fail" doctrine). This change in policy likely reflects the popularity in democracies of preventing credit crunches and insulating average citizens from losses on their deposits. Nevertheless, the social costs of this new approach have proved to be large. In the next section, we review the substantial empirical evidence showing that this Unlimited Protection approach – which departs dramatically from Bagehot's Principles – has entailed major social costs.

[24] Specifically, preferred stock may not work when debt overhang problems would create moral hazard problems from an excessive amount of fixed income obligations, as discussed in Jensen and Meckling (1976) or Myers (1977).

3.6. The Brave New World of Blank-Check Support for Banks

Since the 1970s three dramatic changes have occurred in the basic institutional arrangements of money and banking around the world. On the monetary side, the 1970s marked the end of the Bretton Woods Era of fixed exchange rates. Although many countries experimented with attempts to peg exchange rates in the 1980s and 1990s, and some interventions to affect exchange rates are still common, over the past four decades the world increasingly has shifted from government attempts to peg exchange rates to acceptance of flexible, and sometimes quite volatile, exchange rates.

With respect to banking, two closely related major shifts have occurred. First, there has been a dramatic expansion in the protection of banks by governments. The idea of deposit insurance spread like wildfire after the 1970s. By 1980, only 20 countries had adopted explicit deposit guarantees, and by the end of 2003, the number had grown to 87 (Demirguc-Kunt, Kane and Laeven 2008, p. 3). In addition, beginning in the 1980s, ad hoc government bailouts of banks became common – including Continental Illinois in the United States, and Credit Lyonnais in France.

Second, there has been a remarkable increase in the frequency and severity of banking crises since the 1970s. Since 1970, excluding communist or former-communist countries, according to Laeven and Valencia (2013) there have been over a hundred major banking crises, with an average severity (measured as the ratio of failed banks' negative net worth relative to GDP) of roughly 16%.[25] That is an astoundingly high figure. The

[25] The criterion for a banking crisis used in Laeven and Valencia (2013) requires either substantial losses by failed banks or runs on banks, or both. We agree with this definition and note, following Calomiris and Haber (2014), p. 5, footnote 1. It is important to emphasize that some studies define banking crises to include any bank

comparable measure of severity of U.S. bank failures during the Great Depression is roughly 2% of GDP (Calomiris 2010). When one examines the period 1874-1913, using the same criteria to identify a major banking crisis, there were only 10 cases of severe banking crises, five of which were panics in the United States (with severity averaging 0%, the highest of which was the Panic of 1893, with a severity level of 0.1%). The other five cases (Brazil in 1875, Argentina in 1890, Italy in 1893, Australia in 1893, and Norway in 1900) had severity averaging no greater than 5% of GDP (Calomiris 1999). In other words, the last several decades of banking crisis represent a global pandemic of bank failures that is unprecedented in frequency and severity. The new role of government as a source of funding for bank bailouts has meant that the unprecedented losses from bank failures have been a major burden on taxpayers (Laeven and Valencia 2013; Reinhart and Rogoff 2009).

As a large literature in financial economics has shown, the pandemic of banking crises is closely related to, and largely caused by, the rapid expansion of government protection of banks.[26] Government protection of banks removes market discipline (the threat of withdrawal by depositors and other debt holders, as default risk rises), which permits incompetent bankers to operate banks (adverse selection), and encourages all bankers to take on more risk than they otherwise would (moral hazard). Both of these influences contribute to the increased frequency and severity of banking crises.[27]

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failure, or a sharp contraction of bank credit, or a large loss of bank capital. We do not regard these as crises. Indeed, a contraction of credit may prevent a crisis if bank deleveraging is pursued to reduce risk in the wake of recessionary losses, which is the typical response of banks to such losses in a market-disciplined banking system (given the risk-intolerance of banks' funding sources).

[26] For reviews of this literature, see Demirguc-Kunt, Kane and Laeven (2008), Calomiris (2011), and Calomiris and Haber (2014, pp. 461-462).

[27] For a counterpart argument relevant to sovereign debt crises and international lending of last resort, see Flandreau, Flores, Gaillard and Nieto-Para 2010.

The three fundamental changes in the post-1970 economic environment – flexible exchange rates, government protection of banks, and severe and frequent banking crises – themselves reflect a shift in the political environment in many countries, which has made it very hard for government to maintain a fixed exchange rate, or allow bank failures and depositor losses. With respect to political influences on the retreat from fixed exchange rates, Eichengreen (2008, p. 2) argues that the sustainability of pegged rates as under the gold standard required governments to be protected from political pressure to use exchange rate flexibility to achieve domestic objectives. With the advent of the democratic politics of the 20th century, pressure was brought to bear on governments to subordinate currency stability to other objectives. Universal male, and later female, suffrage and the rise of trade unionism and parliamentary labor parties politicized monetary and fiscal policymaking, undermining the ability to maintain a currency peg.

Eichengreen (2008) posits that increases in populist democracy and the labor movement forced government to resist policies with long-term advantages while short-term recessionary costs made it harder to maintain an exchange rate peg. If valid, the argument applies with equal force to the incentives policy makers faced to protect banks from market discipline (see Rajan and Zingales 2004; Calomiris and Haber 2014). When banks suffer losses – for example, those associated with the onset of recessions, which result in increased loan defaults – market discipline would require banks to reduce loan supply (Calomiris and Wilson 2004), and the heightened risk might even lead to some bank failures or deposit withdrawals. The effects of all these responses would be to reduce bank loan supply, which policy makers will seek to avoid, because reduced lending aggravates the short-term economic contraction, despite the fact that it also strengthens the long-term resilience of the

banking system.[28] Government protection of banks is, in part, a political response intended to mitigate the reduction of loan supply in the wake of recessions.

Furthermore, depositors also vote, and they can be relied upon to advocate bailouts of banks if those bailouts prevent them from having to bear losses themselves. Few countries have been willing to impose losses on "uninsured" depositors during banking crises (Estonia in the early 1990s and Argentina in 1995 are among the notable exceptions). Finally, the move toward flexible exchange rates relaxed fiscal constraints on government that would otherwise have limited the capacity to bail out banks. Thus, by creating political gains from bailouts, the expansion of democracy had a direct effect on the propensity for bailouts. It also had an indirect effect in encouraging bailouts through the increased capacity to perform bailouts that resulted from the ability to finance them with money creation.

Supporting the view that deposit insurance policy responded to popular pressure, consider an article from *Business Week* from April 12, 1933, which describes the rationale that led to the inclusion of deposit insurance in the Glass-Steagall Bill then under discussion: "It became perfectly apparent that the voters wanted the guarantee [deposit insurance], and that no bill which did not contain such a provision would be satisfactory either to Congress or the public. Washington does not remember any issue on which the sentiment of the country has been so undivided or so emphatically expressed as upon this."[29]

More broadly, Demirguc-Kunt, Kane and Laeven (2008) study the adoption and design of deposit insurance in 170 countries, incorporating economic and political influences

[28] Antoniades and Calomiris (2015) show that contractions in the supply of mortgage credit at the county level have important voting consequences in U.S. Presidential elections.

[29] "Deposit Insurance," *Business Week*, April 12, 1933, p. 3. See also Calomiris (2000, Chapter 3) and Calomiris (2010).

as explanatory variables. They find that both external and internal political influences were important for deposit insurance adoption decisions after controlling for economic factors. They find robust evidence for the proposition that internal domestic political pressures for deposit insurance were important in explaining its adoption. Some government protection of banks takes the form of supervisory and regulatory forbearance to avoid forcing protected banks from having to reduce risk or raise capital. This can also be seen as an attempt to avoid or at least postpone credit contractions associated with the recognition of losses. In the United States, it was no coincidence that the crackdown on failed S&Ls, most of which had been deeply insolvent for several years, was postponed until after the 1988 election.[30] Several empirical studies (Honohan and Klingebiel 2003; Claessens, Klingebiel and Laeven 2003; Brown and Dinc 2005, 2011) find that authorities are reluctant to close insolvent banks – particularly just prior to elections – which then leads to larger long-term economic and fiscal costs from the deepening of the banking crisis that results from such forbearance.

The empirical literature on deposit insurance and market discipline shows, however, that not all countries chose to use deposit insurance and bailouts to the same degree. To the extent that countries limit deposit insurance, they encourage market discipline on banks, with important stabilizing effects on banks' risk management (Demirguc-Kunt and Detragiache 2002; Demirguc-Kunt and Huizinga 2004; Martinez Peria and Schmukler 2001; Calomiris and Powell 2001; Yan, Skully, Avram, and Vu 2014).[31]

[30] See also Romer and Weingast (1991) for further analysis of the politics shaping policies towards the S&Ls in the 1980s.

[31] According to the FDIC's official history, FDIC (1984, p. 40) Secretary of the Treasury William H. Woodin was partly responsible for encouraging President Roosevelt's opposition to the proposal, but even in 1932, before his election, Roosevelt had voiced opposition to federal deposit insurance publicly (Calomiris and Haber 2014, p. 461). The about turn of the Franklin D. Roosevelt administration when it came to power in 1933 may

Clearly, the last several decades have seen a decline in the importance of central banks' LOLR assistance as the primary instruments for managing shocks to banking systems. As the world has increasingly insured banks' debts and shored up failed banks through ad hoc rescues (via subsidized mergers, equity injections, nationalization, or debt re-denomination),[32] LOLR assistance through central banks often has been displaced as the primary vehicle for crisis management. When they are involved, central banks often play an assisting role, although they sometimes can serve as vehicles for carrying huge amounts of assets. The new approach to LOLR interventions, which often takes the form of virtually unlimited protection, has also meant that, for most countries, managing crises no longer means the application of Bagehot's Principles.

3.7. The Role of the ECB as a LOLR in the Euro Area

The financial crises that have gripped the euro area since 2008 have seen the development of new mechanisms for LOLR support. These, too, illustrate how the political environment shapes the actions of the LOLR in responding to threats to the banking system. At the onset of the crisis, the political environment of the euro area reflected the unique circumstances of a currency union that resided within a political union that was neither a fiscal union nor a banking union. That is to say, national governments shared control over the

be seen as a case in point illustrating how politics shapes support for deposit insurance. Roosevelt began with hostile views regarding deposit insurance, informed by the prevailing conventional wisdom based on previous experiments with state-level deposit insurance. In reaction to political pressures from Henry Steagall, acting on behalf of small, rural unit banks, Roosevelt and other acquiesced to deposit insurance in order to achieve other banking system reforms .

[32] Debt re-denomination was used first in the United States in 1861 to bail out banks that had been made insolvent by their investments in government bonds (Hammond 1970, Calomiris and Haber 2014, pp. 177-178. Mexico used this technique in the 1980s and Argentina used it in 2002 in combination with other support.

supply of money through the European Central Bank (ECB), but fiscal policy and bank regulatory and supervisory policies, as well as deposit insurance and bank bailouts, remained primarily the purview of national governments. Control over sovereign finances was not centralized, and neither was control over the banking system. A unique risk arises under these special circumstances: a LOLR that provides assistance to sovereigns or to banks may unwittingly serve as a device for transferring resources from one sovereign nation to another, if the country whose banks or sovereign has borrowed from the LOLR later decides to default and exit the currency union.

The ECB is the most economically powerful multi-national institution within the euro area. Nevertheless, under the political circumstances of decentralized sovereign fiscal policy, and decentralized control over banks, the sovereigns that brought the ECB into existence unsurprisingly found it necessary to limit its ability to assist sovereigns or banks.

The ECB operates at the center of the European System of Central Banks (ESCB), which comprises the ECB and the national central banks (NCBs) of all EU Member States whether they have adopted the euro or not. The Eurosystem comprises the ECB and the NCBs of those countries that have adopted the euro. The ECB's legal bases are the Treaty on the Functioning of the European Union and the Statute of the European System of Central Banks and of the European Central Bank.

The ESCB's (and thus the ECB's) LOLR operations are strictly limited by the prohibition on monetary financing as laid down in Article 123 of the Treaty on the Functioning of the European Union. Article 123 prohibits them from establishing "overdraft facilities or any other type of credit facility… in favour of Union institutions, bodies, offices

or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States."

In order to protect the ECB and Eurosystem NCBs from counterparty risk with respect to *private* financial institutions, the second indent of Article 18.1 of the Statute of the ESCB and the ECB provides that when the Eurosystem conducts credit operations with credit institutions and other market participants, lending should be based on adequate collateral.

The first of these provisions is not unusual for a central bank. For example, the Fed (while permitted to purchase U.S. government securities in the market) is not permitted to make loans to the U.S Treasury. The second of these provisions is also present for many, but not all, central banks: it narrowly confines the ECB to assist private financial institutions through collateralized lending. Thus, the ECB is prohibited from acting as a guarantor or from making unsecured loans or preferred stock investments in banks.

The ECB faces additional limitations with respect to its open market purchases of sovereign debts or lending to private financial institutions. In accordance with the provisions in the contractual or regulatory arrangements applied by the relevant NCB or by the ECB, the Eurosystem may also suspend, limit or exclude counterparties' access to open market operations or standing facilities on the grounds of prudence or if there is an event of default of a counterparty. On the grounds of prudence, the Eurosystem may also reject, limit the use of, or apply supplementary haircuts to, assets mobilized by specific counterparties as collateral in Eurosystem credit operations.

The Eurosystem's regular open market operations consist of one-week liquidity-providing operations in euro (main refinancing operations, or MROs) as well as three-month liquidity-providing operations in euro (longer-term refinancing operations, or LTROs).

MROs serve to steer short-term interest rates, to manage the liquidity situation and to signal the monetary policy stance in the euro area, while LTROs provide additional, longer-term refinancing to the financial sector.

Despite these various legal limitations and standard practices, in response to the global financial crisis, beginning in October 2008, the ECB adopted a number of temporary, non-standard monetary policy measures to support financing conditions and credit flows to the euro area economy over and beyond what could be achieved through reductions in key interest rates alone (see Garcia de Andoain et al. 2015). Initially, the response was mainly geared toward ensuring the provision of the liquidity needed by the banking sector at a time when the interbank market and other short-term funding markets were impaired. As the global financial crisis morphed into the European sovereign debt crisis, the ECB considerably expanded the scope and scale of its nonstandard measures.

As of July 2015, those measures comprised five key elements: full allotment refinancing operations; liquidity provision at longer maturities; widening the set of eligible collateral for liquidity support; currency swap agreements; and asset purchases (see Cour-Thirmann and Winkler 2013). Let us briefly discuss each element in turn.

1. Full allotment of refinancing operations: A fixed-rate full allotment tender procedure was adopted for all refinancing operations during the financial crisis. Under fixed rate full allotment counterparties have their bids fully satisfied, against adequate collateral, and on the condition of financial soundness. Thus, contrary to normal practice, eligible euro area financial institutions since October 2008 have had unlimited access to central bank liquidity at the main refinancing rate, subject to adequate collateral.

2. Extension of maturity of refinancing operations: Since June 2009, the fixed-rate full allotment policy has been complemented by 6-month and 12-month long-term refinancing operations (LTRO), reducing the funding risk faced by the banking system over a longer time horizon.
3. Broadening of collateral framework: In response to the crisis the list of eligible collateral accepted in Eurosystem refinancing operations was extended, allowing banks to refinance a larger share of their balance sheet with the Eurosystem.[33]
4. Currency swap agreements: To avoid a shortfall in US dollar funding for euro area banks, the Eurosystem temporarily provided liquidity in foreign currencies, at various maturities, and against euro-denominated collateral. For this, the ECB used reciprocal currency arrangements, notably with the Fed.
5. Asset purchase programs: Starting 2009, several programs of outright asset purchases have been implemented with the objective of sustaining growth across the euro zone and in consistency with the aim of achieving the ECB's inflation target. These include the covered bond purchase program (CBPP), the asset-backed securities purchase program (ABSPP) and the public sector purchase program (PSPP).

In addition to these (non-standard) monetary policy operations, Euro area credit institutions in distressed economies have also been receiving central bank credit through emergency liquidity assistance (ELA), which is the provision by a Eurosystem NCB of central bank money and/or any other assistance that may lead to an increase in central bank

[33] Notable changes included the acceptance starting in October 2008 of some foreign-currency ABS against euro area collateral and the lowering of credit thresholds on marketable assets (except ABS) from A- to BBB. A further change was the temporary suspension of the application of the minimum credit rating threshold for outstanding and new marketable debt instruments issued or guaranteed by the Greek, Irish and Portuguese governments under EU-IMF sponsored programs.

money to a solvent financial institution, or group of solvent financial institutions, that is facing temporary liquidity problems, without such operation being part of the single monetary policy.

Responsibility for the provision of ELA lies with the NCB(s) concerned. This means that any costs of, and the risks arising from, the provision of ELA are incurred by the relevant NCB. However, the Governing Council of the ECB can restrict, with a majority of two-thirds of the votes cast, ELA operations if it considers that these operations interfere with the objectives and tasks of the Eurosystem. Such decisions have recently received scrutiny in the case of Greece where questions by the IMF, among others, about the sustainability of government debt have cast doubt on the solvency of ELA recipient banks.

Some critics also note that the fact that NCBs are liable for the funds transferred through the ELA program may not be very meaningful in some cases. A country exiting the Eurozone, for example, may not be willing or able to repay its liabilities to the ECB. NCBs contemplating such exit may not be reliable screeners of the quality of bank borrowers. Despite these concerns, during the recent Greek crisis of 2015, the ECB has continued to support the provision of ELA to Greek banks subject to the provision of the necessary collateral and on the basis of the supervisors' assessment that the banks are solvent.

Further complicating the ECB's LOLR role, the decentralization of regulation within the Eurozone – especially during the early years of the crisis – meant that the ECB operated without an EU framework for resolving insolvent financial institutions, in an environment where there were doubts about the viability of individual financial institutions in some member countries. This raised questions about the extent to which LOLR policies in the euro area were supporting "zombie" banks, and how those banks' problems would be resolved.

Partly in response to these problems, in June 2012, the European Council agreed to create a banking union that would move in the direction of centralizing supervision and resolution for banks in the Euro area. This established the Single Supervisory Mechanism (SSM) and the Single Resolution Mechanism (SRM), both of which are mandatory for all euro area Member States and open to all other countries in the EU.

In summary, the provision of liquidity support by the ECB is necessarily constrained in comparison to that of other major central banks given that it operates in a monetary union without the same explicit fiscal backing or regulatory coordination as, say, the Federal Reserve. Nevertheless, the ECB has been able, within the statutory limits that it operates, to provide substantial assistance on flexible terms. A key element, however, has been the sharing of risk with Eurosystem NCBs, which has raised concerns about the potential risks of loss related to potential exits from the Euro area.

Ultimately, the ECB's experience during the crisis illustrates that the ability to operate a full-fledged LOLR within a monetary union like the Euro area requires a common framework for supervision, resolution and deposit insurance, with coordinated fiscal backing for LOLR operations and bank resolution; otherwise, the LOLR and national governments and NCBs may be encouraged to finance zombie banks. The creation of a banking union, including the establishment of a Single Supervisory Mechanism and a Single Resolution Mechanism for banks, has been an important step forward in this direction.

4. Statutory Variety of LOLR Rules: Cross-Country Differences, 1960-2010

What sorts of statutory powers do central banks possess as LOLRs? What are the key dimensions of those powers? To what extent do they vary across countries? How much have

they changed over time? What accounts for differences in those statutory rules across countries and over time? To what extent do exogenous political differences or other institutional differences help us to understand differences in LOLR rules?

These questions are central to an understanding of the operations of LOLRs and the ways that political and economic influences affect their abilities to act. It is surprising, therefore, to consider how little these questions have been investigated quantitatively. There is a literature attempting to gauge the extent of monetary policy independence of central banks, but no literature of which we are aware that has attempted to measure differences in the LOLR powers of central banks, much less that has attempted to explain them.

4.1. Data Sources for Central Banks' Charters and Measures of LOLR Powers

To address these questions, we searched central bank websites, libraries, and electronic databases for statutes governing central banks. Although we would not claim that our search was exhaustive (indeed, we are confident that substantial additional effort, especially beyond English language sources, would yield many additional countries), we devoted considerable time to finding and reading as many sources as possible. This process resulted in two samples: The first is a sample of 40 countries covering central bank legislation as of the early 1960s, derived from two remarkably comprehensive volumes produced by Aufricht (1961, 1965), which were published by the International Monetary Fund. The second 12-country sample represents a subset of those 40 countries for which we were able to obtain additional English language sources that permitted us to track central banking legislation for the years 1970, 1980, 1990, 2000, and 2010.

The 40-country sample (listed in Table 2) is regionally diverse, as is the subsample of 12 countries, which includes: Australia, Canada, Egypt, India, Japan, Kenya, New Zealand, South Africa, Saudi Arabia, Thailand, United Kingdom, and United States. Although this is not a random sample of countries, or a representative list of countries (Latin America is entirely excluded from the sample of 12 countries, and there is a heavy tilt in the sample toward former British colonies), the sample includes countries with very different incomes per capita, industrial specializations, legal traditions, and political institutions.

Before we began reading these statutes we did not have a firm notion of precisely how to translate the statutory language into quantifiable differences, or how to use those differences to formulate statistical inferences (there is no prior research to use as a guide). We read the statutes multiple times before coming up with a coding scheme that we believe captures important dimensions of differences in LOLR legislation reasonably well.

We reiterate that our focus is on the powers of the LOLR. Some of the statutes describe in detail what the LOLR may do or what it may not do; other statutes do not limit LOLR activities; still others specify that the LOLR must obtain government approval for some actions. Statutes sometimes provide a mandate for the LOLR to address financial crises, while others do not, and in those with a crisis mandate, there is sometimes an expansion of powers contingent on the existence of a crisis.

Obviously, some judgment is called for in assessing these differences and translating them into scores. We code four attributes of central banks' LOLR powers, and construct a LOLR Index, which is the sum of the four individual scores. These variables (and other variables used below) are defined in Table 1, and LOLR Index scores and their components are reported in Table 2.

LOLR Crisis Mandate is a binary variable that measures whether the legislation provides a mandate for the central bank to address financial crises. We view LOLRs with a mandate to act in response to crises as more powerful. In the case of the U.K., given our discussion above about the legislative debate in 1833 that established a crisis mandate, we score the U.K. as providing a crisis mandate in spite of its absence in the written statute. Eighteen of the 40 countries in our sample have a LOLR Crisis Mandate value of 1 in at least one of the years in our samples. Of those, Japan shows a value of 1 for the crisis mandate only in 2000 and 2010, and Thailand only in 1990, 2000, and 2010; the other 16 countries with crisis mandates display values of 1 beginning in 1960.

LOLR Guarantee is also a binary variable. It captures whether the central bank has the stated power to issue guarantees. We consider the explicit statement that the central bank has the power to offer a guarantee as indicating greater power. There are two ways to get a score of 1 for this variable: either the central bank actually has issued guarantees on its own account without anyone complaining that it shouldn't have done so (the Bank of England is the sole example), or the statute contains explicit authority for the central bank to issue guarantees. Nine out of 40 countries display a value of 1 for the LOLR Guarantee variable.

The third variable is LOLR Powers. This is scaled from 1 to 5. It captures the powers of the central bank in "non-crisis" circumstances (states of the world where there has not had to be a determination by someone of a special crisis circumstance). A score of 1 denotes a very constrained set of powers (e.g., Saudi Arabia's central bank is authorized to engage in exchange transactions but not to lend; it receives a value of 1 for LOLR Powers). A score of 2 denotes a narrowly specified range of LOLR powers confined to collateralized lending. Thirteen of 40 countries have LOLR Powers scores of 2. A score of 3 denotes the authority to

engage in non-collateralized lending. Eighteen of 40 countries have LOLR powers scores in at least one year. A score of 4 denotes an even broader authority. One way to receive a LOLR Powers score of 4 is for the LOLR to enjoy an unlimited range of potential actions, but for those actions beyond lending to have to be approved by the government. Japan receives a score of 4 throughout time, and Thailand and South Africa receive scores of 4 for some of the sample period. A score of 5 reflects unlimited ability for the LOLR to act. Note that in cases of a score of 5 there is still government oversight (the possibility for the government to object), but not required government approval.

LOLR Crisis Powers is scored with the same criteria as LOLR Powers, but measures the range of powers that exist in contingent states of the world where a crisis is occurring. Eleven countries relax restrictions on LOLR powers during crises (Austria in 1960, Canada in 2010, Ceylon/Sri Lanka in 1960, Costa Rica in 1960, Denmark in 1960, Dominican Republic in 1960, Egypt in 1960-2010, Guatemala in 1960, Honduras in 1960, India in 1960-2010, Korea in 1960, and U.S. in 1960-2010). All of these 11 countries have LOLR Powers scores of 2 or 3.

It would be possible to make finer distinctions with respect to LOLR Powers, but doing so would necessarily complicate the analysis by requiring a priori judgments about the weights to attach to different sorts of lending authorities, which we did not think are obvious. The broad categories we employ do cause us to miss at least one interesting episode in which variation to LOLR Crisis Powers occurs: the Dodd-Frank Act of 2010 makes it somewhat harder for the Fed to expand the range of its lending during a crisis, but both before and after 2010 we code the Fed's statutes as implying a value of 3 for LOLR Crisis Powers.

In order to consider the extent to which identifiable country characteristics co-vary with LOLR powers, we also collect data on country attributes that capture important economic or political characteristics. These include GDP per capita, the depth of bank credit markets (credit relative to GDP), and basic institutional and political differences (the country's region, the legal system's country of origin, and the polity score of the country, which captures the extent of democracy). We also experimented with other variables (including measures on central bank monetary independence, the extent of public ownership of banks, stock market capitalization relative to GDP, and whether a severe banking crisis has occurred in the prior decade) not reported here, which did not display any connections to our measures of LOLR powers.

In considering the potential co-variance between LOLR powers and deposit insurance, we construct a single measure of the generosity of deposit insurance coverage as follows: we assume that in the presence of significant coinsurance (10% or greater) depositors have an incentive to discipline banks, and so the size of the maximum amount covered is relevant for measuring the (inverse of the) extent of market discipline. We measure generosity as the ratio of the maximum deposit covered relative to per capita GDP. We discretize this measure into six groups, as shown in Table1.[34]

Tables 3-6 capture some of the basic patterns in our data. Table 3 reports descriptive statistics for key variables we analyze. Table 4 reports correlations among these variables.

[34] In general, one would also have to take into account the presence of co-insurance arrangements that also limit deposit insurance coverage. During some of the period described above, the UK had such provisions, but no other countries did. Incorporating coinsurance in the UK into our analysis, as is done in Calomiris and Chen (2015), does not change any of our reported conclusions.

Table 5 reports overall changes in the aggregate LOLR Index over time. Table 6 compares the country attributes of countries with above- and below-median LOLR Index scores.

The simplest and most obvious implication of Tables 2 and 3 is that countries have instituted substantial differences in the powers of their central banks as LOLRs. The mean LOLR Index is 6.53 and its standard deviation is 2.06. The minimum score observed is 2 (in Saudi Arabia) and the maximum is 12 (in the U.K.). Countries that may be regarded as very similar in some respects display very different LOLR Index scores. Australia, Canada, New Zealand and the U.S. – all of which are former colonies and areas of British settlement – have dramatically different scores (11, 4, 7, and 6, respectively, in 1960).

A second important fact is that the LOLR powers of central banks do not change much over time. In Table 5, we show that, for the sample of 12 countries observed over 1960-2010, the average score increases from 7.1 in 1960 to 8.1 in 2010. Some of that change reflects changes that appear to have been the result of banking crises. Japan's score rose slightly after its banking crisis in the 1990s. South Africa's decision to dismantle Apartheid caused it to empower its central bank to better deal with the prospect of capital flight. Canada's score doubled, from 4 to 8, as the result of changes instituted after the 2008-2009 global financial crisis (although Canadian banks suffered relatively little during the episode, compared to their U.S. counterparts). Crises did not only lead to enhanced LOLR powers, as the aforementioned curtailment of Fed powers under the Dodd-Frank Act of 2010 illustrates.

The correlations reported in Table 4 show that, unsurprisingly, the various components of the LOLR Index tend to be positively correlated, although LOLR powers and LOLR Crisis Mandate are slightly negatively correlated. Polity, Credit, Bkcrisis, GDPCap, regional location, legal origins, and deposit insurance Coverage measures all are uncorrelated

with the LOLR Index score in 1960. Figure 1 also plots the LOLR Index in 1960 against polity scores, and there is no apparent relationship between the two measures. Figure 2 plots the LOLR Index in 1960 against private credit/GDP, which also displays no pattern.

The LOLR Crisis Mandate and LOLR Guarantee components of the LOLR Index, however, do display some interesting correlations. A LOLR crisis mandate is more likely in the Americas, and more likely for lower per capital income countries, and for countries of French legal origin. Vesting the LOLR with the authority to issue guarantees is more likely in Africa and in countries with an English legal tradition.

The generosity of deposit insurance coverage in 2010 is negatively correlated with having a crisis mandate for the LOLR in 1960, and the generosity of coverage in 1980 is negatively correlated with vesting the LOLR in 1960 with the authority to issue guarantees. The negative association between the generosity of deposit insurance and the guarantee power and crisis mandate of the LOLR may reflect substitutability between deposit insurance and LOLR interventions; given that differences in LOLR authority were generally determined before the spread of generous deposit insurance, this result may indicate that the preexistence of LOLR with a crisis mandate or the ability to issue guarantees reduced the political demand for generous deposit insurance. Table 6 confirms this view by showing that above-median LOLR Index countries in 1960 tend to have much lower Coverage scores in 1980.

4.2. Regression Analysis

Tables 7-14 report some simple OLS regression where the LOLR Index, its components, and a measure of how LOLR powers change during crises (LOLR_diffpowers)

are the dependent variables in various sets of regressions. For the most part, the patterns apparent in the simple correlations also show up as partial covariances in the various regressions. Few of these influences, however, are highly statistically significant or robust across specifications. There is weak evidence that lower per capita income is more associated with a crisis mandate (in Tables 7 and 9, but not in Tables 8 and 10). There is weak evidence that the depth of credit is positively related to LOLR Powers (in Tables 8 and 10, but not in Tables 7 and 9). Legal origins and regional effects that appeared in simple correlations are not as visible when other variables are included in the regressions.

In the LOLR_diffpowers regressions, we find that the tendency to make LOLR powers contingent on a crisis are greater for more democratic countries, and this result is more robustly visible in Tables 7-10.

In Tables 11-14, Coverage and Coverage Score in 1980 and 2010 appear as dependent variables, regressed against various 1960 LOLR measures one at a time. Here we find a strong and statistically significant connection between the preexisting LOLR powers and the subsequent generosity of deposit insurance coverage. Consistent with the evidence from Tables 4 and 6, LOLR Guarantee is negatively associated both with Coverage in 1980 and Coverage Score in 1980. This result is not so apparent in the Coverage and Coverage Score measures for 2010, which likely reflects the reduced variation in Coverage across countries over time, as increasingly generous deposit insurance coverage spread to many countries after 1980.

In summary, the extent of LOLR powers differs dramatically across countries. The central banks of some countries (Saudi Arabia, for example) have narrowly defined powers, while others (the UK, Australia and New Zealand, for example) have very broad powers.

LOLR powers have increased over time, but the changes are minor in comparison to the cross-country differences, which are highly persistent over time. Changes over time often coincide with the experience of a banking crisis. The main source of change in LOLR powers is the occurrence of a crisis. Banking crises, for the most part, tend to be associated with expanded LOLR powers, but in some cases (notably, in the United States recently), the crisis led to a reduction in Fed Section 13(3) emergency powers (reflecting the political backlash against the Fed's role during the crisis).

We find evidence for the political substitutability of generous deposit insurance and a powerful LOLR, particularly if the LOLR enjoys the power to issue guarantees. Countries whose LOLRs enjoyed that power in 1960 tended to develop less generous deposit insurance systems by 1980. We also find some evidence suggesting that relatively democratic countries were more likely to make the powers of their LOLRs contingent on the presence of a crisis.

Perhaps as interesting as these patterns is the paucity of connections between the LOLR Index (or its components) and other observable country characteristics, such as GDP per capita, polity score, and the ratio of private credit to GDP. We think that this suggests the importance of idiosyncratic political factors – which we reviewed in detail in Sections 2 and 3 – in explaining the structure and powers of LOLRs.

5. Conclusion

Throughout history politics has shaped the powers and policies of LOLRs. Initially, five key political/institutional problems had to be solved to enable a strong LOLR like the Bank of England, or other LOLRs in Europe to emerge. Where the political environment was less

able to deliver these key preconditions – as in the cases United States, Russia, and Mexico historically – the LOLR was delayed and/or more constrained.

In the late 19th century, the mechanisms of the LOLR became more diverse than collateralized lending. Prior to World War II, LOLRs remained guided by Bagehot's Principles when dealing with the threat of a crisis. They focused on systemic risk, rather than preventing bank failures, per se, and limited as much as possible the public absorption of banks' risks.

After World War II, many countries moved toward Unlimited Protection of banks (as opposed to focusing on systemic risk), which was accomplished through a combination of generous deposit insurance and ad hoc bailouts of banks (equity injections, nationalizations, subsidized mergers, and re-denominations of debt). Throughout this history – from the earliest incarnations of the LOLR to its most recent embodiment in the Eurozone – political preconditions have played a central role in determining when the LOLR would come into being and the constraints under which it would operate.

We quantify and analyze the statutory powers of LOLRs in 40 countries in 1960, and a subset of 12 of these countries from 1970 to 2010. We find that countries differ greatly in the extent of their LOLRs' statutory powers. Those powers change little over time, except in response to crises. Countries with relatively powerful LOLRs in 1960 – in particular, those whose LOLRs enjoyed the power to issue guarantees – tended to be less generous in their level of deposit insurance coverage as of 1980.

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Table 1: Variable definitions and sources

Variable name	Definition	Source
LOLR Index	LOLR aggregate index, computed as simple sum of LOLR Crisis Mandate, LOLR Guarantee, LOLR Powers, and LOLR Crisis Powers	Authors' calculations based on central bank laws and regulations
LOLR Crisis Mandate	Indicates whether the central bank has a "crisis mandate" for LOLR, meaning explicit authority and responsibility to behave differently during a banking crisis, or not. Score is either 0 or 1.	Idem
LOLR Guarantee	Indicates whether the central bank explicitly has the power to issue LOLR guarantees, or not. Score is either 0 or 1	Idem
LOLR Powers	Indicates how much latitude the central bank has to act during normal times. Score ranges from 1 to 5, where 1 is little latitude and 5 is maximum latitude. See text for full explanation.	Idem
LOLR Crisis Powers	Indicates how much latitude the central bank has to act as LOLR during crisis times. Score ranges from 1 to 5.	Idem
LOLR Diff Powers	LOLR Crisis Powers – LOLR Powers	Idem
Polity	Polity score, ranging from -10 to +10 with higher score denoting more democratic and less autocratic regimes	Polity IV project
Credit	Ratio of private credit to GDP (%)	IMF IFS database
Gdpcap	GDP per capita, in thousands of constant 2005 US dollars	IMF IFS database
Legal origin	Legal origin of the country (English law; French law; German Law; Scandinavian law)	La Porta, Lopez-de-Silanes, and Shleifer (2002)
Coverage	Coverage limit of deposit insurance (in 100,000 US dollars); guarantee or deposit insurance schemes with unlimited coverage are set to the maximum statutory coverage limit in a given year with a cap of 350,000 US dollars	Demirguc-Kunt, Kane, and Laeven (2014)
Coverage_score	Ratio of coverage limit of deposit insurance to GDP per capita, discretized into 6 groups (ratio=0, 1, 1 to 2, 2 to 6, 6 to 20, >20) taking on values 0, 0.2, 0.4, 0.6, 0.8, or 1	Authors' calculations based on data from Demirguc-Kunt, Kane, and Laeven (2014)
Coinsurance	Coinsurance percentage of deposit insurance; zero if no coinsurance	Demirguc-Kunt, Kane, and Laeven (2014)
Bkcrisis	Dummy variable indicating whether a (systemic or borderline) banking crisis is taking place or occurred in the previous decade	Laeven and Valencia (2013)

Table 2 LOLR variables, 1960-2010

Country	Year	LOLR Index	LOLR Crisis Mandate	LOLR Guarantee	LOLR Powers	LOLR Crisis Powers
Australia	1960	11	0	1	5	5
Australia	1970	11	0	1	5	5
Australia	1980	11	0	1	5	5
Australia	1990	11	0	1	5	5
Australia	2000	11	0	1	5	5
Australia	2010	11	0	1	5	5
Austria	1960	4	0	0	2	2
Belgium	1960	7	1	0	2	4
Canada	1960	4	0	0	2	2
Canada	1970	4	0	0	2	2
Canada	1980	4	0	0	2	2
Canada	1990	4	0	0	2	2
Canada	2000	4	0	0	2	2
Canada	2010	8	1	0	2	5
Ceylon/Sri Lanka	1960	8	1	0	3	4
Costa Rica	1960	6	1	0	2	3
Denmark	1960	6	0	0	3	3
Dominican Republic	1960	8	1	0	3	4
Egypt	1960	9	1	1	3	4
Egypt	1970	9	1	1	3	4
Egypt	1980	9	1	1	3	4
Egypt	1990	9	1	1	3	4
Egypt	2000	9	1	1	3	4
Egypt	2010	10	1	1	3	5
El Salvador	1960	4	0	0	2	2
Finland	1960	6	0	0	3	3
France	1960	6	0	0	3	3
Germany	1960	6	0	0	3	3
Greece	1960	7	0	1	3	3
Guatemala	1960	6	1	0	2	3
Honduras	1960	6	1	0	2	3
Iceland	1960	8	0	0	4	4
India	1960	6	1	0	2	3
India	1970	6	1	0	2	3
India	1980	6	1	0	2	3
India	1990	6	1	0	2	3
India	2000	6	1	0	2	3
India	2010	6	1	0	2	3
Indonesia	1960	4	0	0	2	2
Ireland	1960	4	0	0	2	2
Italy	1960	6	0	0	3	3
Japan	1960	8	0	0	4	4
Japan	1970	8	0	0	4	4
Japan	1980	8	0	0	4	4
Japan	1990	8	0	0	4	4
Japan	2000	9	1	0	4	4
Japan	2010	9	1	0	4	4
Kenya	1960	6	0	0	3	3
Kenya	1970	6	0	0	3	3
Kenya	1980	6	0	0	3	3
Kenya	1990	6	0	0	3	3
Kenya	2000	6	0	0	3	3
Kenya	2010	6	0	0	3	3

Korea	1960	6	1	0	2	3
Mexico	1960	11	0	1	5	5
Netherlands	1960	4	0	0	2	2
New Zealand	1960	7	0	1	3	3
New Zealand	1970	7	0	1	3	3
New Zealand	1980	7	0	1	3	3
New Zealand	1990	11	1	0	5	5
New Zealand	2000	11	1	0	5	5
New Zealand	2010	11	1	0	5	5
Nicaragua	1960	8	1	1	3	3
Norway	1960	6	0	0	3	3
Pakistan	1960	7	0	1	3	3
Philippines	1960	6	1	0	2	3
Portugal	1960	6	0	0	3	3
Saudi Arabia	1960	2	0	0	1	1
Saudi Arabia	1970	2	0	0	1	1
Saudi Arabia	1980	2	0	0	1	1
Saudi Arabia	1990	2	0	0	1	1
Saudi Arabia	2000	2	0	0	1	1
Saudi Arabia	2010	2	0	0	1	1
South Africa	1960	7	0	1	3	3
South Africa	1970	7	0	1	3	3
South Africa	1980	7	0	1	3	3
South Africa	1990	9	0	1	4	4
South Africa	2000	9	0	1	4	4
South Africa	2010	9	0	1	4	4
Spain	1960	9	1	0	4	4
Sweden	1960	6	0	0	3	3
Switzerland	1960	4	0	0	2	2
Thailand	1960	8	0	0	4	4
Thailand	1970	8	0	0	4	4
Thailand	1980	8	0	0	4	4
Thailand	1990	9	1	0	4	4
Thailand	2000	9	1	0	4	4
Thailand	2010	7	1	0	3	3
United Kingdom	1960	12	1	1	5	5
United Kingdom	1970	12	1	1	5	5
United Kingdom	1980	12	1	1	5	5
United Kingdom	1990	12	1	1	5	5
United Kingdom	2000	12	1	1	5	5
United Kingdom	2010	12	1	1	5	5
United States	1960	6	1	0	2	3
United States	1970	6	1	0	2	3
United States	1980	6	1	0	2	3
United States	1990	6	1	0	2	3
United States	2000	6	1	0	2	3
United States	2010	6	1	0	2	3

Table 3. Descriptive statistics of main regression variables

Statistics limited to 1960 cross-sectional sample of 40 countries.

Variable	Obs	Mean	Std. Dev.	Min	Max
1960 value					
Lolr	40	6.53	2.06	2.00	12.00
lolr_crisismandate	40	0.35	0.48	0.00	1.00
lolr_guarantee	40	0.23	0.42	0.00	1.00
lolr_powers	40	2.83	0.93	1.00	5.00
lolr_crisispowers	40	3.13	0.88	1.00	5.00
Polity	40	3.75	7.57	-10.00	10.00
Credit	40	25.96	20.48	4.95	95.99
Gdpcap	40	7.97	7.76	0.22	37.12
legalorigin1 (English=1)	40	0.33	0.47	0.00	1.00
legalorigin2 (French=1)	40	0.43	0.50	0.00	1.00
legalorigin3 (German=1)	40	0.13	0.33	0.00	1.00
legalorigin4 (Scandinavian=1)	40	0.13	0.33	0.00	1.00
region1 (Africa=1)	40	0.08	0.27	0.00	1.00
region2 (Americas=1)	40	0.23	0.42	0.00	1.00
region3 (Australasia=1)	40	0.28	0.45	0.00	1.00
region4 (Europe=1)	40	0.43	0.50	0.00	1.00
1980 value					
Coverage	40	0.11	0.27	0.00	1.00
coverage_score	40	0.17	0.27	0.00	0.80
2010 value					
Coverage	40	0.89	0.90	0.00	3.31
coverage_score	40	0.47	0.29	0.00	1.00
1970-2010 average					
Bkcrisis	40	0.25	0.16	0.00	0.50

Table 4. Correlation matrix of main variables

Statistics limited to 1960 cross-sectional sample of 40 countries.

	lolr	lolr crisis mandate	lolr guarantee	lolr powers	lolr crisis powers	polity	credit	gdpcap
lolr crisis mandate	0.30*							
lolr guarantee	0.59***	-0.02						
lolr powers	0.88***	-0.15	0.49***					
lolr crisis powers	0.96***	0.32**	0.40***	0.84***				
Polity	-0.09	-0.14	-0.19	-0.03	-0.02			
Credit	-0.06	-0.29*	-0.19	0.16	-0.05	0.30*		
Gdpcap	-0.17	-0.39**	-0.11	0.02	-0.17	0.59***	0.62***	
legalorigin1	0.08	-0.06	0.27*	0.07	0.02	0.07	-0.25	-0.04
legalorigin2	0.05	0.32**	0.02	-0.11	0.05	-0.47***	-0.19	-0.42***
legalorigin3	-0.17	-0.12	-0.20	-0.09	-0.14	0.30*	0.45***	0.33**
legalorigin4	-0.02	-0.28*	-0.20	0.15	0.03	0.32**	0.18	0.34**
region1	0.11	-0.01	0.30**	0.05	0.07	-0.16	-0.01	-0.25
region2	0.01	0.36**	-0.00	-0.16	-0.01	-0.29*	-0.20	-0.25
region3	0.03	0.02	0.07	-0.00	0.04	-0.08	-0.35**	-0.28*
region4	-0.10	-0.31**	-0.22	0.11	-0.07	0.40***	0.49***	0.59***
Coverage1980	-0.11	-0.05	-0.22	-0.07	-0.07	0.30*	0.18	0.30*
Coverage2010	-0.03	-0.33**	-0.23	0.19	0.03	0.16	0.25	0.34**
Coverage_Score1980	-0.17	0.08	-0.34**	-0.16	-0.11	0.36**	0.20	0.22
Coverage_Score2010	0.07	-0.25	-0.13	0.26	0.09	0.06	0.11	0.12
Bkcrisis19701980	0.18	0.21	-0.20	0.17	0.21	-0.03	0.16	-0.11

***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5. LOLR index over time, 1960-2010

Statistics based on sample of 12 countries for which we have LOLR information through time

	Average LOLR
1960	7.1
1970	7.2
1980	7.2
1990	7.8
2000	7.8
2010	8.1

Table 6. Conditional means of country variables based on LOLR index

Means of country variables, split by median value of LOLR index (which is 6). Statistics limited to 1960s cross-sectional sample of 40 countries. ***, ** and * denote statistical significantly different between LOLR high and low groups at the 1%, 5%, and 10% level, respectively.

	Below median LOLR	Above median LOLR
Polity	5.25	1.50
Credit	27.63	23.46
Gdpcap (in thousands)	9.16	6.19
English legal origin	0.09	0.13
French legal origin	0.10	0.13
German legal origin	0.08	0.06
Coverage1980 (in US$ 100,000)	0.16	0.02
Coverage2010 (in US$ 100,000)	0.98	0.74
Coverage_score1980 (in US$ 100,000)	0.24	0.06**
Coverage_score2010 (in US$ 100,000)	0.05	0.09
Bkcrisis19702010	0.26	0.25

Table 7. Regressions of LOLR on country characteristics: 1960 only

Dependent variable is the LOLR index for the year 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) lolr	(2) lolr_ crisismandate	(3) lolr_ guarantee	(4) lolr_ powers	(5) lolr_ crisispowers	(6) lolr_ diffpowers
polity	0.00554	0.00751	-0.0117	-0.00468	0.0145	0.0191*
	(0.0622)	(0.0120)	(0.0105)	(0.0279)	(0.0272)	(0.0111)
credit	0.00876	-0.00175	-0.00435	0.0107	0.00419	-0.00648
	(0.0214)	(0.00507)	(0.00460)	(0.00926)	(0.00900)	(0.00456)
gdpcap	-0.0641	-0.0255*	0.00772	-0.0123	-0.0340	-0.0217
	(0.0662)	(0.0132)	(0.0133)	(0.0327)	(0.0280)	(0.0141)
Constant	6.788***	0.570***	0.321***	2.664***	3.234***	0.570***
	(0.497)	(0.129)	(0.105)	(0.250)	(0.216)	(0.147)
Observations	40	40	40	40	40	40
R-squared	0.035	0.163	0.063	0.037	0.042	0.205

Table 8. Regressions of LOLR on country characteristics: 1960 only, controlling for legal origin

Dependent variable is the LOLR index for the year 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) lolr	(2) lolr_ crisismandate	(3) lolr_ guarantee	(4) lolr_ powers	(5) lolr_ crisispowers	(6) lolr_ diffpowers
polity	0.0108	0.0139	-0.00985	-0.00963	0.0163	0.0259**
	(0.0722)	(0.0117)	(0.0127)	(0.0323)	(0.0312)	(0.0124)
credit	0.0184	-0.00249	-0.00195	0.0157*	0.00712	-0.00857*
	(0.0196)	(0.00585)	(0.00467)	(0.00824)	(0.00875)	(0.00485)
gdpcap	-0.0704	-0.0192	0.00843	-0.0228	-0.0369	-0.0142
	(0.0672)	(0.0131)	(0.0132)	(0.0328)	(0.0288)	(0.0149)
legalorigin1	0.215	0.198	0.360**	-0.233	-0.111	0.122
	(1.057)	(0.187)	(0.173)	(0.477)	(0.438)	(0.183)
legalorigin2	-0.135	0.431**	0.196	-0.613	-0.149	0.464*
	(0.823)	(0.197)	(0.149)	(0.364)	(0.393)	(0.265)
legalorigin3	-1.090	0.234	0.0276	-0.840**	-0.511	0.328*
	(0.725)	(0.193)	(0.0763)	(0.362)	(0.358)	(0.185)
Constant	6.693***	0.239	0.0414	3.076***	3.337***	0.260
	(0.810)	(0.212)	(0.148)	(0.387)	(0.362)	(0.216)
Observations	40	40	40	40	40	40
R-squared	0.065	0.232	0.141	0.110	0.064	0.304

Table 9. Regressions of LOLR on country characteristics: 1960 only, controlling for regional effects

Dependent variable is the LOLR index for the year 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	lolr	lolr_ crisismandate	lolr_ guarantee	lolr_ powers	lolr_ crisispowers	lolr_ diffpowers
polity	0.00438	0.0117	-0.0117	-0.00933	0.0137	0.0230**
	(0.0663)	(0.0117)	(0.0104)	(0.0298)	(0.0288)	(0.0105)
credit	0.00738	-0.000911	-0.00519	0.00965	0.00383	-0.00581
	(0.0228)	(0.00584)	(0.00373)	(0.00979)	(0.00945)	(0.00599)
gdpcap	-0.0577	-0.0252*	0.0172	-0.0154	-0.0343	-0.0189
	(0.0789)	(0.0144)	(0.0128)	(0.0382)	(0.0328)	(0.0146)
region1	0.479	-0.0646	0.601	-0.0763	0.0181	0.0944
	(1.115)	(0.372)	(0.357)	(0.344)	(0.468)	(0.378)
region2	-0.0740	0.338	0.0708	-0.408	-0.0752	0.333
	(0.981)	(0.244)	(0.194)	(0.427)	(0.419)	(0.266)
region3	0.0315	-0.000323	0.132	-0.0753	-0.0247	0.0506
	(1.145)	(0.194)	(0.220)	(0.539)	(0.483)	(0.242)
Constant	6.749***	0.459**	0.169	2.850***	3.270***	0.419
	(0.929)	(0.219)	(0.208)	(0.448)	(0.388)	(0.301)
Observations	40	40	40	40	40	40
R-squared	0.039	0.247	0.175	0.062	0.043	0.260

Table 10. Regressions of LOLR on country characteristics: 1960 only, controlling for legal origin and regional effects

Dependent variable is the LOLR index for the year 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	lolr	lolr_ crisismandate	lolr_ guarantee	lolr_powers	lolr_ crisispowers	lolr_ diffpowers
polity	0.0117	0.0159	-0.00872	-0.0125	0.0170	0.0295**
	(0.0746)	(0.0112)	(0.0125)	(0.0345)	(0.0326)	(0.0116)
credit	0.0182	-0.00159	-0.00354	0.0155*	0.00779	-0.00774
	(0.0230)	(0.00704)	(0.00384)	(0.00906)	(0.01000)	(0.00632)
gdpcap	-0.0630	-0.0187	0.0176	-0.0279	-0.0340	-0.00608
	(0.0792)	(0.0154)	(0.0137)	(0.0378)	(0.0337)	(0.0166)
legalorigin1	0.127	0.146	0.271	-0.130	-0.160	-0.0295
	(1.582)	(0.261)	(0.208)	(0.623)	(0.623)	(0.193)
legalorigin2	-0.0660	0.334	0.235	-0.519	-0.116	0.403
	(0.893)	(0.206)	(0.176)	(0.371)	(0.432)	(0.303)
legalorigin3	-1.162	0.198	0.0149	-0.797*	-0.577	0.220
	(1.121)	(0.234)	(0.147)	(0.468)	(0.497)	(0.205)
region1	0.324	0.0166	0.521	-0.286	0.0724	0.358
	(1.830)	(0.433)	(0.377)	(0.632)	(0.722)	(0.315)
region2	-0.0552	0.311	0.0160	-0.367	-0.0154	0.352
	(1.255)	(0.274)	(0.233)	(0.538)	(0.514)	(0.278)
region3	0.194	0.0592	0.1000	-0.109	0.144	0.253
	(1.846)	(0.282)	(0.278)	(0.786)	(0.739)	(0.234)
Constant	6.577***	0.179	-0.0507	3.187***	3.261***	0.0738
	(1.154)	(0.227)	(0.231)	(0.573)	(0.497)	(0.232)
Observations	40	40	40	40	40	40
R-squared	0.067	0.285	0.216	0.128	0.067	0.353

Table 11. Regressions of deposit insurance coverage in 1980 on LOLR measures and country characteristics in 1960

Dependent variable is the deposit insurance coverage limit (expressed in 100,000 US$, with 0 denoting no explicit DI) in 1980. All explanatory variables are measured as of 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Coverage 1980	(2) Coverage 1980	(3) Coverage 1980	(4) Coverage 1980	(5) Coverage 1980	(6) Coverage 1980
Lolr	-0.00829					
	(0.00919)					
lolr_crisismandate		0.0443				
		(0.100)				
lolr_guarantee			-0.118**			
			(0.0480)			
lolr_powers				-0.0208		
				(0.0292)		
lolr_crisispowers					-0.00546	
					(0.0219)	
lolr_diffpowers						0.0582
						(0.0841)
Gdpcap	0.00982	0.0113	0.00949	0.0103	0.0101	0.0114
	(0.00646)	(0.00773)	(0.00632)	(0.00665)	(0.00647)	(0.00739)
Constant	0.0821	0.000932	0.0572	0.0834	0.0428	-0.00243
	(0.0703)	(0.0718)	(0.0392)	(0.0786)	(0.0741)	(0.0582)
Observations	40	40	40	40	40	40
R-squared	0.092	0.094	0.123	0.093	0.088	0.100

Table 12. Regressions of deposit insurance coverage in 2010 on LOLR measures and country characteristics in 1960

Dependent variable is the deposit insurance coverage limit (expressed in 100,000 US$, with 0 denoting no explicit DI) in 2010. All explanatory variables are measured as of 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Coverage 2010	(2) Coverage 2010	(3) Coverage 2010	(4) Coverage 2010	(5) Coverage 2010	(6) Coverage 2010
Lolr	0.0144					
	(0.0609)					
lolr_crisismandate		-0.441				
		(0.340)				
lolr_guarantee			-0.423			
			(0.279)			
lolr_powers				0.177		
				(0.154)		
lolr_crisispowers					0.0908	
					(0.154)	
lolr_diffpowers						-0.352
						(0.314)
Gdpcap	0.0396*	0.0284	0.0364	0.0385*	0.0407*	0.0314
	(0.0219)	(0.0253)	(0.0219)	(0.0207)	(0.0216)	(0.0244)
Constant	0.479	0.818**	0.694**	0.0831	0.281	0.745**
	(0.463)	(0.340)	(0.257)	(0.420)	(0.525)	(0.301)
Observations	40	40	40	40	40	40
R-squared	0.113	0.160	0.151	0.146	0.120	0.149

Table 13. Regressions of deposit insurance coverage score in 1980 on LOLR measures and country characteristics in 1960

Dependent variable is the deposit insurance coverage score in 1980. All explanatory variables are measured as of 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Coverage Score 1980	Coverage Score 1980	Coverage Score 1980	Coverage Score 1980	Coverage Score 1980	Coverage Score 1980
Lolr	-0.0182					
	(0.0142)					
lolr_crisismandate		0.110				
		(0.0963)				
lolr_guarantee			-0.206***			
			(0.0548)			
lolr_powers				-0.0490		
				(0.0378)		
lolr_crisispowers					-0.0240	
					(0.0336)	
lolr_diffpowers						0.102
						(0.0856)
Gdpcap	0.00686	0.0104*	0.00645	0.00783	0.00725	0.00988*
	(0.00561)	(0.00562)	(0.00536)	(0.00557)	(0.00561)	(0.00544)
Constant	0.234*	0.0487	0.165**	0.246*	0.187	0.0608
	(0.128)	(0.0599)	(0.0667)	(0.135)	(0.133)	(0.0541)
Observations	40	40	40	40	40	40
R-squared	0.066	0.080	0.148	0.075	0.053	0.081

Table 14. Regressions of deposit insurance coverage score in 2010 on LOLR measures and country characteristics in 1960

Dependent variable is the deposit insurance coverage score in 2010. All explanatory variables are measured as of 1960. Regressions estimated with OLS, with White robust standard errors between parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

VARIABLES	(1) Coverage score 2010	(2) Coverage score 2010	(3) Coverage score 2010	(4) Coverage score 2010	(5) Coverage score 2010	(6) Coverage score 2010
Lolr	0.0126					
	(0.0235)					
lolr_crisismandate		-0.145				
		(0.109)				
lolr_guarantee			-0.0821			
			(0.136)			
lolr_powers				0.0789*		
				(0.0425)		
lolr_crisispowers					0.0356	
					(0.0567)	
lolr_diffpowers						-0.173
						(0.115)
Gdpcap	0.00511	0.00102	0.00402	0.00433	0.00519	0.000817
	(0.00598)	(0.00624)	(0.00588)	(0.00551)	(0.00594)	(0.00619)
Constant	0.347*	0.513***	0.456***	0.213	0.317	0.515***
	(0.182)	(0.0996)	(0.0823)	(0.149)	(0.207)	(0.0922)
Observations	40	40	40	40	40	40
R-squared	0.023	0.065	0.029	0.080	0.026	0.101

Figure 1. LOLR and Polity Index, 1960 and 2010

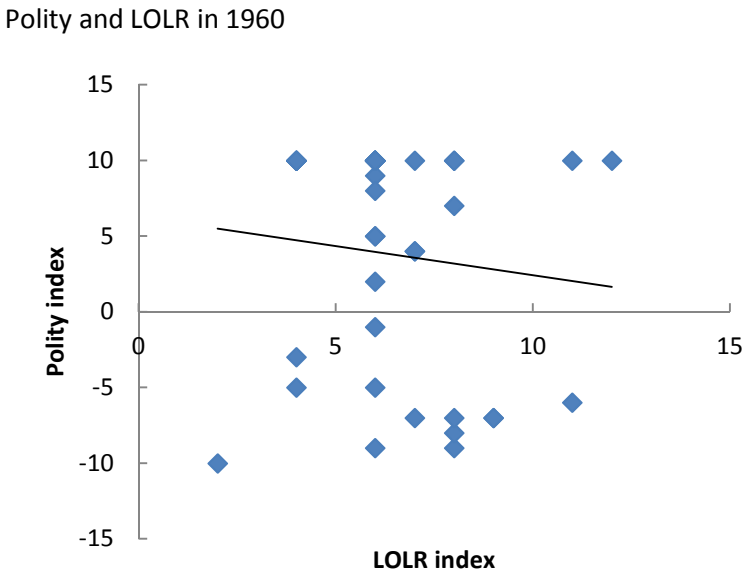

Figure 2. LOLR and Financial Development, 1960 and 2010