At Your Service! Liquidity Provision and Risk Management in 19th Century France*

Maylis Avaro
University of Pennsylvania

Vincent Bignon
Banque de France and CEPR

Abstract

This paper builds on a historical study to exhibit a solution to the trade-off faced by central banks between providing liquidity to a broad group of financial intermediaries, and the risk that this easy access may fuel moral hazard. In the late 19th century, the Bank of France operated a very broad discount window and used a variety of risk management techniques to effectively subdue risk-taking behaviours and shield its balance sheet from losses. This allowed agents to monetise a diverse set of capital while limiting the risk of bail-out. The central bank could thus expand its liquidity facility to help stabilise the economy after negative income shocks without suffering losses.

Keywords: lender of last resort, central bank, discount window, shadow bank

* We thank Pamfili Antipa, Charles Calomiris, Rui Esteves, Marc Flandreau, Farley Grubb, Clemens Jobst, Nikita Lychakov, Kris Mitchener, Nathalie Monnet, Kilian Rieder, Pierre Sicsic, Cédric Tille, John Turner and Stefano Ugolini for their comments and suggestions as well as seminar participants at the Bank of France and participants of the 2017 Economic History Society meeting at Royal Holloway–University of London, the 2017 World Congress of Cliometrics in Strasbourg, the 2018 Historiales in Neuchâtel, the 2018 CEPR Economic history symposium at Banca d'Italia in Rome, the 2018 World Economic History Congress in Boston, the 2019 University of Geneva PhD workshop and the 2019 EHES conference in Paris. We are grateful to Jean-Laurent Rosenthal for sharing data on banks operated in 1898. The data collection was made when Maylis Avaro was an intern of Bank of France whose hospitality is gratefully acknowledged. The views expressed here are those of the authors and do not reflect those of the Bank of France or the Eurosystem.

"I promise you," she said, "to sign—"
"I've enough of your signatures."
"I will sell something."
"Get along!" he said, shrugging his shoulders;
"you've not got anything."

Flaubert, *Madame Bovary*

1. Introduction

This paper relies on a historical study to show how a central bank might contain the credit risk associated with liquidity provision, while also curbing the moral hazard behaviour that may follow the widespread supply of liquidity from the central bank.

When designing its operational and risk management frameworks, a central bank defines both the breadth of its discount window–who has access to credit and under which conditions– and the instruments to be wielded against moral hazard. As a lender of last resort, a central bank issues money against eligible debt securities; thus decisions of eligibility immediately motivate a discussion on tolerable levels of credit risk. This implies a trade-off between the ability to cope with crises and the need to limit exposure to credit risk (Chapman and Martin, 2013). In this regard, central banks follow a variety of models (BIS–CGFS, 2015). It is therefore important to document the cases in which central banks have designed a broad discount window while limiting risk-taking behaviours (Calomiris, *et al.* 2016). In this paper we will document the case of the late 19th century Bank of France.

The operational design of the discount window directly affects the ability of a central bank to cope with financial stress. It is defined both by the type of eligible agents–including financial intermediaries and non-financial agents–and by the type of guarantees that the central bank accepts as collateral. Under severe enough market frictions, a central bank operating a restrictive discount window may increase the odds that intermediaries should fail for lack of liquidity, cf. Friedman and Schwartz (1963) and more recently Acharya, Gromb and Yorulmazer (2012). Conversely, a broad access to the discount window may reduce the default rate in times of crises (Bignon and Jobst, 2017).

Banking theory has shown that the level of certainty regarding access to the discount window may induce situations of moral hazard by influencing the degree of liquidity of the assets held by financial intermediaries (Rochet and Tirole, 1996). It may also spur financial intermediaries

to increase their exposure to credit risk in the hope of selling the risky assets to the central bank when the crisis comes, in a mechanism akin to risk-shifting strategy (Jensen and Meckling, 1976). Theoretical solutions to those problems include (i) the ability to discriminate between assets across classes of credit risk, (ii) collateralisation, and (iii) conditioning the volume lent on the risk appetite and risk behaviour of the borrower.

The case of France at the Belle Époque is interesting. The institutional environment ensured that financial intermediaries were subjected to market discipline, yet the central bank provided easy liquidity. The charter of the Bank guaranteed a broad access to the discount window. Yet the Bank of France encountered little ex-post credit risk as provisioning for losses on discount window activity amounted to less than 0.01% of the total volume during the 19th century. Moreover, entry into banking was at that time not subject to a specific regulatory approval, no deposit insurance existed, and the government did not intervene to bail out failing banks. Thus the behaviour of banks could not have resulted from the expectation of a bailout or public protection weakening market discipline.

We mined archives from the head office and local branches of the Bank of France. We detailed the procedures of supervision of the credit risk, documented the capital pledged by counterparties and described its organisation and procedures. We hand-collected a cross-section of around 1,700 discounting counterparties within the Bank's discount window, cumulatively representing 7% of the total volume discounted by the Bank of France in 1898. Our sample comprises information on the identity of candidates to the discount window, together with their occupation, economic and social situations, wealth and financial position within the Bank, as well as with an audit of their activity.

Our results show that the Bank of France operated a broad and diverse discount window by modern standards. Any businessman could gain access to it, and the Bank allowed the use of a set of eligible guarantees greater than in any central bank today. It tapped detailed and sophisticated information to reduce the moral hazard temptation that might accrue from the implementation of such a broad discount window. Risk management was tightly designed: the Bank used the information to discriminate its refinancing operations towards risk-averse agents. We also document differences in the use of guarantees during crisis times versus normal times.

2. History and theory of the discount window

2.1. *Related historical literature*

Our paper offers a novel empirical study of the risk management at a central bank discount window and its relation to the breadth of its access by relying on detailed and encompassing data. Previous work by Leclecq (2010) provides an in-depth discussion of the changes of implementation procedures of discount operations. Bignon and Flandreau (2018) show the century-long decline in the failure rate of financial intermediaries. Bignon and Jobst (2017) established that, in a situation of income shock, better access to central bank lending provided by local branch offices of the Bank of France lowered defaults by reducing the risk of being liquidity constrained. Plessis (1998) portrays the functioning of a branch of the Bank of France in the late 19th century but does not discuss the system of risk management system. Hautcœur *et al.* (2014) chronicle how the Bank of France 'floated a lifeboat' to an insolvent bank in 1889 in order to minimise moral hazard, but do not discuss how this relates to the discount window operations.[1]

2.2. *Theoretical debates*

Our study ties in with the literature on the lender of last resort (Bignon *et al.* 2012, Calomiris *et al.* 2016). Rationales for liquidity provision by a central bank for the intervention of a central bank during a crisis are twofold: averting bank runs (Allen and Galle, 2000) and avoiding a dislocation of the payment system, i.e. a reduction of the liquidity of debt securities and the subsequent urge to convert them into cash.[2]

Coordination failures can occur among financial intermediaries and set off a banking panic (Calomiris and Schweikart, 1991). Institutional structures such as branch bank laws, bank cooperation arrangements, and the existence of a central bank affect the likelihood of banking panics (Calomiris and Gorton, 1991). The provision of loans through the discount window provides a safety net for the financial system in cases of coordination failures (Calomiris, 1993; Rochet and Vives, 2004).

[1] Other cases of discount window lending include Flandreau and Ugolini (2013, 2014), Anson *et al.* (2018) at the Bank of England, and Jobst and Rieder (2018) for the Austrian National Bank. The French case is interesting for its large number of counterparties, and the wealth of surviving qualitative details.
[2] See Ugolini (2017) for a survey.

In times of strong doubts regarding the solvency of debt issuers, the liquidity of those debts is negatively impacted, justifying a swap of money against debts. Freeman (1999) has shown that in an economy in which private debt circulates as a medium of exchanges, the existence of a negative aggregate shock (a crisis) on a segmented debt market can trigger the emergence of a discount window. In such a case, the central bank facility that converts debt claims into cash, i.e. a means of payment generally accepted by every agent, can smooth the shock on condition that it holds significant information on the debts.

Banking theory stresses that if the government is unable to screen borrowers, guaranteeing access to the discount window may spark moral hazard behaviour (Williamson, 1998). The certainty of the access to the central bank may also weaken market discipline by encouraging risk-taking behaviours by the banks (Calomiris and Haber, 2014). Chapman and Martin (2013) have extended Freeman's model to include the moral hazard problem. They conclude that providing liquidity to a limited number of creditors competing for funds can solve the problem by maintaining market discipline. They add that in cases of external shock, i.e. a disruption of market infrastructures, the central bank should temporarily broaden their discount window.

The decision on eligibility immediately leads to a discussion of the risk management tools that the central bank may use to sate the risk appetite of its borrowers. Theory suggests three mechanisms potentially effective in mitigating agency issues arising from discount window: (i) screening and monitoring of the risk appetite of the counterparties; (ii) pledging of collateral (iii) reputation building by the borrower e.g. through repeated discounting. [3]

The second mechanism, pledging of collateral, proves the cheaper solution if the cost for the lender to monitor borrowers is high relative to revenues of the loan, insofar as it seizes the asset immediately upon default and thus limits agency problem (Leland and Pyle, 1977; Smith and Warner, 1979). The pledging of collateral may also act as a signal of the willingness of the borrower to reimburse, thus acting as signalling device and limiting adverse selection (Chan and Kanatas,

[3]This mechanism is akin to Diamond's model (1991): a lender monitors the borrowers to detect whether they prefer risky or less risky projects, which in effect switches the borrowers' choice towards less risky projects. Borrowers can instead accumulate a reputation of prudent behaviour. In the context of our study the lender will assess the reputation of agents that are the most at risk of moral hazard (those who might expose the lender to losses), and since monitoring is costly to the central bank, the central bank will grade the reputation of banks with large off-balance sheet exposure (typically banks who had given their guarantees to many other agents). The lender then uses these assessments to condition the volume lent on the risk appetite or risk portfolio of the banks.

1985). It is also a disciplining device if it negatively affects the borrowers' willingness to default (Boot, Thakor and Udell, 1991). Collateralisation does not eliminate the need to screen borrowers on an ongoing basis as there are situations in which the collateralisation of assets may amplify adverse selection, notably when the lender offers a range of options to protect the bank from credit risk or when the setting of interest rate is independent of the decision on collateral (Wette, 1983). This was the case for the Bank of France in our study: it forced agents to lend at a fixed interest rate. The screening and monitoring of borrowers remained an important mechanism, especially for firms with a low net worth and thus little collateral to offer. In this case, monitoring was a partial substitute for collateral (Holmstrom and Tirole, 1997). Historical research has also shown that central banks, in their role as regulators of the payment system, have long tended to collect detailed information about financial intermediaries - which was exploited for ulterior screening processes. (Ugolini, 2017).

Paramount for our study is the result by Bester (1994) that pledging collateral ex-ante is especially useful when the bankruptcy procedure is not efficient enough to act as a guarantee for lending. In our case study, although bankruptcy procedures largely favoured creditors, not all agents were eligible to filing for bankruptcy. The procedure was only afforded to licensed traders, as opposed to farmers or landowners. Given that the 1897 renewal of the Bank of France issuing privilege had extended the discount window to farmers, and insofar as landowners were also eligible, Bester's result implies that the Bank was more likely to ask non-traders to pledge ex-ante collateral, notably in the form of eligible marketable securities or some form of immediately seizable credit line.

Finally, risk-taking behaviours may be limited if the central bank are able to shift part of the losses onto other market participants through a mechanism of mutual insurance akin to Gorton and Huang (2006). Participants may agree to cover part of losses to limit the externalities created by a disorderly default. This type of loss-covering tools allows the central bank to separate liquidity provision from the risk of bailing out insolvent and distressed banks.

3. Institutional background on banking and the payment system

3.1. Means of payment

In late 19th century France, four types of means of payments were commonly used: coins, banknotes, bank transfers, checks and bills of exchange —those with a small nominal amount were especially used to pay transactions.[4] Bills of exchanges were forms of short-term credit that were renewable at a horizon of 3 months, which was also the term limit used by banks and the Bank of France to discount bills.[5] Table 1-1 provides an estimate of the relative importance of each type of means of payment in the total stock of means of payment in 1898. It shows that the stock of bills in circulation was roughly equivalent to the stock of coins and banknotes. Of these, the Bank of France discounted 20% of bills in circulation but 40% of their total amount (15.3 million bills for a total of 11bn francs), reflecting a distribution skewed towards the higher average value of discounts (Fr 721 vs. Fr 366).[6]

Table 1-1: Stock of means of payment in 1898 France

	Stock of means of payments	**Average value (in French francs)**	
Gold and silver coins in circulation	3.51 bn (11% of GDP)		
Banknotes	3 bn (9.4% of GDP)	130	
Checks	0.16 bn	5,800	
Bills of exchanges	6 bn (19% of GDP)	366	

Source: Statistics on coins are found in Sicsic (1992). The average value of the stock of banknotes in circulation is from the Annual report of the Banque de France to its shareholders (1899). The stock and average amount of bills and checks are estimated using the method in Roulleau (1914).[7]

Bills of exchange created interconnectedness between banks and non-banks and among non-banks. There is both a legal and an economic reason for this feature.

Economically, everyone could purchase a bill as a saving or lending instrument. As such, bills were a tool of short-term finance between agents having excess liquidity (who were buyers of bills) and those experiencing a temporary need for short-term funding. Since nothing restricted

[4] Legally a bill is an order to pay a fixed amount of money to the bearer at a pre-determined future date in a pre-specified location. Nothing precludes the bills of exchanges from being a pure credit instrument.

[5] Roulleau (1914) estimates that bills have an average maturity of 1.5 to 3 months.

[6] In regional branches, 9.48 million bills were discounted for a total of 5.83 bn French francs (fr) and an average of 614fr.

[7] The total value of the 75 million bills stamped was equal to 27.52 billion francs or 81% of the French GDP. This is far higher than in the UK where the number of bills stamped represented 37% of GDP (£1.2 bn / 30 bn francs), cf Roulleau (1914) and GDP from Solomou and Weale (1991). The average maturity in France was 80 days, which entails an average stock value of 6 billion francs. Only 7,246 checks were drawn in 1898 with an average value (in 1912) of 5,800fr and an average maturity of 1.4 day, yielding a total of 42 billion francs and an average daily stock of 160 million francs (Roulleau, 1914, p. 58).

access to this investment vehicle, it was very likely that non-banks held bills as savings, and would have been able to convert them into more liquid assets.

Legally, the credit risk of bills was limited by the joint liability rule: any endorser of a bill was liable for the final repayment of the bill to the bearer upon default. This put skin in the game and provided incentives for the discounter to screen and monitor the quality of the original debtor and other endorsers. This explains why various individuals engaged in screening. The information on solvency was known not only by banks but also by the payer's suppliers and clients. The circulation of bills of exchange likely created clusters of individuals who knew each other well and engaged in peer selection.

3.2. Financial stability

In late 19th century France, threats to the financial stability included bank runs and increasing counterparty risk on means of payment not intermediated by banks. Entry into banking was not regulated except for the privilege of issuing banknotes.[8] Deposit insurance and bank regulation -which are identified as one arrangement that may prevent bank runs, did not exist. The Bank of France was a publicly listed company founded in 1800 by Parisian merchant bankers to refinance the Parisian trading community. It also acted as the bank of the state and relied on a charter granted by the government. The charter attributed it the monopoly of banknote issuance (Bignon and Flandreau, 2018).

The banking system was heterogeneous both in type and size of its financial intermediaries. Many non-banks guaranteed the end-payment of the predominant form of means of payment. Heterogeneity also extended to assets held and liabilities due, and to the size of branch networks. Around 2,000 banks operated 2,900 branches (see appendix 1). We identified four types of financial intermediaries.[9] The first type was national banks, which comprised the four deposit banks operating a national network of branches (the *Comptoir National d'Escompte de Paris*, the *Société Générale*, the *Crédit Lyonnais* and the *Crédit Foncier*). The first three together operated 513 branches. The second type was regional banks such as the *Crédit du Nord* in Lille. 194 banks

[8] Therefore, and contrary to countries without a central bank such as the U.S. or Latin America, no bank supervisor existed in 19th century France (Toniolo and White, 2015).

[9] We based our identification on the description of the activity of the counterparty provided by the supervisor as well as on the definition of a bank according to Freixas Rochet (2008, p1), see appendix 1.

operated on average 2.5 branches, with the largest maintaining 17 branches, mostly in the same region. In third came the local banks which operated only one branch, such as the *Courtois* bank in Toulouse. 1,910 banks handled only one branch. Fourth and last came the other financial intermediaries which comprised individual discounters and traders which discounted bills on a regular basis, often concurrently with another occupation, such as Mr. Boubée from Auch, a wood trader and discounter. In the absence of any legal constraint put on the entry into banking, this kaleidoscopic clientry suggests that the very fragmented nature of banking was not the product of ill-designed regulation.

By modern standard, banks were back then highly capitalised.[10] They held very liquid assets, suggesting that there was little maturity transformation risk. The capital ratio of local banks amounted to 33% of their liabilities and 18% of the liabilities of the national deposit banks. As a supplementary cushion to absorb the potential losses, uncalled capital shares represented 14% of local banks assets. Sight deposits represented about two-third of the liabilities of both types of banks. Banks used this funding to finance the discount of bills of exchanges, which represented a third of the assets of local banks and 42% of those of national deposit banks. Only 1.8% of bills were unpaid at maturity in 1898, mostly bills of lower average value.[11] Local banks had 40% of their assets held in overdraft facility (non-collateralised loans) for their customers. National deposit banks held a quarter of their assets as collateralised loans to their customers or invested in money market instruments. This is consistent with the view that maturity transformation was not a substantive threat to financial stability in late 19th century France.

An important source of risk was creditors not rolling over their funding of non-financial agents (Nishimura, 1995). Part of the bills originated in client-supplier relationships, whereby the supplier drew an order to his client to be paid at some horizon. To roll over a bill, the payee simultaneously provided the payer with the money necessary to pay the maturing bills while drawing a new bill on the payer on a new term (Roulleau, 1914).[12] The rollover risk of short-term funding could materialise especially when banks lost deposit funding, in which case the knowledge of the poor investment strategy of the banks could well trigger an informed bank run. But bank

[10] For the source, see Appendix 1.

[11] Earlier in the 19th century the default rate on bills could exceed 10% (Roulleau, 1914)

[12] The archives of the Bank of France mention on several occasions that some of the bills were regularly rolled over, see for example the 1898 report of the branch of Bordeaux, Flers, Grenoble and Roubaix.

panics could also originate in coordination failure between financial intermediaries after an external shock, such as an agricultural shock (see section 9.3).

Another source of systemic risk was the payment system. The credit risk associated with some means of payment could disrupt the liquidity position of some agents and therefore trigger their failure. The failure of the issuer of a means of payment would delay or cancel the payment expected by its holder. This would put his liquidity position at risk. In 19th century France, bills of exchange were the main conveyer of this type of financial stress, often independently from the banking system. Bills were negotiable, in which case they could have been endorsed (discounted after taking a 'haircut') by a third party who could in turn resell it to a fourth party, and so on. Credit risk was present in this financial system.

Financial risk could be contained by the monetisation of debts, notably by the purchase of bills of exchanges or by the swap of banknotes or Bank of France reserves against gold or securities. The discount window of the Bank of France was a standing facility, by which the Bank stood ready to purchase debts payable at a 3-month maturity. The charter of the Bank guaranteed a broad access to the discount window, which was open to any solvent and reputable trader.[13] The Bank made eligible all debts with a low enough credit risk, which was contained by the use of collateral or guarantees. To be eligible for purchase by the Bank, a debt had to be endorsed by at least two other individuals, who were jointly liable in case of default of the issuer according to the French code of commerce.[14] The Bank was therefore exposed to three types of credit risk: the risk of default of the issuer of the debt, the risk of default of the guarantors and the risk of default of the counterparty. In this paper, we analyse how the Bank of France managed those risks using both qualitative and quantitative information on counterparties.

4. A database of the counterparties of the Bank of France network.

We hand-collected archival data and a variety of sources to reconstruct the history of discount window usage in the end of the 19th century (details in Appendix). We gathered all extant information on the counterparties of the Bank of France, viz. all individuals, corporations or banks owning an account at the Bank and using it to discount bills of exchange at the discount window.

[13] A trader is someone earning revenues from the regular purchase and sale of goods and services

[14] Article 140 « tous ceux qui ont signé, accepté ou endossé une lettre de change, sont tenus à la garantie solidaire envers le porteur. » Code de commerce, 1952 Source: Gallica.

Our principal source is the yearly reports completed by branch supervisors of the Bank of France. These branch supervisors (*inspecteurs des succursales*) were a body of a dozen Paris-based agents in charge of screening and monitoring the activity of the branches of Banque de France. We collected information on all 94 branches operating in 1898 except the Parisian branches that were not monitored by those supervisors or where local archives have been lost.[15]

We gathered detailed individual information on about 1,700 counterparties in 1898, that can be compared to the roughly 1.6 million firms in activity in France that year. In each report, for each counterparty, the supervisor reported the identity, address, occupation, as well as the amount discounted; he also recorded the value of the securities pledged and drawn as a guarantee to the overdraft facility (advances on securities).[16] Most of the time, we can also collect an estimate of the wealth of the counterparty - or of his capital and reserves when the counterparty is an incorporated company. Each entry also reports whether some of the bills presented for discounting were endorsed by another signature–in which case the bill is said to bear a third signature–or whether some security has been deposited to substitute for the missing third signature.[17] The supervisor also systematically mentioned whether the counterparty guaranteed (endorsed) some bills for other clients of the Bank and all his endorsements. Since the Parisian archives on discount activity have vanished, all of the counterparties are located outside Paris. The non-Parisian portfolio of bills represented half of the Bank of France discount activity in 1898.

We focus on a cross-section of the year 1898. From a macroeconomic perspective, the fiscal budget was roughly balanced at 0.3% of GDP, and monetary injection amounted to 4.1% of the GDP, a third of which were the advances collateralised by securities.[18] Those monetary injections

[15] We are not aware of a similar source describing the universe of Parisian clients. The series of *compte rendu hebdomadaire du conseil général* only accounts for the main clients. Collecting information on them would bias the sample of clients towards the wealthiest. When we did not find information on clients in 1898 as the report for that year was missing, we collected information in the 1897 report to check whether the missing reports bias the information we have collected. This is the case in 5 branches, Lille, Rouen, Bordeaux, Roubaix and Saint Quentin. Given our research question, and since the 'bureaux auxiliaires' (ancillary bureaux) did not have a discount committee taking decision, we exclude those from the study.

[16] In 52 instances the supervisor copied a balance sheet of the firm.

[17] for details on the third signature or on direct discount, see Leclerc, 2010,p. 54-5 or Rapport d'Inspection, Limoges, 1898, '*garanties remplaçant la troisième signature*'

[18] The value of the Bank of France bill portfolio was 898 million francs and advances on securities amounted to 421 million francs.

were in line with that decade's average.[19] To document how the composition of counterparties evolved in a branch hit by successive negative productivity shocks, we also collected an annual time-series of all counterparties of the branch of Moulins between 1890 and 1905.

On top of the amount of liquidity provided and of the guarantees pledged, the supervisory reports also gave the occupation of the counterparties and some balance-sheet nuggets of information. We collected all the items of the balance-sheets reported to construct various measures of liquidity risk. We used the information on the occupation of the counterparties to measure the level of disintermediation of the payment system, both in the number of counterparties and in the value of those discounts. Finally, the supervisor reported a judgment on the risk appetite of the counterparty, mentioning for example if an individual was often connected to dubious transactions or whether a company had a perfect business history - see section 5.3 for details. We collected and encoded these judgements.

We obtained relevant documents from both Parisian and regional archives to reconstruct the history of the information system of the Bank of France's branches and its regulations. We used correspondence from the Bank of France as well as a variety of internal reports to assess local economic environment. We know the population of banks at the city level from the commercial almanac, and we matched the bank counterparties of the Bank of France with the bank in activity during 1898 - see appendix for details.

On the Paris financial market, the stock index grew by 1.8% compared to 1897, and no major shock hit the Parisian banking sector. Local bank runs occurred on banks in five regions (out of 87). In Dijon, the Burgundy Bank lost deposits for embezzlement of funds by the manager for his mistress. In Rheims, the failure of a broker in champagne wine kindled doubts on the solvency of the Camuzet bank, thus triggering a run on this bank. In Bordeaux, the failure of a wine broker with whom the bank Piganeau was deeply involved, triggered a run on the bank. Other troubled banks can be found in Carcassone and Lons-le-Saunier.

Some negative productivity or income shocks hit one of the main sectors of a region. We identified a negative shock in 15 regions, see Appendix 3 for a description. Nine regions specialised

[19] The total discount of the Bank of France branches in 1898 amounted to about 6 billion francs. Between 1890 and 1905, the total annual discount of the Bank branches oscillated between 5 billion and 9 billion. Source: Archives de la Banque de France (hereafter ABDF), Assemblée Générale des actionnaires 1890-1905.

in the capital-intensive activity of fattening calves suffered from an epizootic disease. Five regions specialised in textile production were hit by negative demand shock triggered by the US protectionist tariffs enacted in the Dingley act of 1897 and by the drop in exports triggered by the Spanish-American war in Cuba.[20] Finally the Besancon watch industry suffered from the liquidation of one of its flagship local companies.

5. Assessing the monitoring of counterparties and risk management of the central bank

5.1. Empirical strategy

We ask the following questions: How broad was the discount window of the Bank of France? How did the Bank of France manage the risk associated with its discount window?

On the one hand, credit rationing at the discount window can be desirable to mitigate moral hazard behaviour. Conversely, a broad discount window allows to smooth negative shocks.

To this end, we first analyse the breadth of the discount window with both cross-section and panel data on counterparties. Then, we study the role of the three mechanisms to mitigate agency issues suggested by the theory: (i) the screening and monitoring of the risk appetite of the counterparties; (ii) the pledging of guarantees (iii) the building of a reputation by the borrower through relationship lending.

We first estimate the two first mechanisms with the following baseline specification:

$$\text{Liquidity}_{i,b} = \beta_1 \text{risk appetite}_i + \text{Guarantees}_i * \alpha + \beta_2 \text{Crises}_b + \beta_3 (\text{risk appetite} * \text{crisis}) + (\text{Guarantees}_i * \text{Crises})\theta + +\eta \text{controls}_{i,b} + \varepsilon_{i,b} \quad (1)$$

$\text{Liquidity}_{i,b}$ is the volume of liquidity provided by the branch b to each counterparty *i*. We measure the liquidity provided by summing the amount of bills brought to the branch of by the Bank of France. Risk appetite is the rating of risk appetite of the counterparty *i*, Guarantees is a vector of the four types of different collaterals that can be seized in case of default of a counterparty. Crises is a dummy variable equal to one for branches operating in economies hit by a local negative

[20] The June 1898 report on cyclical activities states that « La guerre entre l'Espagne et les États-Unis a fait un tort considérable à l'industrie lainière déjà si éprouvé par le tarif prohibitif établi en Amérique. « La situation est très critique » écrit le Directeur de St Quentin, « aussi bien pour les filatures que pour les tissages ; les prix de vente sont toujours très bas par suite du manque d'affaires et d'autre part, la hausse de la matière première s'est encore accentuée depuis le mois de mars » Source : ABDF, Rapport conjoncturel, juin 1898.

shock. Controls include counterparty variables such as dummies for various occupation categories, for being a director of the branch, for having a female relative in the management of the business.

To assess the effect of the third mechanism - relationship lending - we compare the counterparties using the discount window in 1898 with those already using it in 1897, and add a dummy equal to one if a counterparty is observed in both. The following sections present stylized facts about the different variables.

5.2. The liquidity provision of a broad discount window

In 1898, the regional branches of the Bank of France discounted 9.48 million bills for a total value of 5.831 million francs. We used supervisory reports which offer a snapshot of the local discount window activity during the 15-day visit of the supervisors in the regional branches. By gathering all available information, our database is by construction a sample of all the counterparties of the Bank. Our sample represents 7.4% of the total of the liquidity allocated in 1898. The average liquidity provided to a counterparty was 258,254fr. The median counterparty received 60,000fr.

The Bank allowed for a very diverse set of financial intermediaries in its discount window. The diversity of the financial intermediaries in late 19th century France was fully represented. We also identified counterparties acting as shadow banks, i.e. discounting bills of exchange to third parties and discounting them at the Bank of France. Such agents were often wealthy individuals, landlords, who could pledge securities as collateral and rely on a large capital to guarantee their bills. The Bank of France also accepted to discount non-bank agents, for smaller amounts.

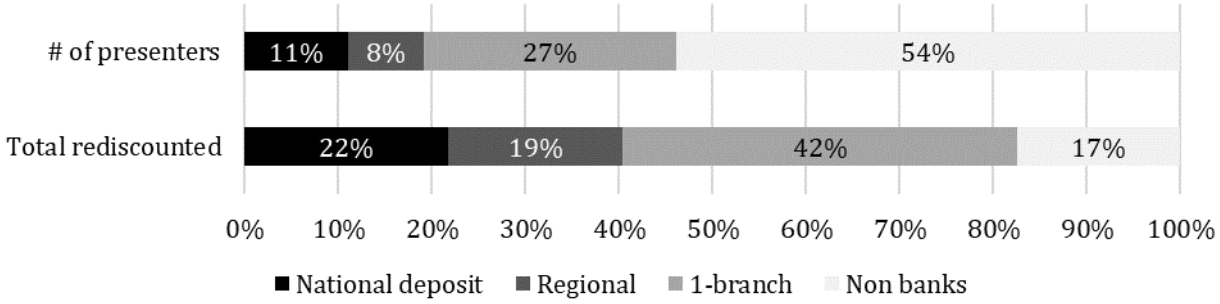

Figure 1-1 breaks down the discount activity between categories to analyse the distribution of counterparties and check whether those financial intermediaries differed with respect to the volume of discounting they were granted access to. Non-bank agents represented 54% of the counterparties but only 17% of the volume of discount. One-branch banks represented a quarter of the counterparties but the total volume of their discount amounted to 42% of the total discount. National deposit banks and regional banks were similar in terms of number and share of discount.

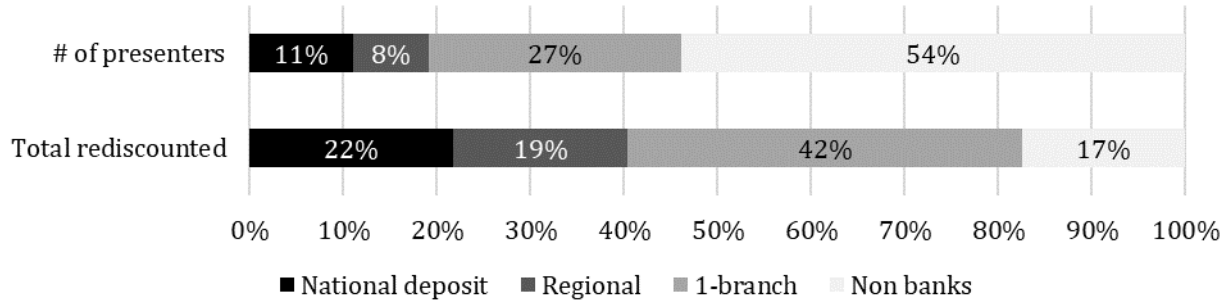

Figure 1-1: Distribution of counterparties per category and volume of bills discounted at the Bank of France in 1898.

Note: The total number of counterparties in the sample is 1676 and the volume of discount amounted to 43.3 million francs.

Source: Authors' computation using supervisory reports of 1898.

We use the fiscal statistics on the number of firms paying the 'Patentes' tax to document that the percentage of non-banks at the Bank of France's discount window represented 0.05% of all firms in business during the year 1898. Matching the financial institutions recorded at the discount window of the Bank of France with the commercial almanac shows that, overall, 27% of the French banks had their debts swapped for liquidity by the Bank of France[21]. Figure 1-2 presents the breakdown by type of financial intermediaries: 28% of local branches of regional banks and 35% of branches of national deposit banks presented bills to discount at the Bank of France. The share reached 25% for one-branch banks. This suggests that banks exhibited a similar propensity to resort to the facility of the Bank of France.

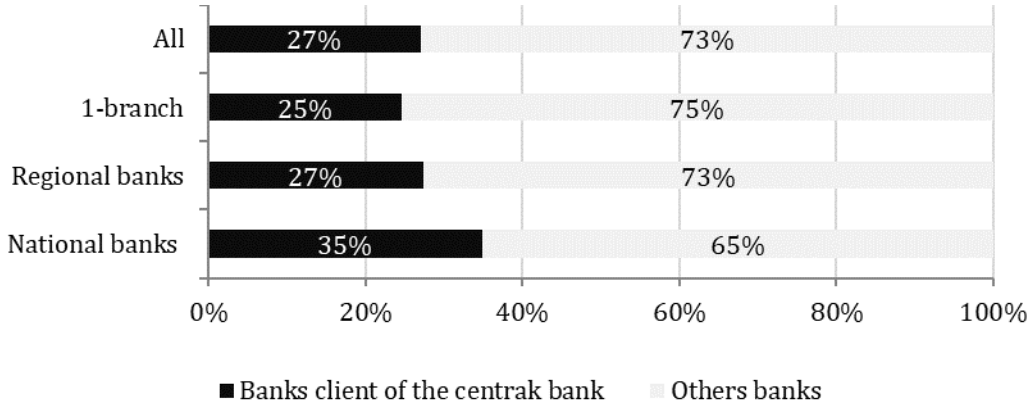

Figure 1-2: Banks discounting bills at Bank of France's discount window as percentage of banks operating in France.

Note: The number of banks in France in 1898 according to the commercial almanac is 2753, of which 513 are national banks, 496 are Regional banks, 1744 are one branch banks.

Source: Authors' computation from supervisory reports of 1898 and the 1898 commercial almanac

[21] See appendix 1 for description of the matching of banks between the Bank of France counterparties and the commercial almanac.

5.3. Screening risk appetite of counterparties

The first mechanism we study is the screening and monitoring of the risk appetite of counterparties of the Bank of France. The Bank assessed the attitude toward risk of its counterparties when deciding to provide refinancing. This included a qualitative analysis of the risk culture of the counterparties. Supervisors and branch managers conducted this analysis. For each counterparty, they produced proprietary soft information on managers and businessmen on several aspects of their risk culture, including business model attitude, personality and personal history. This information was then converted into ratings.

One dimension assessed by the supervisors was internal governance, discussing in particular the character of the bank's managers. For example, the supervisor of Lorient recorded the following judgment for Delmas, a local branch manager of the Société Générale: 'Has just arrived, smart, active, related to the best families of Lorient. Keeps a close eye on his rather numerous clients'[22]. This was a positive assessment of the internal governance of the bank.

The assessment exercise also included risk management, as illustrated by the case of banker Herbulot in Sedan in Eastern France, who was described in the following words:

> *His business started poorly, was sentenced to refund 120,000fr following stock-market transactions on behalf of a married woman. It seems that the lesson has quieted Herbulot, who also used to speculate personally; but that is a strong indication of the haphazardness of this banker.*

Herbulot was thus recorded as a risk-taker counterparty.

Supervisors also scrutinised risk to liquidity and to capital, for example banker Ginget in Annecy was recorded as 'having too much long term credit and working only with deposits which can be very dangerous in case of a panic'[23] or bankers Salzeda in Bayonne, who were described as 'manag[ing] their business reasonably well, but are diligent. They discount with 2 signatures–including to young clients–therefore bills they present ought to be examined'.[24]

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[22] Source: Rapport d'inspection… Lorient, 1898 « Directeur M. Delmas, qui vient d'arriver, intelligent, actif, apparanté aux meilleures familles de Lorient. Suit de près sa clientèle, assez nombreuse. »

[23] Source: Rapport d'inspection… Annecy 1898 : « C'est une banque qui a beaucoup trop d'immobilité et qui actuellement ne marche qu'avec des dépôts, ce qui peut être très dangereux en cas de panique, du reste on ne sait pas pour quel chiffre ils en ont. »

[24] Source: Rapport d'inspection… Bayonne 1898 « Ils dirigent assez bien la maison, mais ils sont ardents, ils font beaucoup de prêts directs—aux jeunes gens même—et le papier qui en résulte a besoin d'être trié dans les présentations.»

Finally, the agents of the Bank of France reviewed business models, illustrated by discounter Legendre in Blois, painted as 'usurious lender; questionable clients'[25] or Habrioux, Société Générale manager 'in Moulins for 20 years [with] very good knowledge of the place; is said to have a personal clientèle; mostly credit papers with rather good guarantees'[26].

We used these qualitative assessments available in the Bank of France supervisory reports to build a variable on the risk appetite of the counterparties. Since the supervisors relied mostly on the qualitative description than on the grades, we reconstructed a rating of risk appetite based on the soft information available in their reports. We distinguished three categories, risk takers, to which we attribute a rating of -1, risk neutral, rated 0 and risk averse receiving +1. Delmas from Lorient is attributed a +1 for his good management while Herbulot is rated -1 for having speculated on behalf of a married woman. We built a categorical variable using this numerical rating for each of counterparties.

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[25] Source: Rapport d'inspection… Blois 1898 « Prêt à des taux usuriers. Clientèle douteuse. »

[26] Source: Rapport d'inspection… Moulins 1898 « Directeur, M. Habrioux, à Moulins depuis 20ans, connait très bien la place. Beaucoup de papier de crédit assez bien garanti »

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[28] Source: Rapport d'inspection… Bayonne 1898 « Ils dirigent assez bien la maison, mais ils sont ardents, ils font beaucoup de prêts directs—aux jeunes gens même—et le papier qui en résulte a besoin d'être trié dans les présentations.»

[29] Source: Rapport d'inspection… Blois 1898 « Prêt à des taux usuriers. Clientèle douteuse. »

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Figure 1-3 displays the volume of liquidity lent according to the risk appetite. The Bank of France prioritised lending to risk-averse counterparties especially in the case of banks as they were the ones with larger off-balance sheet exposure. Non-bank agents who displayed a risk-taking behaviour were mostly absent from the discount window while the Bank accepted a larger share of risk-takers among branch managers of National banks; in case of default, headquarters would reimburse the debt.

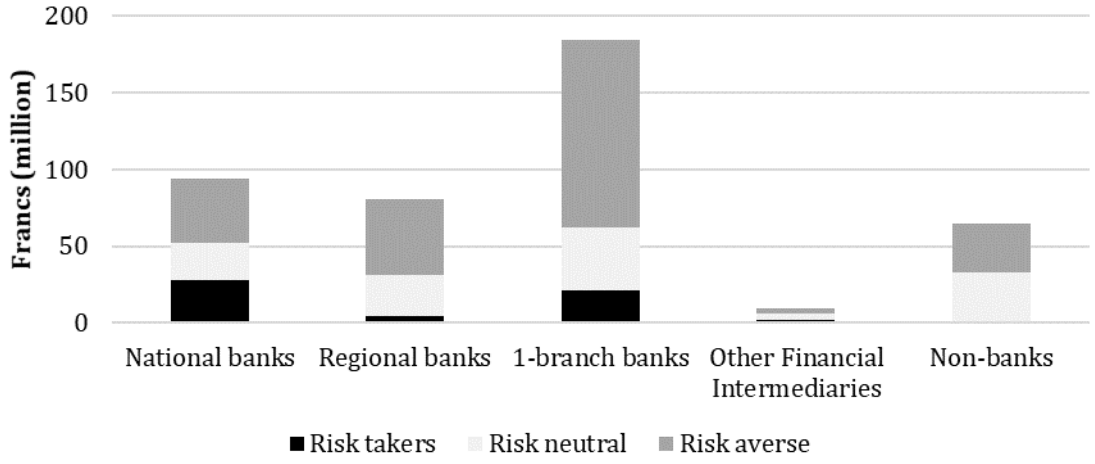

Figure 1-3: Distribution of liquidity per category of counterparties and risk appetite.
1676 counterparties in 1898.
Source: Authors' computation using data from supervisory reports of the Bank of France.

5.4. Pledging guarantees

The second mechanism used by the Bank of France to align the incentives of the borrower with the interest of the bank was the provision of credit risk guarantees against the bills that were discounted. The Bank accepted four types of guarantees.

The first type of guarantee was marketable securities which were pledged as collateral and could be immediately seized in case of default of the counterparty. The Bank accepted a limited number of securities such as French treasury bonds, some railways companies' shares and some French cities bonds.[31]

An alternative to the pledging of securities consisted in pledging a 'surety',[32] a third-party contractual commitment to reimburse any debt of a failed debtor up to a certain predetermined limit. This guarantee could also be seized immediately upon default, thus limiting agency problem.

Third, all bills discounted at the Bank needed to be guaranteed by two credit risk guarantors, who endorsed the bills. The Bank required the credit risk guarantors to pay the bill in case of default of the payer once the failure procedure was started.

The fourth guarantee was not directly pledged to the Bank. It consisted in the capital of the counterparty which served to limit the exposure to credit risk. The Bank was able to recuperate the claim through a failure procedure. The capital was comprised of the real estate value and the total financial wealth which could have easily been seized in case of default. Lending against the guarantee of the accumulated wealth did not entail an important credit risk given that this capital could be seized. Although the procedure was lengthier and potentially more costly than collateralisation with securities, it was a very effective way to recuperate debt payment in a country in which the failure law was harsh with debtors and thus allowed the creditors to recover their claim in the end (Sgard, 2006). Moreover, the Bank did not face any liquidity risk, given its right to issue banknotes, which enabled it to wait to recuperate its claims.

The Bank kept a close track of the capital of its counterparties. To access the discount window of the Bank of France, all counterparties had to formally apply to open an account at their

[31] The list of the eligible securities was decided by the shareholders of the Bank and the fulfilment of the eligibility of pledged securities was carefully monitored by the Banque de France headquarters. Source: AD Isère, 1ETP 1 – 18 Répertoire des circulaires.

[32] The surety is a provision of the Napoleonic code called *aval.*

local branch.[33] The application required the sharing of the legal documentation on the company[34] (notarial deeds, legal notices, company statutes) as well as a certificate of worthiness signed by three external persons. The application files were well kept and continually updated, recording any evolution in company size, in capital, and risks taken.[35] The list of updates was sent fortnightly to the headquarters. Mortgage statements were required yearly.[36] The branch managers were responsible for the information collection and received help by their team, notably a controller who supervised the registries.[37]

Out of these four types of guarantees, the Bank required at least two credit risk guarantors, though one could be replaced by the pledging of collateral. The Bank examined the quality of the bills presented[38] and the exposure of each of the counterparty. When necessary, it imposed credit limits, limiting the total volume of debt which could be purchased from a counterparty.[39] These limits were fixed individually according the guarantees provided. Counterparties wishing to sell more debts than their credit limit could negotiate with the Bank by offering to increase the volume of their collateral or counterparty risk guarantees.[40]

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[33] Any individual wishing to sell a debt at a branch of the Bank first needed to open a formal account which required sharing all the legal documentation on his company (notarial deeds, legal notices, company statutes). Source : Circulaire d'Aout 1880 du Gouverneur de la Bank of France aux directeurs « Lorsqu'une demande en compte courant extérieur avec faculté d'escompte vous sera adressé, vous la communiquerez à votre Comité d'Escompte, vous receuillerez des renseignements sur l'honorabilité et la solvabilité de l'intéressé et vous adressez au Gouverment de la Banque un rapport motivé faisant connaître : *La source des renseignements que vous aurez recueillis, *L'avis du comité d'escompte, * Votre avis sur l'admission ou le rejet de la demande. Ces documents ont pour effet de dispenser les comptes courants de la formalité des trois signatures exigées par le règlement intérieur. » AD Isère, 1ETP 1 – 34.

[34] Règlement des Succursales, Banque de France, tome 1, p214. ABDF.

[35] Source: case of Barronat who reported the leave of her son-in-law from the family company and was required to send the updated capital of the company to the Banque de France. AD Isère, 1ETP 1 – 34, correspondances. Lettre du directeur à A Vve Baronnat et Cie à Cullins. 28 juin 1898

[36] Source : Rapport d'inspection… Moulins 1897 « Les relevés d'hypothèques sont fournis au commencement de chaque année ». p566

[37] The controller's journal mentioned establishing the list of information on clients, source: AD Isère, 1ETP 1 – 34.

[38] Rejection of bills presented at the discount window could represent up to a quarter of bills represented in one semester. Namely, Cadore Bank in Bordeaux had a rejection rate of 24%. Source: ABDF Rapport d'inspection… Bordeaux 1897.

[39] For example, Sauvanet, wine maker in Allier region was limited to a total discount of 50,000fr by order of the headquarters 'Limité à 50 000' par le Contrôle des Portefeuilles' Source : Rapport d'Inspection… Moulins 1898.

[40] For example, the bank Charpenay and Rey from Grenoble asked the portfolio control service to be able to exceed by 25% the collateral they could pledge in order to discount two bills of their local clients. Source: AD Isère, 1ETP 1 – 34, correspondances. Lettre du directeur au contrôle des Portefeuilles , 31 janvier 1898

The pledged guarantees varied between the different types of counterparties. Table 1-2: Summary statistics of the guarantees used by the Bank of France's counterparties to access liquidity. Table 1-2 presents summary statistics on the four types of the guarantees.

Table 1-2: Summary statistics of the guarantees used by the Bank of France's counterparties to access liquidity.

Type of guarantees	Summary statistics	All
Number of credit risk guarantors	Number of counterparties with at least 1 credit risk guarantor	676 (40%)
	Total number of credit risk guarantors	*3579*
Counterparty risk guarantee	Number of counterparties with at least 1 counterparty risk guarantee	362 (22%)
	Total value	*4.2 million Fr*
Collateral	Number of counterparties with pledged securities	851 (51%)
	Total value	*9.2 million Fr*
Capital	Number of counterparties with real estate and financial wealth.	1576 (94%)
	Total value	*176.4 million Fr*

Figure 1-4 and Figure 1-5 display the reported guarantees per category of counterparties. Financial intermediaries borrowed liquidity amounting to 40% of the value their capital, which could be seized upon default according to the bankruptcy law, against 10% for non-financial agents. 15% of the liquidity to regional and one-branch banks was guaranteed by collateral, against 31% for other financial institutions and 86% for non-banks. Non-financial agents borrowed liquidity mainly against collateral and with a counterparty risk guarantee (40% of total bills).

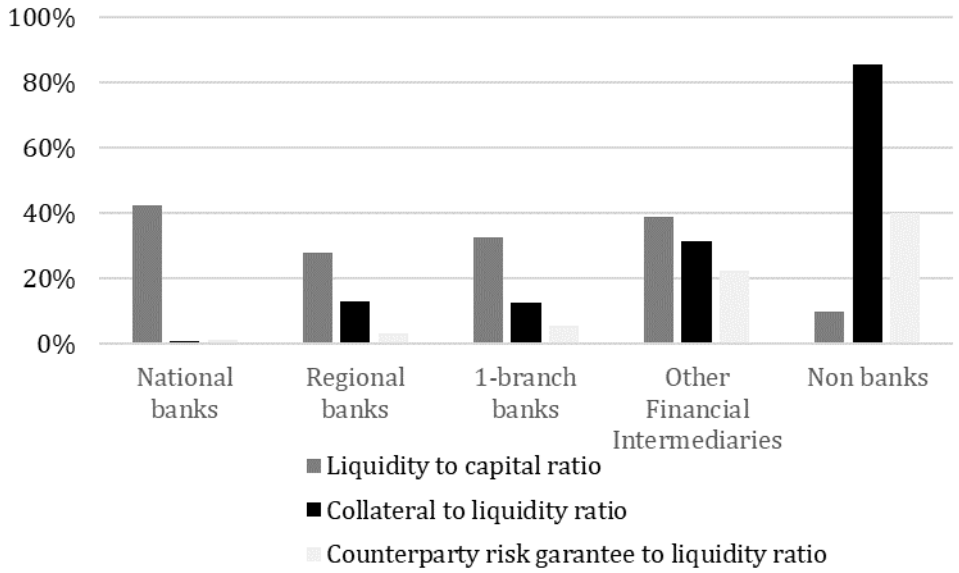

Figure 1-4: Capital, Collateral and Counterparty risk guarantee compared to liquidity, per category of counterparty (1676 counterparties in 1898).
Source: Authors' computation using data from supervisory reports of the Bank of France.

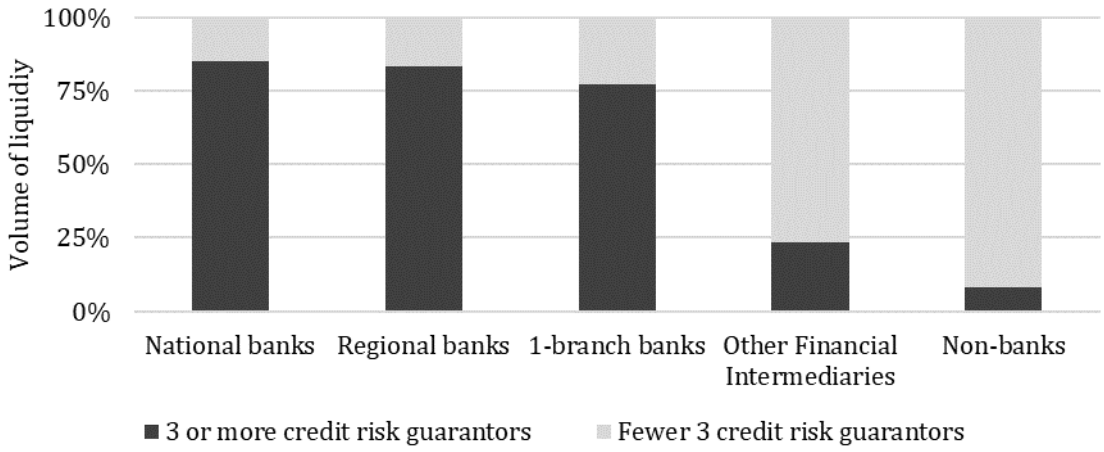

Figure 1-5: Distribution of liquidity by occupation and number pledged credit risk guarantors by liquidity.
Reading: 75% of the liquidity provided to one branch-banks was provided to those presenting bills with three of more credit risk guarantors.
Source: Authors' computation using data from supervisory reports of the Bank of France.

5.5. Relationship lending

The third mechanism used by the Bank of France to mitigate the moral hazard problem was relationship lending. We measure relationship lending by the number of counterparties having repeated interactions with the central bank.

While operating a system of payment between Paris and the French regions, between provincial regions and within them, the Bank of France carefully recorded a vast quantity of information on an assortment of agents, on their business, their capital and on their risk appetite. Counterparties with a longer presence at the discount window could build a positive reputation toward the Bank's branch. We check whether the Bank valued this information in its activity of lender of last resort by comparing the liquidity provided to new and existing counterparties in the branches operating in an economy hit by a local shock in 1898. We also study the arrival and departure of counterparties at the discount window of the branch of Moulins between 1890 and 1950. The next version of this paper will include a comparison of all branches between 1897 and 1898. We identify the existing counterparties by their presence at the discount window in 1897 while new counterparties are first observed in 1898. 22% of the counterparties were new at the discount window in 1898. New counterparties received on average 56,000fr of Bank of France liquidity while existing counterparties received 149,000fr.[41] This suggests that being known at the discount window was an asset to counterparties when requesting liquidity in region hit by a shock.

6. Results: Risk management mechanisms of a broad discount window

6.1. Setting breadth to accommodate local shocks

The breadth of the discount window played a crucial role during periods of shocks on local economies. The Bank accepted a larger number of non-financial agents directly affected by a crisis as well as shadow banks and non-banks without relaxing its standards or taking additional risks.

[41] Source: authors' computation using data from supervisory reports of the Bank of France.

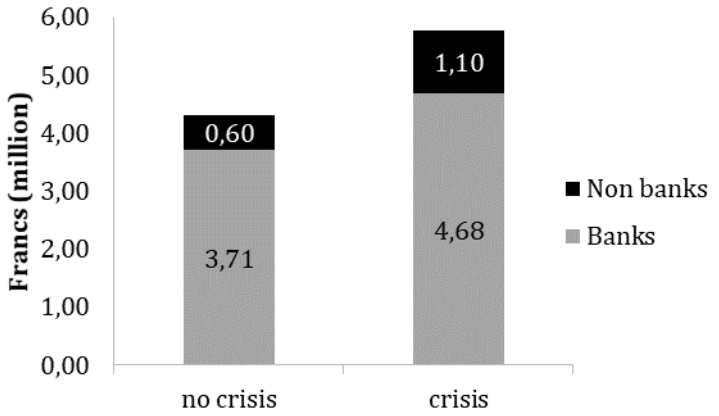

Figure 1-6: Average liquidity provided per branch, in regions hit by a local shock in 1898 compared to others.

Note: The total liquidity provision in branches hit by a crisis is 109mn francs against 323mn francs in the other branches.

Source: Authors' computation from supervisory reports of 1898 and the 1898 commercial almanac.

Figure 1-6 reports the average liquidity provided at the branch level in regions hit by a local shock in 1898 compared to others. The liquidity allocated to counterparties in the former regions received more liquidity than in the rest of the country. This difference was driven by a more important number of counterparties in branches located in regions hit by a shock: the average number of banks in the counterparties of branches in such regions was 12 against 9 in the rest of the country and the average number of non-banks was 15 against 6 in the rest of country. In cases of local stress, the Bank of France broadened the discount window to accommodate more counterparties, especially non-banks.

This result is also observable in the data from the panel of counterparties facing local shocks in the branch of Moulins. In the 1890s, the counterparties of the branch of Moulins were confronted with a liquidity crisis. Turmoil hit the agricultural sector, which locally consisted mainly of fattening cattle. An epizootic disease crippled the fattening business by preventing the cattle from putting on weight and potentially causing a capital loss.[42] A drought that hit the region in 1893 precipitated the apparition of the cattle disease. More droughts hit the region in 1895 and in 1898. Between 1898 and 1900, the disease was especially strong and stifled the cattle fattening business.

[42] See Appendix 2 for details on the graziers' fattening crisis.

Figure 1-7 presents the evolution of the discount at the branch of Moulins during this episode.[43] The local branch refinanced a greater number of non-financial agents in years of agricultural shock than in typical years. At the end of the 1890s, the increase of the liquidity provision was characterised by both the arrival of debts through the local banks and by the arrival of non-financial agents directly affected by the crisis - the beef cattle famers or graziers. Graziers' debts also came at the discount window through their direct creditors, the local landlords. These wealthy agents pledged their capital to discount graziers' debts. The number of banks within the branch portfolio remained stable during the period but the number of graziers went from four before the crisis to twenty-six at the peak of the crisis in 1898. The total liquidity allocated to banks nearly tripled during the period. The total liquidity provided to graziers and landlords increased more than fivefold between the first years of the period and the peak of the crisis.

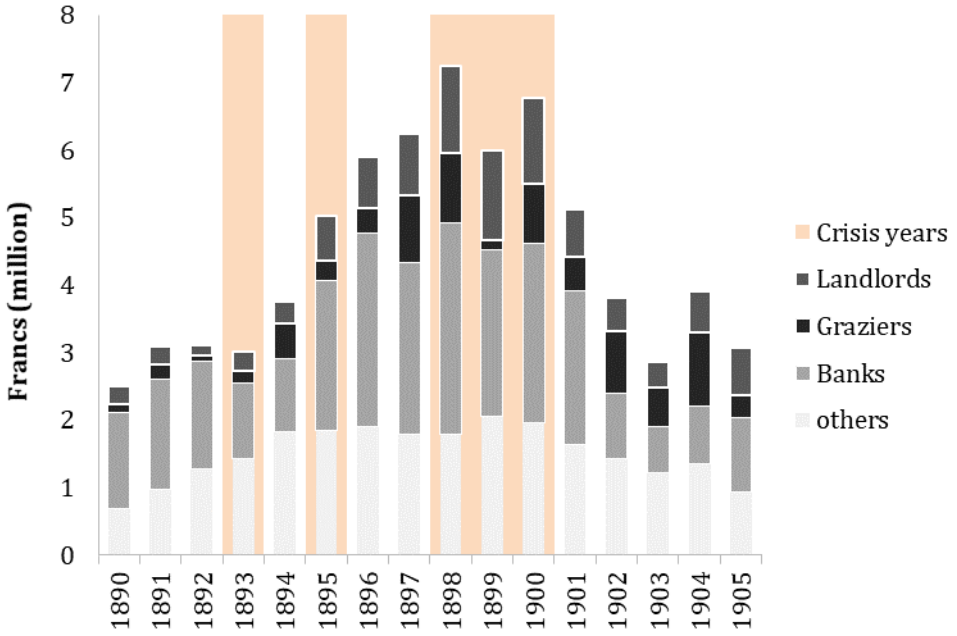

Figure 1-7: Volume of bills discounted at the branch of Moulins per category of presenters, 1890-1905 per category of presenters.
Source: Supervisory reports of Moulins (1890-1905).

The increase of liquidity provision might have been driven by either a greater number of counterparties, or a greater volume of liquidity lent. We decomposed the share of variation of liquidity provided between the change of provision to existing counterparties and the evolution

[43] We identified the years of crisis thanks to reports on the local economy. Source: *ABDF Résumés mensuels des rapports des directeurs de succursales*. See Appendix 2 for further details on Moulins' dataset.

of the counterparty base. Table 1-3 provides the numbers for the average liquidity provision and the number of counterparties at the branch of Moulins. During the years of drought and spread of the cattle disease which stressed the local economy, more non-financial counterparties used the liquidity provision of the Bank compared to the non-crisis situation. The average liquidity provided to banks was also more important those years. By contrast, the Bank of France did not allocate more liquidity on average to non-financial counterparties. On the economy recover, the average amount of liquidity provided to all the counterparties was reduced. This allowed the Bank to decrease its exposure after the crisis. Even if the number of non-financial counterparties remained more important after the shock than before, the total amount of the liquidity provision returned to pre-crisis level.

Table 1-3: Liquidity provision at discount window of the branch of Moulins.

	Pre-crisis period	Years of crises	Post-crisis period
Average number of counterparties			
Banks	9	9	6
Non-banks	35	56	54
Average liquidity provision per counterparty, *(thousands of francs)*			
Banks	194	291	203
Non-banks	63	60	48

Note: Years of crises are 1893, 1895, 1898-1900. The years 1890-1892, 1894 and 1896-1897 are incorporated as 'pre-crisis period'. The period 1901-1905 is labelled the post-crisis period. The total liquidity provision before the crisis is 23.7mn francs. It amounts at 28.9mn francs for the crisis period and 18.7mn francs after the crisis.
Source: Supervisory reports, Moulins 1890-1905.

6.2. Risk management of a broad discount window: collateralisation and the importance of soft information

To quantitatively assess the risk management framework of the Bank, we analyse the determinants of the decisions to provide liquidity by accepting to discount a bill, using the cross-section of 1676 counterparties from the 94 provincial branches. We test whether the improvement of collateralisation and of the rating of risk appetite was linked to an increase of volume of the liquidity provided, using the baseline model of Equation (1), first in the setting of the 1898 cross-section in Table 1-4 column 1 and 2, then in the setting of the panel of counterparties at the branch of Moulins during the period 1890-1905, in column 3, 4 and 5.

Results of the estimation of Equation (1) show that accumulated soft information on counterparties on their risk appetite mattered. Improving the rating of risk appetite when asking to swap debt against cash at the discount window increased the liquidity provided by 18,600fr.[44] The four types of guarantees also were important and significant in the discount decision of Bank of France. As seen in column 1, the addition of one credit risk guarantor increase the liquidity by 62,100fr. Pledging 1,000fr of collateral increased the volume of liquidity by 280fr.

Table 1-4: The determinants of central bank liquidity provision

	(1)	(2)	(3)	(4)	(5)
	1898 Cross-section		Panel: branch of Moulins		
	Liquidity provision	Liquidity w/ Crises	Liquidity provision	w/ Crisis	Crises x rating
Collateral	0.28***	0.29***	0.21**	0.21**	0.26*
	0.00	0.00	(0.03)	(0.03)	(0.05)
Nb. of credit risk guarantors	62.10***	64.54***	28.20***	28.47***	27.21***
	0.00	0.00	(0.00)	(0.00)	(0.00)
Counterparty risk guarantee	0.46***	0.37*	76.97***	77.86***	78.54***
	0.00	0.07	(0.00)	(0.00)	(0.00)
Capital	0.06***	0.06***	0.14***	0.14***	0.13***
	0.00	0.00	(0.00)	(0.00)	(0.00)
Assessment of risk appetite	18.62**	36.37***	28.32**	30.08**	13.85
	0.04	0.00	(0.03)	(0.02)	(0.34)
Crises		40.28***		20.19*	3.96
		0.00		(0.07)	(0.76)
risk appetite*crises		-65.74***			56.84**
		0.00			(0.05)
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Other interactions	*N.a.*	*Yes*	*N.a.*	*N.a.*	*Yes*
Occupation FE[45]	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Adjusted R^2	0.670	0.670	0.456	0.458	0.463
Observations	1589	1589	671	671	671

Columns 1 and 2 of this table perform a cross-section analysis on the discount volume granted by the Bank of France to its counterparties in 1898 according to pledged guarantees. Column 1 estimates the main specification, using OLS with robust standard errors, over the dataset of counterparties. The definition of the five type of guarantees as well as descriptive statistics are provided in section 5.1. Column 2 adds the dummy for crises at branch level interaction between Crises and the rating of risk appetite. Columns 3, 4 and 5 of this table perform a panel analysis on the discount volume granted by the Bank of France to its counterparties at the branch of Moulins between 1890 and 1905. Except the dummy for crises, all variables are defined at the counterparty level. For counterparty risk guarantee, we use here a dummy coding the presence of a surety supporting the counterparty instead of the sum guaranteed by the surety. The panel is unbalanced and composed by 136 counterparties. Risk appetite and capital are one-year lagged. Column 3

[44] We also ran the regression with the total exposure of the counterparties instead of the liquidity provided, which allows to account for off-balance-sheet exposures. The coefficients are stable and significant whether we analyse the liquidity provision or the total exposure of the counterparties.

[45] We also ran the regression with the inclusion of branch fixed effect, see Table 1-10, the coefficients of Column 2 are robust. We do not include counterparty fixed effect in the panel of Moulins. The panel is unbalanced and the fixed effects would capture an important part of the effect of the individual reputation and capital which are stable across years. If included, only the more volatile collateral and number of credit risk guarantors and counterparty risk guarantee are significant. Although, the interaction of crises and the rating of risk appetite is robust to the inclusion of counterparty fixed effects.

estimates the main specification, using fixed effects by occupation. Column 4 adds the dummy Crises coding for years of negative shocks and columns 5 adds the interaction between the crises and the other variables. Controls for specification (1) and (2) also include dummies for each occupation, a dummy for being a director of the branch and a dummy for including female relative in the business. Controls for specification 2 and 5 also include non-significant interactions between the dummy Crises and other types of guarantees (collateral, number of credit risk guarantors, counterparty risk guarantor, capital). Controls for column 3, 4 and 5 include a dummy correcting for seasonal variation (if the supervisory report is written during low agricultural season). The cross-section sample is winsorized at 1% top and bottom for the following variables: liquidity provision, capital, collateral, counterparty risk guarantee and number of credit risk guarantors. p-values are in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

Column 2 reveals that counterparties located in an economy affected by a crisis received 40,300fr of additional liquidity compared to the counterparties in non-affected branches. The effects of the guarantees are stable compared to the baseline model estimated in the specification (1). The interaction between the assessment of the risk appetite and the dummy for crisis is significant but doesn't come with the expected positive sign. This sign can be explained by the arrival of new counterparties during crises. The extensive margin of counterparties played a more important role in explaining the increase of discount volume in time of crises. When new counterparties arrived at discount window, they tended to receive a neutral rating of their risk appetite by the Bank, which evolved with repeated interactions. The rise in numbers of risk neutral agents pushes the coefficient downward at the aggregate level. Figure 1-8 details the proportion of the different attitude toward risk of the counterparties. Risk takers were less numerous by 2 percentage points in the portfolios of branches facing a negative shock. The proportion of risk neutral counterparties was more important, by 16 percentage points. The Bank of France broadened its discount window during crises without accepting a greater share of risk-takers among its counterparties.

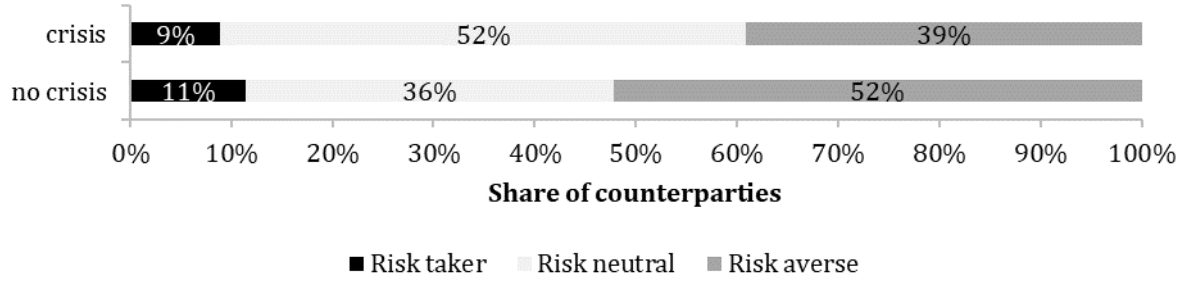

Figure 1-8: Proportion of the different attitude toward risk of the counterparties of branches affected or not by a local crisis.

Reading: 11% of the counterparties using the discount window facility of the Bank of France in 1898 were risk-takers.

Note: The total counterparties for the branches hit by a crisis in the local economy is 516, against 1160 for the other branches.

Source: Supervisory reports, 1898.

We also replicate the analysis described in Equation (1) across different years using the panel data of counterparties from the branch of Moulins. Coefficients of the baseline specification reported in column 3 are similar to the ones in the cross-section; all type of guarantees yield positive and significant coefficients. In column 4, we show that the Bank of France increased its liquidity provision by 20,190fr during period of crises. In column 5, we added the interactions between risk appetite, guarantees and negative shocks. The coefficient for the interaction with the rating of risk appetite is positive and significant. During years of negative shock for the economy of Moulins, a counterparty with a positive rating of his risk appetite received 56,840fr more liquidity than a counterparty with similar rating during a non-crisis year. We conclude that in time of crises, the Bank payed special attention to the risk appetite and concentrated its lending of last resort to agents who proved to be risk averse. Results are robust to the exclusion of the counterparties receiving the largest amount of liquidity from the Bank and to the clustering of errors at counterparty level.

6.3. Managing breadth: relationship lending and extensive margin

We then investigate the role played by relationship lending at the discount window of the Bank of France. We compare new counterparties with counterparties which were present more than one consecutive year. We first used the limited setting of the 14 branches which faced a new shock in 1898 compared to 1897, then the case of the branch of Moulins. We introduced a dummy Existing equal to 1 if a counterparty using the discount window in 1898 was already present in 1897 in the setting of the cross-section. In the setting of Moulins, the dummy is equal to 1 for the year t if a counterparty present in year t was also present for the years t-1 and t-2.[46] We also used an alternative variable which sums the number of years of presence in the previous periods: for a counterparty present in year $t \in [1890 - 1905]$, we compute t-1890 minus the number of years of absence of the counterparty at the discount window. The average number of years of presence at the discount window of Moulins across the panel is 11 for financial and 7 for non-financial counterparties. We added these variables alternatively to our baseline model and report results in Table 1-5.

[46] We use the second order to avoid collinearity between the occupation fixed effect and the dummy.

Table 1-5: *The role of the relationship lending mechanism*

	(1) Cross-section	(2)	(3) Panel of Moulins	(4)	(5)
	Liquidity provision	Liquidity provision	Liquidity provision	w/ crises	w/ crises
Collateral	0.27***	0.21***	0.21***	0.27***	0.27***
	0.00	0.01	0.00	0.00	0.00
Nb of credit risk guarantors	54.57***	28.10***	27.97***	27.26***	27.19***
	0.00	0.00	0.00	0.00	0.00
Counterparty risk guarantor	0.43***	73.33*	73.49*	76.12*	74.57*
	0.01	0.06	0.06	0.09	0.09
Assessment of risk appetite	-37.95*	27.71**	28.11**	13.44	14.26
	0.06	0.01	0.01	0.26	0.24
Capital	0.04**	0.14**	0.13**	0.13**	0.12**
	0.01	0.01	0.01	0.02	0.02
Dummy Existing	27.96**	15.83*		8.51	
	0.02	0.05		0.22	
Nb years of presence			2.70*		1.88
			0.09		0.15
Crises				-5.13	-29.23
				0.85	0.26
Crises * risk appetite				56.09**	61.62**
				0.02	0.02
Crises * Existing				19.74	
				0.37	
Crisis * Nb years of presence					9.04
					0.14
Other interactions	N.a.	N.a.	N.a.	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Occupation FE	No[47]	Yes	Yes	Yes	Yes
Adjusted R^2	0.639	0.457	0.458	0.463	0.471
Observations	452	671	671	671	671

Column 1 reports results of an OLS estimation of the equation (1) in which we added a dummy equal to 1 when the counterparty was already present in year *t-1*, with robust standard errors. Controls include a dummy for being a director of the branch and a dummy for including female relative in the business. Columns 2 to 5 report results of panel regressions on counterparties of the branch of Moulins, including an occupation fixed effect. For counterparty risk guarantee, we use here a dummy coding the presence of a surety supporting the counterparty instead of the sum guaranteed by the surety. Errors are clustered at counterparty level. Controls for specifications 4 and 5 also include non-significant interactions between the dummy Crises and other types of guarantees (collateral, number of credit risk guarantors, counterparty risk guarantor, capital). Controls for column 3, 4 and 5 include a dummy correcting for seasonal variation (if the supervisory report is written during low agricultural season). The cross-section sample is winsorized at 1% top and bottom for the following variables: liquidity provision, capital, collateral, counterparty risk guarantee and number of credit risk guarantors. p-values are in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

The coefficients of the variables capturing the relationship lending mechanism are both positive and significant. The other coefficients are stable compared to those of the baseline specification reported in Table 1-4. This suggests that the Bank of France used some form of

[47] We will include occupation fixed effect once we compile the full sample 1897-1898 for all branches. If we include occupation fixed effect, the dummy Existing is no longer significant.

relationship lending when choosing to provide liquidity. In branches facing a local shock in 1898 compared with 1897, the Bank provided 27.960fr more to counterparties known at the discount window than to new counterparties. In Moulins, an additional year of presence at the discount window during the period 1890-1905 allowed counterparties to receive 2.700fr more liquidity. When including year fixed effects, see Table 1-10 in appendix, the coefficients remain stable except for the dummy Existing which become significant only at the 15% level. The coefficients of the interactions between the dummy crises and the relationship lending variables are positive but not significant. This result suggests that, when providing liquidity to smooth a local negative shock, the Bank did not discriminate according to the number of years of presence but rather using the soft information on risk appetite.

To investigate the relative persistence of counterparties at the branch of Moulins, we compute the average number of years of presence at the discount window. We measure the average number of years during which a counterparty is using the liquidity provision of the central bank. Table 1-6 reports the results. Non-financial counterparties were not regularly using the facility of the discount window before the crises. Their presence increased during the period of crisis, as seen also in Figure 1-7. The volatility of the presence of the counterparties most affected by the agricultural shocks in the area of Moulins–graziers and landlords–decreased significantly after the crises while that of banks increased. Banks were less likely to be observed at the discount window after the crisis while the most affected counterparties are persistent, though discounting only small amounts. The persistence of non-banks at the discount window can be explained by the fact that once these agents completed their applications to open an account the Bank to access its liquidity, they were likely to keep this account open to be able to borrow liquidity again later.

Table 1-6: Mean rate of presence at the discount window

	All time	Pre-crisis	In crisis	Post-crisis
Banks	52%	55%	54%	36%
Graziers	54%	35%	54%	65%
Landlords	31%	20%	35%	35%
Others	42%	33%	50%	38%

Note: The mean rate of presence is defined as the average number of years during which a counterparty is reported to use the liquidity provision of the central bank. The full sample is composed by 16 banks, 35 graziers, 38 landlords and 47 other counterparties.
Source: Supervisory reports of Moulins 1890-1905

In order to investigate the determinants of the presence of counterparty and the eligibility criteria of the Bank of France we calculate the probability for a counterparty to be newly present at the discount window. We define a variable $Arrival_{i,t}$ equal to 1 for counterparty *i* who is present at the discount window in year *t* and absent in year *t-1,* and equal to 0 otherwise. We run a logit regression where $Arrival_{i,t}$ is the dependant variable. The explanatory variables are the same as in Eq(1). Results are described in: column (1) shows that a counterparty is more likely to be a new counterparty using the liquidity provision of the central bank if: he has good guarantees, he is risk averse in a crisis, and he is not a bank. The breakdown by period, as reported in Columns (2) through (5) reveals that the occupation of the counterparty is not a significant factor outside the years of crisis. However during the crisis, the main determinant of arrival at the liquidity provision facility was being a non-bank and especially being a risk averse non-bank. As the crisis hitting Moulins originated primarily outside of the financial sector, this indicates that the central bank opens its refinancing facility primarily to counterparties most hit by the crisis and rewards risk averse attitudes.

Table 1-7: The determinants of arrival of counterparties at the discount window

	(1) Arrival All sample	(2) Arrival Pre-crisis	(3) Arrival In crisis	(5) Arrival Post-crisis
Collateral	-0.00	-0.01	0.00	-0.00
	0.31	0.16	0.74	0.82
Number of credit risk guarantors	-0.24**	-0.24**	-0.08	-1.44**
	0.01	0.02	0.61	0.02
Counterparty risk guarantor	-0.78***	-0.64*	-0.51	-1.77***
	0.00	0.06	0.11	0.00
Capital	0.00	0.00	-0.00	0.00
	0.86	0.63	0.32	0.32
Assessment of risk appetite	0.57***	0.56*	-0.66	0.43
	0.00	0.06	0.12	0.21
Crises	0.70***			
	0.00			
Risk appetite*crises	-0.88**			
	0.02			
Non-banks	0.78**	0.32	15.89***	0.77
	0.02	0.53	0.00	0.39
Risk appetite*non-banks		-0.07	14.99***	0.23
		0.90	0.00	0.77
Pseudo-R^2	0.054	0.045	0.087	0.103
Observations	883	264	321	298

This table details coefficients for a logit analysis of the arrival of counterparties at the branch of Moulins between 1890 and 1905. Excepting the dummy for crises, all variables are defined at the counterparty level. The full sample is composed of 136 counterparties. Column (1) estimates the specification on the full sample. Variable

definitions and summary statistics are provided in section 5.1. For counterparty risk guarantee, we use here a dummy coding the presence of a surety supporting the counterparty instead of the value guaranteed by the surety. Controls include a dummy correcting for seasonal variation (if the supervisory report is written during low agricultural season). Column (2) to (5) estimates the specification on a sub-sample. The years 1890-1892, 1894 and 1896-1897 are pooled under 'pre-crisis'. The period 1901-1905 is labelled 'post-crisis' period. p-values are in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

6.4. Averting losses at the discount window

The Bank of France was a profitable institution. In 1898, the branches of the Bank of France provided 5,831 million francs to its counterparties. From these operations, the Bank accrued a net revenue of 11 million francs, which represented around 25% of its total annual revenue.[48] Figure 1-9 details the product of the operation of the liquidity provision as well as the profit at the branch of Moulins before, during and after the agricultural shocks. The branch was always profitable over the 1890-1905 period and the increase in the volume of operations during the crisis period resulted in a higher profit than during the rest of the period. This shows that the Bank was able to accommodate a greater diversity of counterparties and increase its refinancing to banks without taking losses.

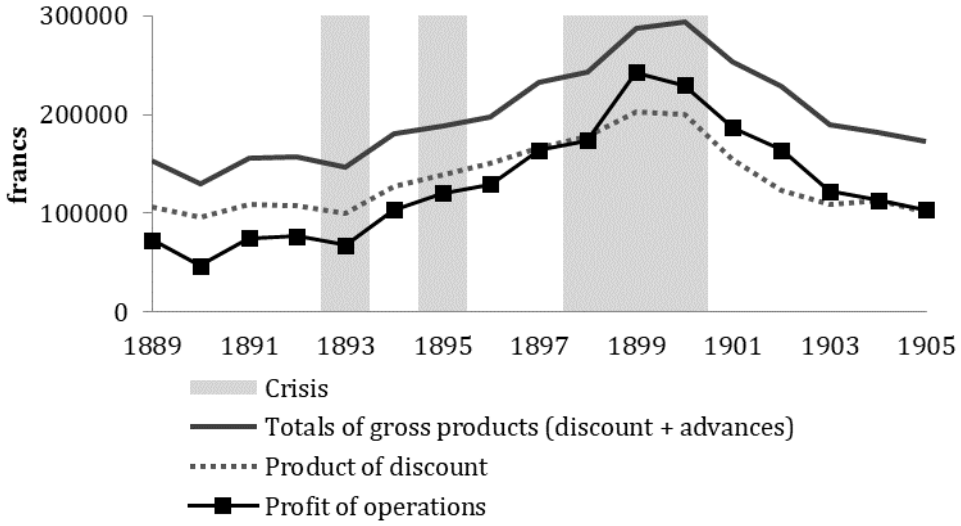

Figure 1-9: Product and profit of operations at the branch of Moulins, 1890-1905 (in francs).
Source: Compte rendu, Assemblée générale des actionnaires de la Banque de France.

7. Conclusion

Abating financial stress is more efficiently achieved when a central bank opens its liquidity provision to the widest set of counterparties. This dovetails with the well-known result in

[48] Source : Annexes de l'assemblée générales des actionnaires de la Banque de France, 1898.

macroeconomics which states that welfare is higher when the negative income shock is smoothed by an accommodating monetary policy. This intuition ushers in the practice by central banks of broadening their discount window in times of crisis. But an equally large body of literature emphasises the risk associated with operating a broad discount window. Certainty of access to the central bank may weaken market discipline and fuel moral hazard and hence future crises. In this paper, we built on a historical study to document a situation in which a central bank operates a broad discount window but implements procedures and tight management techniques to protect its shareholders from the losses associated with risk taking.

We show that, in conformance with theory, the Bank of France used three mechanisms to mitigate agency issues arising from the broadening of the discount window: collateralisation, screening and monitoring the risk appetite of the counterparties, and using relationship lending. This risk management framework enables the Bank to accommodate a variety of counterparties affected by negative income shocks, including non-financial agents. The collection of soft information of the risk appetite of the counterparties played an important role at the Bank of France when prioritising the provision of liquidity.

An important lesson from our study is therefore that the type of guarantees that a central bank can accept depends on the legal framework in which it operates and on the central bank charter. The legal framework and the charter identify the arsenal of risk management tools that the central bank may mobilise to curb moral hazard. This sets the breadth of the discount window and hence the ability of the central bank to stabilise the economy. The harsh creditor laws of 19th century France forbade debt forgiveness and hence allowed the Bank to rely on the failure procedure to separate credit risk from liquidity risk.

Our findings have implications for the current situation. With the development of non-bank payment operators, the current world of payment instruments is now returning to the French situation of the late 19th century. At the time, payments instruments were (partly) dis-intermediated from deposit banking, and thus runs could occur on those instruments. Today's ongoing Covid crisis has similarly brought about a negative income shock which has forced the creation of new liquidity facility such as the Municipal Liquidity Facility of the Fed. One may speculate whether the breadth of the discount solution was one of the practical solutions found by the Bank to deal with the instability spawned by this payment environment. We show in this paper that a central

bank can allow a broad access to its discount window while curtailing the ensuing moral hazard. The Bank circumvented the obstacle by acquiring information on counterparties and using it to assess the riskiness of its counterparties. This is not too far removed from today's financial 'haircuts' commensurate with the ratings of financial assets.

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9. *Appendices*

9.1. Statistics on banks

Population and size of the banks operating in 1898

We matched the banks in our sample of Bank of France clients with the location of one of the 2,921 branches of banks operated in 1898, as they were given by the commercial almanac *Bottin du commerce et de l'industrie* (see Hoffman *et al.*, 2015). The almanac provides the address and town of each bank. We matched the information on towns of the 2,921 bank branches in the Almanac with the GIS coordinates (latitude and longitude) of cities as given by the INED city database. Of the 889 banks that discounted at one of the local branches of the Bank of France (outside Paris), the information on 760 banks was matched with their location using the commercial almanac. Of these 760 banks, 451 were located in a town that has at least once reached the threshold of 2,500 inhabitants in the period between 1826 and 1990 (source: INED database on urbanisation). The threshold of 2,500 is the usual minimal definition of a city by modern French benchmarks. We proved unable to match the town cited in the almanac in 309 instances. In that case, we input the geographic coordinates of the capital city of the 'arrondissement', i.e. a district subdivision. We failed to locate either the address or the town of 129 banks from the almanac.

We distinguish national deposit banks from regional banks, one-branch banks and discounters. We follow the classification made by the supervisor between bank and discounter. Plessis (1999, p. 205) writes that it is usual for an inspector to label a discounter as a discounter in the report of a given year and to label it as a bank in the subsequent reports (and vice-versa). This is of no consequence for our distinction between banks and non-banks.

We label as 'regional' a bank that operated at least 2 branches as reported in the commercial almanac. We checked that the banks identified as regional by the historiography also falls in this category defined by our identification rule. We found no example in Kaufmann (1914), Freedeman (1993) or Plessis and Lescure (1999) of a regional bank defined by the criterion 'at least 2 branches' that is not also identified as a regional bank in the historical literature. Any other bank is labelled as 'local' or '1-branch' bank. The three national deposit banks–Crédit Lyonnais, Société générale and Comptoir National d'Escompte de Paris–operated 513 branches outside the Seine district.

Balance-sheet information

We use Kaufman (1912) to document the balance sheet of the three largest national deposit banks. We use the Bank's archives to document the balance sheet of 23 smaller banks of various sizes and split over the French territory. The 23 local and regional banks are: Banque commerciale d'Annecy, Banque de Mulhouse in Belfort, Comptoir Maconnais in Chalon-sur-Saône, Banque de Bourgogne in Dijon, Crédit mutuel de Poligny, Société Lyonnaise de Crédit, Société Lyonnaise de dépôts et de comptes courants, Banque Mutuelle in Lyons, as well as banks Sandelyon in Lyons, Collet in Lyons, Piot in Lyons, Sappin in Auxerre, Berthier in Auxerre, Moneste in Chambéry, Béguet in Moulins, Hours in Moulins, Maudière in Moulins, Rabier in Nevers, Richault in Orléans, Berge in Perpignan, Camuset in Rheims, Chapuis in Rheims, Bayette in Saint-Étienne, Dastugue in Tarbes, De Boussac in Toulouse.

9.2. Creating a database of counterparties from the Bank of France's archives

We collected detailed information on the counterparties to the discount window thanks to the supervisory reports, *Rapport concernant la vérification du service de la succursale de …*[49] Each supervisor's visit was followed by the production of two reports on the management of the branch addressed to local managers and the headquarter portfolio controllers, the first one on the portfolio management and another one the administrative management.

Each supervisory report on portfolio management of a branch contains the same information, divided in three parts. It starts with a brief comparison between the portfolios of the branch during the visit with the state of the portfolio during the last visit. In a second part the supervisor described the individual characteristics of the presenters of the bills of exchanges discounted during the period of the visit (under the heading '*présentateurs*'). The last part describes the characteristics of the individuals that guarantee the discount under the heading 'main debtors and endorsers' ('*principaux obligés et endosseurs*'). In the second and third part, each page of the report contains four sections: the first for the supervisor's comments, the second for explanations by the local manager of the branch, the third for the supervisor's new observations and the last

[49] These reports have been digitised and may be consulted on site at the archives of the Bank of France.

section for follow-up (‘*suite à donner au rapport*’). This organisation set up a dialogue between the branch and Paris, as the main objective of the report was to assess the quality of the management of the branch.

In each report, for each presenter or endorser, the supervisor reported the identity, address, occupation, as well as the amount discounted, and the value of the securities pledged and drawn as a guarantee to the overdraft facility (advances on securities).[50] Most of the time, we also have an estimate of the wealth of the presenters or of his capital and reserves when he was admitted. Each entry also reports whether any of the bills presented for discounting were endorsed by another signature–in which case the bill is said to bear a third signature–or whether any security has been deposited to substitute for the missing third signature.[51] The supervisor also systematically mentioned whether the client has guaranteed (endorsed) some bills for other clients of the Bank and all his endorsements. By gathering all available information in the report, our database is by construction a sample of all the counterparties of the Bank as each report only offers a snapshot on the activity during the visits of the supervisors.[52]

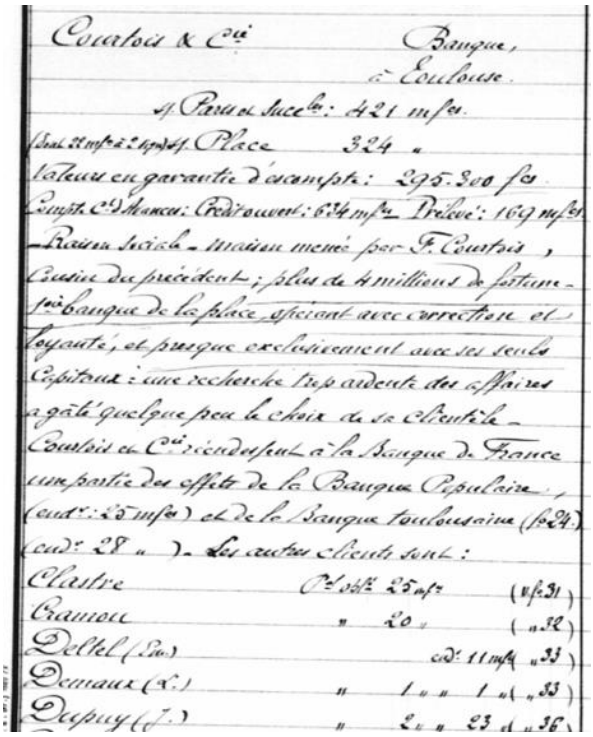
Figure 1-10 presents an excerpt from the report of the Toulouse exhibiting an example of a presenter to the discount window operated in Toulouse. The first line indicates the name of the discounted client and his occupation (*Courtois bank* here). The second line gives the city. The third and fourth lines give the amount of bills discounted payable on Paris or in the other cities (421,000fr) and on the city where the branch is located (here Toulouse, for 324,000fr). To the left of the fourth line, the supervisor reported that bills with a total value of 22,000fr were guaranteed by two others persons (of the 324,000fr payable in Toulouse). The amount of securities pledged to guarantee the bills discounted with 2 signatures (295,300fr) is reported on the fifth line reports while the sixth line indicated the amount of the Lombard—collateralised—lending. The supervisor then briefly describes an assessment of the counterparty solvency, of the quality of his management and the risk associated with his business. When the supervisor opinion is only factual, we have coded the information as neutral and set the dummy to 0. On the contrary the dummy was set to 1 if the supervisor reported a positive assessment of the management of the business. The last lines

[50] In 52 instances the supervisor copied a balance sheet of the firm.

[51] For details on the third signature or on direct discount, see Leclerc, 2010, p. 54-5 or Rapport d’Inspection, Limoges, 1898, ‘*garanties remplaçant la troisième signature*’

[52] The information on the Bank’s activity in Paris had been lost and cannot be recovered for lack of archives.

indicated either the main agents endorsed ('*principal obligé*' or first signature) and the other endorsers of the bill ('the second or third signature').[53]



Name Profession

City

Discounted on Paris & branches: 421 mfs

(with 22mfs 2 signatures bills) discounted in the city: 324 mfs.

Value of pledged securities: 295.300 fcs.

Current account: Loan granted: 634mfs. withdrawn: 169mfs.

Description of the company and its capital

Description of the character of Courtois

Description of the clients of Courtois

Figure 1-10: Excerpt from the Toulouse report of 1898 (left panel) and its description (right panel)

9.3. Coding local negative shocks (crisis)

We sought to measure the financial distress of Bank of France counterparties. We identified episodes of distress from period accounts of regional economic conditions prepared by the Bank of France inspector and branch managers. We used two sources: the supervisors' reports which details the state of the portfolio and local economic conditions in the past 12 months, and the reports on economic situations ('*Rapports conjoncturels*'), a monthly summary of the state of local economies sent monthly by each branch manager to their headquarters. From the economic conditions reports, we identify three macroeconomic shocks outside the financial sector in 1898: a cattle disease, the 1897 US tariff (Dingley Tariff) and the Spanish-American war. We collected mentions of these

[53] The list of 'debtors' and 'endorsers' does not always report all the clients of the bank, but indicate the most important names ('*Sa clientèle de place comprend surtout :*', Rapport d'Inspection, Limoges, 1898, p7 'Crédit Lyonnais')

shocks in the branch reports. We also checked for the existence of banking crises, looking for mentions of bank runs, bankruptcies or distress of the banking sector such as erosion of capital or important losses. We code the dummy crises equal to 1 in case of a regional shock identified at the branch level. Table 1-8 details each crisis episode and locates the affected branches. We also mention which type of counterparties were impacted.

Table 1-8: Identifying negative shocks in local economies

Type of crisis	Explanation	Concerned branches
Agricultural crisis	In the 1890s, recurring outbreaks of the epizootic Foot-and-Mouth disease prevented cattle from putting on weight. First diagnosed in France in 1893, the infection lasted until 1898[54] and was particularly costly for graziers as the resulting animal mouth ulcers hampered feeding and fattening. Animals starved to death, causing major losses to graziers.	Moulins, Caen Aurillac, Mende Bourges St Etienne Saint Lô Nevers Chalon sur Saône
Industrial crisis	The Spanish-American war heavily impacted industrial sites reliant on textile such as wool and silk fabrics. The war led to an unanticipated disruption of French textile exports to the US, which compounded the stress following the 1897 US 'Dingley Tariff'[55].	Laval Flers Castres Epinal Rheims
	In 1898, a crisis in the Besancon watch industry led to the liquidation of a major company, Wolff and Picard[56].	Besancon
Banking crises	In Carcassonne and Bordeaux, stress on wine traders due to the 1897 US 'Dingley Tariff' affected in turn the situation of major bankers[57].	Carcassonne Bordeaux
	In Rheims, banks faced losses after twin bankruptcies of a major textile producer and important wine maker.	Rheims
	In Lons-le-Saunier, an important discount house filed for bankruptcy after the death of its manager[58].	Lons-le Saunier

[54] See in particular Vallat (2001).
[55] Source : Rapports conjoncturels 1898.
[56] Source : Rapports d'inspection… Besançon, 1896, 1897, 1898.
[57] Source : Rapports d'inspection… Bordeaux 1897 and Carcassonne 1898
58 Source : Rapports d'inspection… Lons le Saunier 1898

	In Dijon, the large Bank of Burgundy faced runs and stress after the failure of a major chemical industry[59].	Dijon

9.4. Additional tables of results

Table 1-9: Baseline model with additional controls

	(1)	(2)
	1898 Cross-section	
	Liquidity provision	Liquidity w/ Crises
Collateral	0.30***	0.29***
	0.00	0.00
Nb of credit risk guarantors	64.97***	67.78***
	0.00	0.00
counterparty risk guarantee	0.52***	0.46***
	0.00	0.01
Capital	0.04***	0.04***
	0.00	0.00
Assessment of risk appetite	17.63	36.10**
	0.14	0.02
risk appetite*crises		-61.13***
		0.01
Controls	Yes	Yes
Other interactions	N.a.	Yes
Occupation FE	Yes	Yes
Branch FE	Yes	Yes
Adjusted R^2	0.626	0.631
Observations	1589	1589

Columns 1 and 2 of this table perform a cross-section analysis on the discount volume granted by the Bank of France to its counterparties in 1898 according to pledged guarantees. Column 1 estimates the main specification, using OLS with robust standard errors, over the winsorized dataset of counterparties. The definition of the five type of guarantees as well as descriptive statistics are provided in section 5.1. Column 2 adds the dummy for crises at branch level interaction between Crises and the rating of risk appetite. The other interactions between the dummy Crises and other types of guarantees (collateral, number of credit risk guarantors, counterparty risk guarantor, capital) are included but not reported in details as non-significant. The coefficient of the dummy crisis is omitted due to collinearity with the fixed effect by branch. Controls for specification (1) and (2) also include fixed effects by occupation and by branch, as well as a dummy for being a director of the branch and a dummy for including female relative in the business. The cross-section sample is winsorized at 1% top and bottom for the following variables: liquidity provision, capital, collateral, counterparty risk guarantee and number of credit risk guarantors. Errors are clustered at branch level. p-values are in brackets. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

59 Source : Rapports d'inspection… Dijon, Caron 1898

Table 1-10: The role of the relationship lending mechanism, including year fixed effects

	(1) Liquidity provision	(2) Liquidity provision	(3) w/ crises	(4) w/ crises
Collateral	0.22***	0.22***	0.26***	0.27***
	0.01	0.01	0.00	0.00
Number of credit risk guarantors	29.13***	28.70***	28.15***	27.71***
	0.00	0.00	0.00	0.00
Counterparty risk guarantor	76.01*	74.75*	78.61*	76.39*
	0.05	0.05	0.08	0.09
Assessment of risk appetite	35.54***	36.75***	18.63	20.17*
	0.00	0.00	0.12	0.09
Capital	0.13**	0.12**	0.12**	0.11**
	0.02	0.02	0.02	0.03
Dummy Existing	14.60		7.60	
	0.13		0.46	
Number of years of presence		6.01**		4.16*
		0.05		0.09
Crises * Risk appetite			65.04***	59.88**
			0.01	0.01
Crises * Existing			17.52	
			0.48	
Crisis * Number years of presence				6.13
				0.30
Other interactions	N.a.	N.a.	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Occupation FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.457	0.463	0.461	0.469
Observations	671	671	671	671

Columns 1 to 4 report results of panel regressions on counterparties of the branch of Moulins, including an occupation and year fixed effect. Errors are clustered at counterparty level. Specifications 4 and 5 also include non-significant interactions between the dummy Crises and other types of guarantees (collateral, number of credit risk guarantors, counterparty risk guarantor, capital. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.