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ECONOMIC HISTORY

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At Your Service!

Liquidity Provision and Risk Management in 19th Century France[*]

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Abstract

This paper uses a historical study to show 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 late 19th century the Bank of France operated a very wide discount window and used a variety of risk management techniques to effectively subdue risk-taking behaviors and to protect its balance sheet from taking any loss. This allowed agents to monetize a very diverse set of capital while limiting the risk of bail-out. We show that this effectively helped the central bank to stabilize the economy from the consequences of negative income shocks.

JEL code: E51, G23, N13
Keywords: lender of last resort, central bank, discount window, shadow bank

This paper uses a historical case to show how a central bank can contain the credit risk associated with liquidity provision and tame the moral hazard behavior that may arise from receiving liquidity from the central bank.

When it designs its operational and risk management frameworks, a central bank defines both the wideness of its discount window –who has access to it and under which conditions– and the mechanisms it used to attempt to subdue moral hazard. Because the lending of last resort role consists in issuing money against eligible debt securities, the decision on eligibility immediately bring in a discussion on the credit risk that the central bank is ready to bear. This implies a trade-off between the ability to cope with crisis and the need to limit exposure to credit risk (Chapman and Martin, 2013). On this regards 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 widely accessible discount window while limiting risk-taking behaviors (Calomiris, Flandreau, Laeven, 2016). In this paper we document the case of Bank of France in late 19th century.

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–banks, shadow banks or non-banks– and by the type of capital that the central bank accepts as collateral. Under severe enough market frictions, a central bank operating a very restrictive discount window may increase the odds that intermediaries may fail for lack of liquidity, see for example 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 certainty of the access to the discount window may bring issues of moral hazard by influencing the choice of the degree of liquidity of assets held by financial intermediaries (Rochet and Tirole, 1996). It may also induce 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 the ability (i) to discriminate assets across classes of credit risk, (ii) collateralization, and (iii) conditioning the volume lent on the risk appetite and risk behavior of the borrower.

France in late 19th century is a good case to study as the institutional environment guarantees that financial intermediaries were subjected to market discipline but the central bank guarantees a widely accessible liquidity provision. The charter of the Bank guaranteed a wide access to the discount window and yet the Bank of France did encounter very little ex-post credit risk as the provisioning for losses on discount window activity was limited to less than 0.001% of the volume during the 19th century. Entry into banking was not subject to a specific regulatory approval, no deposit insurance existed and the government did not intervene to bail out failing banks. Banks behaviors could not have resulted from the expectation of a bailout or the public protection weakening market discipline.

We use archives from the head office and local branches of the Bank of France to detail the procedures of supervision of the credit risk, to document the capital pledged by counterparties and to describe its organization and the procedures. We hand-collected a cross-section of about 1,700 counterparties discounting with the Bank's discount window representing 7% of the volume discounted by the Bank of France during 1898. Our sample comprises information on the identity of presenters to the discount window, together with their occupation, economic and social situations, wealth and financial position with the Bank together with an audit of their activity.

Results show that Bank of France operated a wide and diverse discount window. It used detailed and sophisticated information to tame the moral hazard temptation that could have been created by the implementation of a wide discount window. Risk management was tightly designed, and the Bank uses the information to discriminate its refinancing operations towards risk-averse agents. The discount window was especially wide compared to modern standard. Any trader could have access to it and the Bank allowed the use of a set of eligible guarantees much greater than the one allowed in any central bank today. We also document differences in the use of guarantees during crisis times versus normal times.

The rest of the paper is organized as follows. Section 2 present the institutional background of late 19th century France and the underlying financial risk. Section 3 presents the data. Section 4 summarizes the theoretical literature on the access to the discount window and implied risk-behaviors that it may induced. Section 5 describes the various tools of risk management used by the Bank of France. Section 6 show how a wide discount window helped containing the spread of financial risk. Section 7 concludes.

Our paper is the first empirical study of the risk management at a central bank discount window and its relation to the broadness 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 & Jobst (2017) demonstrate that, in case of income shock, a better access to central bank lending provided by local branch offices of the Bank of France significantly lowered defaults because it reduces 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. Hautcoeur et al. (2014) present how the Bank of France organized the provision of a "lifeboat" to an insolvent bank in 1889 to minimize moral hazard, but do not discuss how this relates to the discount window operations.[1]

Our study provides a detailed analysis of the functioning of liquidity provision at the discount window at the Bank of France and discusses the implications both for the stability of the payment system and the management of bank instability. It relates to the literature on the design of the lender of last resort (Bignon et al. 2012, Calomiris et al. 2016). Ugolini (2017) argues that historical analysis teach that the centralization of regulatory tasks related to the functioning of the payment system within the realm of central banks reduces financial instability by providing central banks with detailed information banks.

1. **Institutional background on banking and the payment system**

In late 19th century France, financial stability may have been threatened by bank runs and/or by increasing counterparty risk on means of payment not intermediated by banks. Entry into banking was not a regulated activity except for the privilege of issuing banknotes.[2] Deposit insurance and bank regulation are identified as one arrangement that may prevent bank run but none existed in France then. Moreover, the banking system was extremely heterogeneous in type and size of financial intermediaries and many non-banks guaranteed the end-payment of the predominantly used form of means of payment.

In 1898, the banking system is extremely heterogeneous in terms of assets held and liabilities due but also in terms of size of their branch network. About 2,000 banks operate 2,900 branches, see appendix 1. Three deposit banks have a national outreach, and operate together 513 branches. 194 deposit banks operated on average of 2.5 branches, with the largest maintaining 17 branches, mostly in the same region. Finally, 1,910 banks operated only in one branch. In the absence of any legal constraint put on the entry into banking, this suggests that the very fragmented nature of banking was not the product of ill-designed regulation.

Banks are highly capitalized by modern standard, see figure 1. They hold very liquid assets, suggesting that there are few maturity transformation risk. The capital ratio of local banks levells at 33% of their liabilities and at 18% for the liabilities of the national deposit banks. As a supplementary cushion to absorb the potential losses, uncalled capital shares represent 14% of local banks assets. Sight deposits represent about two-third of the liabilities of both types of banks. Banks use this funding to finance the discount of bills of exchanges, which represents a third of the assets of local banks and 42% of those of national deposit banks. Local banks have 40% of their assets held in overdraft facility (non-collateralized

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[1] Other cases of discount window lending include Flandreau and Ugolini (2013, 2014) and 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 wealth of quantitative and qualitative details on counterparties and the number of counterparties.

[2] Therefore, and contrary to countries without central bank such as the U.S. or Latin America, no bank supervisor existed in 19th century France (Toniolo and White, 2014).

loans) to their customers. National deposit banks have a quarter of their assets held as collateralized loans to their customers or invested in money market instruments. This is consistent with the view that maturity transformation is not a substantive threat to financial stability in late 19th century France.
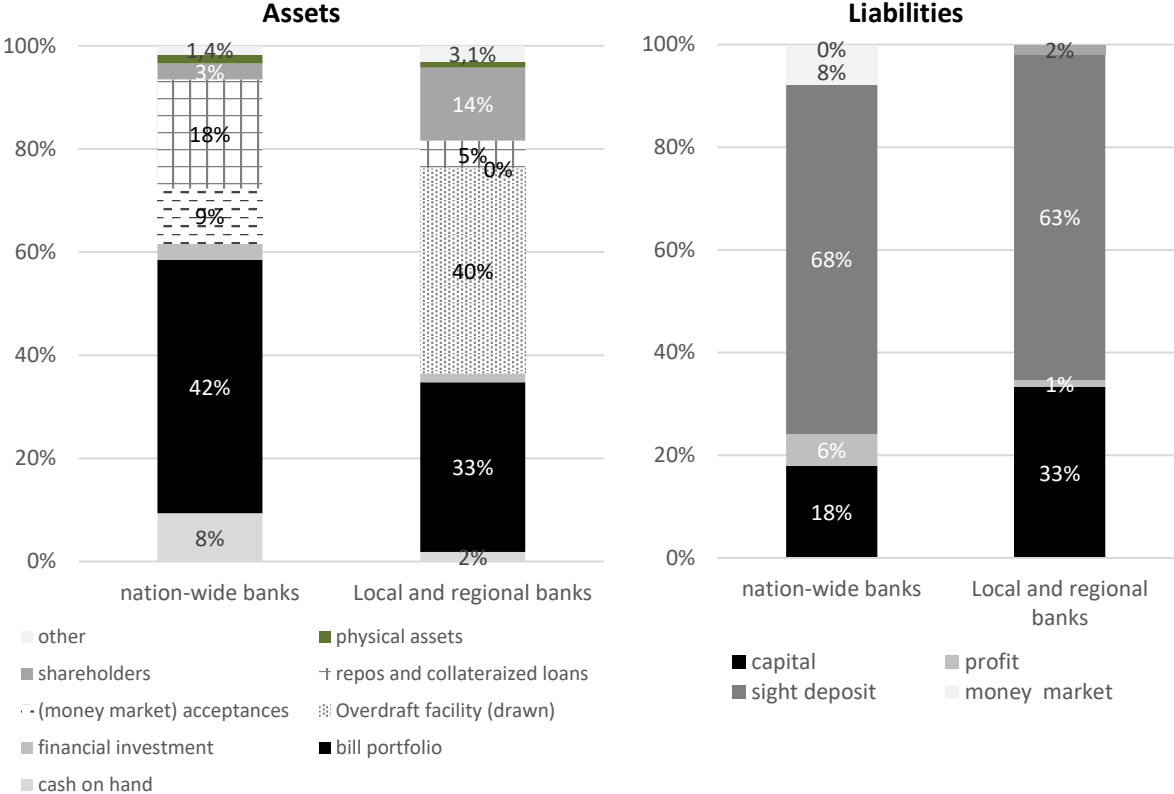
Figure 1: The main items of the balance sheet of French banks in 1900.
Source: see appendix 1

In 1898, four types of means of payments are commonly used: (i) coins, (ii) banknotes, (ii) bank transfers and (iv) bills of exchange as those with a small nominal amount were especially used to pay transactions.[3] Checks and bills expose the holder to the default of the counterparty. In 1898, 1.8% of bills were unpaid at maturity, mostly bills of lower average value, but sooner in the 19th century the default rate on bills could have exceeded 10% (Roulleau, 1914). Table 1 provides an estimate of the relative importance of all types of means of payment. It shows that the stock of bills in circulation is 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 of bills for a total of 11 bn), reflecting a distribution skewed towards the higher average value of rediscounted (721 vs. 366 francs).[4]

An important source of risk is the risk of credit not rolling-over their funding of non-financial agents (Nishimura, 1995). Indeed overdraft facilities and bills of exchanges are forms of short-term credit that were renewable at a horizon of 3-month, which is also the term-limit used by banks and the Bank of France to discount bills.[5] Part of them originate in client-supplier relationships, whereby the supplier draw to his client an order to pay at some horizon. To rollover a bill, the payee simultaneously provide

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

[4] In the regional branches, 9,48 million of bills were discounted, for 5,83 billion and an average of 614 francs

[5] Roulleau (1914) estimates that bills have an average maturity of one month and a half to 3 months.

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).[6]

Table 1: Stock of means of payment in 1898 France

	Stock of means of payments	Average value (in 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

Sources: The statistics on coins is from 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 is estimated using the method in Roulleau (1914). [7]

The rollover risk of short-term funding could materialize especially when banks loose deposit funding. It could be that the knowledge of the poor investment strategy of the banks triggered an informed bank run, as we have found in a number of cases detailed in section 4.C. But not all bank runs were caused by the poor management of banks, which, in an economy without any deposit insurance, give a special role to the lender of last resort to provide liquidity support, if the central bank is able to make a careful screening of the stressed bank.

Another source of potential systemic risk originates in the payment system, as the credit risk associated with some means of payment can disrupt the liquidity position of some agents and therefore trigger their failure. This can occur if an agent is awaiting a payment that does not materialize because of the failure of the issuer of the means of payment. In 19th century France, the bills of exchange are the main conveyer of this type of financial stress, often independently of the banking system. Bills are negotiable, in which case they could have been endorsed (discounted against a "haircut") by a third party who could have resold it to a fourth party, and so on.

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

- The economic reason is that everybody can purchase a bill as a saving or lending instrument. As such, bills are 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. Because nothing restrict access to this investment vehicle, it is very likely, that non-banks held bills as saving, and could have been in the situation to convert it into more liquid assets.
- The legal reason is that the credit risk of bills was limited by the joint liability rule, i.e. by the fact that any endorser of a bill was liable on the final repayment of the bill to the bearer upon default. This puts skin in the game and provides incentives for the discounter to screen and monitor the quality of the original debtor and the other endorsers. This explains why various individuals engage into screening, as the information on solvency was not known only by banks

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[6] The archives of the Bank of France mentioned in 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.

[7] The total value of 75 million of bills stamped is equal to 27.52 bn or 81% of the French GDP. This is far higher than in the UK where the amount of bills stamped represented 37% of GDP (or 1,200 million of GBP / 30 billions of Francs), cf Roulleau (1914) and GDP from Solomou and Weale (1991). The average maturity in France was 80 days, which gives an average stock of 6 billion. Only 7,246 checks were drawn in 1898 with an average value (in 1912) of 5,800 francs and an average maturity of 1.4 day, thus giving a total 42 billion of francs and an average daily stock of 0.16 bn (Roulleau, 1914, p. 58).

but also known by the payer's suppliers or his clients. The diffusion of bills of exchange likely created clusters of individuals that knew each other well and engaged in peer selection.

Financial risk could have been contained by the monetization of debts, and 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 wide access to the discount window, which was open to any solvent and reputable trader. [8] The Bank made eligible all debts with a low-enough credit risk. Credit risk 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, which were jointly liable in case of default of the issuer according to the French code of commerce.[9] The Bank was therefore exposed to three types of credit risk: the risk of the default of the issuer of the debt, the risk of the default of the guarantors and the risk of the default of the counterparty. The management of those risks used both qualitative and quantitative information on counterparties, see the discussion in section 4.

2. **Data**

We hand-collect archival data and a variety of sources to reconstruct the history of the use of the discount window in the end of 19th century, see description in details in Appendix. We gathered the information on individual discounter from the yearly reports filed by the supervisors of the branches (*inspecteurs des succursales*), a group of a dozen of Paris-based supervisors in charge of screening and monitoring the activity of the Banque de France branches. We collected information on all 94 branches operated in 1898 except the Parisian branches that were not monitored by those supervisors.[10]

We know from the Bank of France archives detailed individual information on about 1,700 counterparties in 1898 (that can be compared to the roughly 1.6 million of firms in activity in France during that year.[11] In each report, for each presenters or endorsers of a branch, the supervisor has 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).[12] Most of the time, we also know an estimate of the wealth of the presenters or of his capital and reserves when the presenter is an incorporated company. Each entry also reports whether some of the bills presented for discounting was 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.[13] The supervisor also systematically mentioned whether the client has guaranteed (endorsed) some bills for other clients of the Bank and all his endorsements.

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

[9] 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.

[10] We are not aware of a similar source describing the universe of Parisian clients. The *compte rendu hebdomadaire du conseil general* only account for the main clients. Collecting information on them will bias the sample of clients towards the biggest ones. When we did not find information on clients in 1898 because the report for that year was missing, we collect information in the 1897 report– to check whether the missing reports bias or not the information we have collected. This is the case of 5 branches, Lille, Rouen, Bordeaux, Roubaix and Saint Quentin. Given our research question, and because the bureaux auxiliaires did not have a discount committee taking decision, we exclude the bureau auxiliaires from the study.

[11] The number of firms

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

[13] 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*"

We focus the cross section on the year 1898. In terms of macro-economic policy, the fiscal budget is then roughly balanced at 0.3% of GDP. The monetary injection amount to 4.1% of the GDP, of which the advances collateralized by securities represented a third.[14] Those monetary injections are representative of the decadal average.[15] To document how the composition of counterparties evolved in a branch hit by three successive negative productivity shock, we also collected an annual time-series of all counterparties of the branch of Moulins between 1890 and 1904.

On top of the amount discounted and the guarantees provides, the archives give the occupation of the counterparties together with detailed background information on risk-appetite, some balance-sheet pieces of information. Each time the Bank presents a balance-sheet, we collect all the items to construct various measures of liquidity risk. We use the information on the occupation of the counterparties to document how often the payment system was bank-disintermediated, in terms of numbers of counterparties and value discounted. Because the Parisian archives on discount activity have disappeared, all of the counterparties are located outside Paris. The non-Parisian portfolio represented half of the Bank of France discount activity in 1898 or 7% of the non-Parisian counterparties.

We obtain 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 use correspondence from the Bank of France as well as a variety of reports to assess local economic environment. We know the population of banks at the city level from the commercial almanac. We match 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 regions). In Dijon the Burgundy bank lost deposits for embezzlement of funds to his mistress by the manager. In Reims, the failure of a broker in champagne wine triggered doubts on the solvency of bank Camuzet, 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 were in Carcassone and Lons-le-Saunier.

Some negative productivity or income shocks hit one of the main sector of a region. We identify a negative shock in 15 regions, see Appendix 3 for a description. Nine regions specialized in the capital-intensive activity of fattening young beefs suffered from an epizootic disease. Five regions specialized 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 reduction in exports caused by the Spanish-US war in Cuba.[16]

3. **Theoretical discussion**

The literature on liquidity provision by a central bank emphasizes two main rationales for the intervention of a central bank during a crisis: to prevent bank runs and to avoid the malfunctioning of the payment system, i.e. a reduction of the liquidity of debt securities and the implied need to convert

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[14] The value of the BdF bill portfolio was 898 million and advances on securities amount to 421 million Francs.
[15] The total discount of the Bank of France branches in 1898 was about 6,000 million of francs. Between 1890 and 1905, the total annual discount of the Bank branches oscillated between 5,000 million and 9,000 million. Source: ABDF Assemblée Générale des actionnaires.
[16] The Report on cyclical activities of June 1898 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 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.

them into cash. The literature also emphasizes the importance of the design of the central bank intervention as ill-designed policies may worsen the crisis rather than mitigating it. This section discusses the main takeaways we use to analyze the framework of the Bank of France before WWI.

Research has shown that banks benefit from a lender of last resort not because of the specificities of the banking contract, but because bank panics occur in connection with the environment, in which banks are operated. An environment is characterized by the banking laws and market structure as well as the arrangement among banks in terms of cooperation, including the existence of a central bank (Calomiris and Gorton, 1991). Banking theory insists that guaranteeing a wide access to the discount window may trigger moral hazard behavior and weaken market discipline by encouraging risk taking (Rochet and Tirole, 1996). In particular, research has suggested that the certainty of the access to the central bank may trigger risk-taking behaviors by the banks. It was shown (Gorton, 1988) that if runs are purely beliefs-driven, the availability of a lender of last resort facility opened to any bank is sufficient to eliminate this cause of run. In contrary, when a run is triggered by information on the quality of the management of a bank, a lender of last resort may –in theory– weakened the incentives of a bank to manage its liquidity position.

The other rationale for an active lending of last resort policy related to the threat on the regular working of the payment system that may come from the malfunctioning of the debt market. This motivation for the intervention of the central bank may be twofold. First as noticed by Friedman and Schwartz (1963), discount window lending may smooth the seasonality of local interest rates[17]. Second in times of high-level of doubts on 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 is circulating as a medium of exchanges, the existence of a negative aggregate shock –a situation akin to a crisis– on a segmented debt market is a rationale for the existence of a central bank. In such case, the central bank facility that convert debt claim into cash, i.e. a mean of payment generally accepted by every agent, can smooth the shock, at condition that the central bank significant information on the debts. Chapman and Martin (2013) have extended this model by studying banks tempted by moral hazard behaviors. This creates a tradeoff for the central bank when deciding on eligibility at its discount window: the central bank can either accept anyone, at the risk of fueling moral hazard or limit the access to its facility to discipline creditors.

The decision on eligibility immediately leads to the discussion of the risk management tools that the central bank can use to limit the risk appetite of its borrowers. Theory suggests four mechanisms potentially effective in mitigating agency issues arising from discount window: (i) the screening and monitoring of the risk appetite of the counterparties; (ii) the building of a reputation by the borrower; [18] (iii) the pledging of collateral and (iv) the rationing of discounting conditional on the available information of risk-taking behaviors. Repeated discounting is another mechanism, as a periodic relationship created both information on the counterparts and the incentive to behave under the fear of exclusion from future discount window lending in case of default.

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[17] This was formally show by Miron (1986).

[18] This mechanism is akin to Diamond's model (1991): in this model, a lender monitors the borrowers to detect if they prefer risky over less risky projects, which in effect switches the borrowers' choice towards less risky projects. Borrowers can instead accumulate a reputation of prudent behavior. In the context of our study the lender will assess the reputation of agents that are the most at risk of moral hazard (those that can expose the lender to losses), and because 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). Then the lender will use these assessments to condition the volume lent on the risk appetite or risk portfolio of the banks.

The third mechanism, pledging of collateral, may be a cheaper solution, if the cost for the lender to monitor borrowers is high relative to revenues of the loan, by seizing the asset immediately upon default, thus limiting 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 signaling device and limiting adverse selection (Stiglitz and Weiss, 1981; Chan and Kanatas, 1985). It is also a disciplining device if it affects the borrowers' willingness to default (Boot, Thakor and Udell, 1991; Holmstrom and Tirole, 1997). Collateralization does not suppress the need to screen borrowers on an ongoing basis, as there are situations in which the collateralization of assets may amplify adverse selection notably when the lender offers a menu of options to protect the bank from credit risk or when the decision on 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 to lend at a fixed interest rate.

Importantly for our study is the result by Bester (1994) that pledging collateral ex ante is especially useful if the bankruptcy procedure is not efficient enough to act as a guarantee of the lending activity. In our case study, although the bankruptcy procedures were especially in favor of creditors, not all agents were eligible for filing for bankruptcy. The procedure was only allowed to individuals acknowledged by law as traders, as opposed to farmers or landowners. Given that the 1897 renewal of the Bank of France issuing privilege had opened the discount window to farmers, and given that landowners were also eligible, Bester's result implies that the Bank was more likely to asked non-traders to pledge ex ante collateral with the Bank, notably in the form of eligible marketable securities or some form of credit line sizeable on demand.

Finally, risk-taking behaviors may be limited if the central bank can pass part of the losses to other market participants, using a mechanism of mutual insurance akin to Gorton and Huang (2006). Participants may agree to fund part of losses to limit the externalities created by a disorderly default. This type of loss-funding tools allows the central bank to separate liquidity provision from the risk of bailing out insolvent and distressed banks.

Moral hazard by the central bank counterparties can also have an internal origin if the governance of the central bank lead to systematically bias its lending decision (Calomiris and Haber, 2014). This issue may arise in big organization in which agents can use the complexity of the organization to favor some of their acquaintance to the detriment of their principal. Given that the Bank had decentralized its discount in about a hundred of branches this situation was quite a possibility unlikely. This issue could have been subdued by the design of an appropriate internal governance aimed at limiting principal-agent problem within the organization.

4. **Monitoring counterparties and risk management by the central bank**

The Bank of France operated a multi-layer system of information and controls to limit its exposure to the credit risks of its counterparties. This system allows selecting the individuals it was exposed to, which requires a screening of the risk appetite (section a). It defines the guarantees asked to make sure that the Bank recuperates its claim in case of default of the agents (section b). Finally when some agents were close to default, this system allows the Bank to deal with resolution of failing counterparties without bailing them out. The wideness therefore depends on which forms of capital is taken as guarantee.

a) Screening risk appetite of counterparties
Not all agents can access the liquidity provision of the Bank of France. The Bank screened the capital of each presenters. The Bank also assesses the risk appetite of its counterparties when deciding to

provide refinancing. This includes a qualitative analysis of risk culture and internal governance of the counterparties. The screening and risk assessment are made by conducted by supervisors and branch managers.

Discounting with the Bank requires to formally apply for benefitting the facility and imply sharing the legal documentation on the company[19] (notarial deeds, legal notices, company statutes) as well as a certificate of worthiness signed by three external persons. The final decision to accept the opening of an discount account was made by the headquarter. These files were continually updated, recording any evolution in company size, in capital, in risks taken.[20] Mortgage statements were required yearly[21] and the list of updates was sent bi-monthly to the headquarters. The local managers of each branch were responsible for the information collection and were helped by their team, notably a controller who supervised the registries[22].

The capital was measured by the real estate value and the total financial wealth which could have easily been seized for agents acting as traders, as opposed to farmers or landowners. The quantitative information was completed with qualitative assessment and supervisory judgments on "soft" information. This information was converted into ratings. One dimension assessed is the internal governance, discussing notably the character of the banks' managers. For example, Delmas, manager of the Société Générale branch in Lorient was described with the following words: "just arrived, smart, active, related to the best families of Lorient. Keep a close eye on his clients, quite numerous"[23].

Risk management is also included in the assessment exercise, for example, the file of the banker Herbulot in Sedan in eastern France stated that: "This house badly began, he was condemned to the refund of 120,000f, results of stock-market transactions for a married woman. It seems that the lesson quietened down Herbulot who also speculated personally; but there is there an indication to be held on the lightness of this banker". Risk to liquidity and to capital are also scrutinize, for example banker Ginget in Annecy is recorded as "having too much long term credit and works only with deposits which can be very dangerous in case of panic"[24] or bankers Salzeda in Bayonne described as "manag[ing] quite well the house but are arduous. They discount with 2 signatures –including to youngs – The bills that they presented therefore need to be selected"[25].

Finally the business model is also assessed, for example discounter Legendre in Blois is recorded as "usurious rates; questionable clients"[26] or Habrioux, Société Générale manager "in Moulins for 20years [with] very good knowledge of the place; is said to have a personal clientele, mostly credit papers with

[19] Règlement des Succursales, Banque de France, tome 1, p214. ABDF.
[20] 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
[21] Source : Rapport d'inspection… Moulins 1897 « Les relevés d'hypothèques sont fournis au commencement de chaque année ». p566
[22] The controller's journal mentioned establishing the list of information on clients, source: AD Isère, 1ETP 1 – 34.
[23] Source: Rapport d'inspection… Lorient, 1898 « Directeur M. Delmas, qui vient d'arriver, intelligent, actif, apparenté aux meileures familles de Lorient. Suit de près sa clientèle, assez nombreuse. »
[24] 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.
[25] 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.»
[26] Source: Rapport d'inspection… Blois 1898 « Prêt à des taux usuriers. Clientèle douteuse ».

quite good guarantees"[27]. We use the qualitative assessment available in the Bank of France supervisory report to build a rating of risk appetite of the counterparties.

Because the supervisors relied mostly on the qualitative description than on the ratings, we reconstruct a rating of risk appetite based on the soft information available in their reports. We distinguish three categories, risk takers, to which we attribute a rating of -1, risk neutral, rated 0 and risk adverse 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 build a categorical variable using this numerical rating for each of counterparties.

Figure 2 displays the volume of liquidity lent according to risk appetite rating. The Bank of France prioritizes lending to risk adverse counterparties especially in the case of banks as they are the ones with larger off-balance sheet exposure. Non-bank agents who are risk taker are mostly absent from the discount window while the Bank accepts a bigger prevalence of risk takers among managers of branches of National banks as in case of default, the headquarters would be reimbursing.
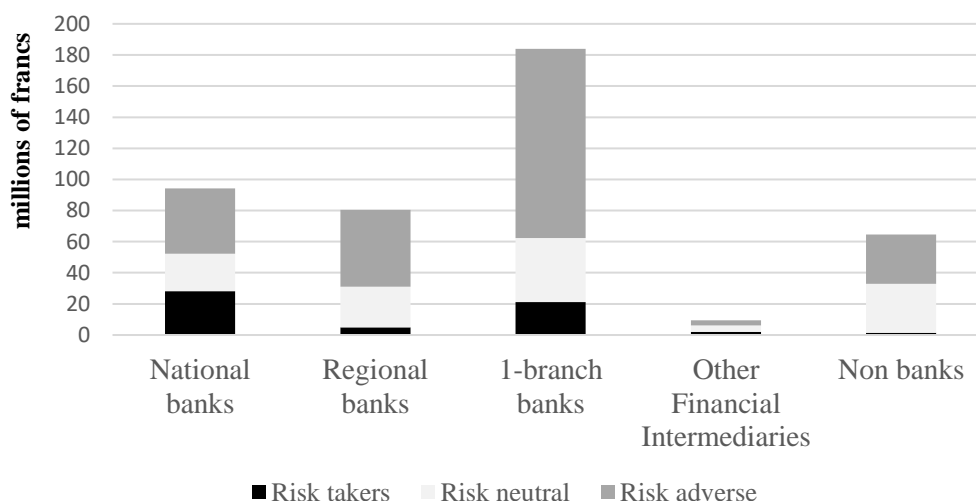
Figure 2: Distribution of volume liquidity lent per category of counterparties and of risk appetite.
1676 counterparties in 1898.
Source: Authors computation using data from Bank of France rapports inspection.

b) Counterparty risk management at the Bank of France

To align the incentives of the borrower with the interest of the bank, the Bank of France requires every counterparty to provide credit risk guarantee against the bills that are discounted. Four types of guarantees could have been mobilised.

The first type of guarantee is marketable securities such as which are 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.[28]

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[27] 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 »

[28] 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.

Second, a variation to the pledging of securities consists in pledging a "surety",[29] a third party contractual commitment to reimburse in case of default any debt of a failed debtor up to a certain predetermined limit. This guarantee can 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 guarantor. Credit risk guarantors are asked to pay the bill in case of default of the payer once the failure procedure is started.

Fourth another mechanism limiting the exposure to credit risk consists in recuperating the claim through a failure procedure. Although the procedure was lengthier and potentially more costly than collateralization, 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 debtors to recuperate their claim in the end (Sgard, 2006).

Thus lending against the guarantee of the accumulated wealth does not entail an important credit risk given that this capital can be seized in a failure procedure and knowing that the Bank does not faced liquidity risk given its right to issue banknotes, which enables it to wait to recuperate its claims.

Out of these four types of guarantees, the Bank requires at least two credit risk guarantors, though one can be replaced by the pledging of collateral. Detailed information on the personal capital of the counterparty is also required.[30] The Bank records the sizeable capital of all its counterparties and of the guarantors to make sure to be fully reimbursed through the sales of sized properties in case of bankruptcy.

The Bank manages the quality of the bills presented[31] and the exposure of each of the counterparty, when necessary, imposed credit limits, i.e. limited total volume of debt which could be purchased from a counterparty.[32] These limits were fixed individually according the guarantees provided. Individual wishing to sell more debts than their credit limit can negotiate with the Bank by offering to increase the volume of his debts backed by collateral or counterparty risk guarantees.[33]

The guarantees pledged vary between the different types of counterparties. Table 2 presents summary statistics on the four types of the guarantees. The Bank of France was exhaustively reporting the capital of its counterparties and a majority of them pledge collateral. The Figure 3 and 4 displays the reported guarantees per category of counterparties. Financial intermediaries borrow liquidity amounting at 40%

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

[30] 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.

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

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

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

of the value their capital, which can be seized upon default according to the bankruptcy law, against 10% for the non-financial agents. 15% of the liquidity to regional and one branch banks is guaranteed by collateral, against 31% for other financial institutions and 86% for non-banks. Non-financial agents borrow liquidity mainly against collateral and with a counterparty risk guarantee (40% of the amount of their bills).

Table 2: Summary statistics of the guarantees used by the Bank of France's counterparties to access liquidity provision. The total of counterparties is 1676 individuals.

| Type of guarantees	Summary statistics	All
Number of credit risk guarantors	Number of presenters with at least 1 endorser	676 (40%)
	Total number of endorsers	3579
Counterparty risk guarantee	Number of presenters with 1 or multiple sureties	362 (22%)
	Total value	4.2 millions F
Collateral	Number of presenters with pledged securities	851 (51%)
	Total value	9.2 millions F
Capital	Number of presenters with real estate & financial wealth.	1576 (94%)
	Total value	176.4 millions F
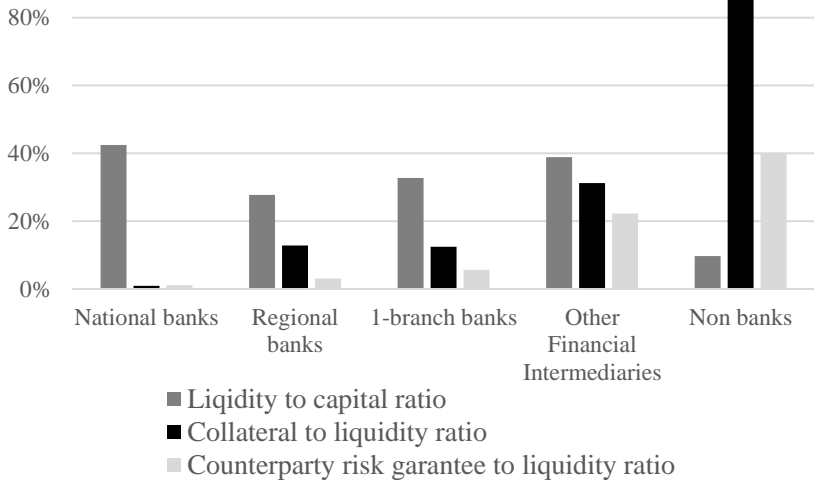
Figure 3: Capital, Collateral and Counterparty risk guarantee compared to liquidity lent per category of counterparties (1676 counterparties in 1898)

Source: Authors computation using data from Bank of France rapports d'inspection.
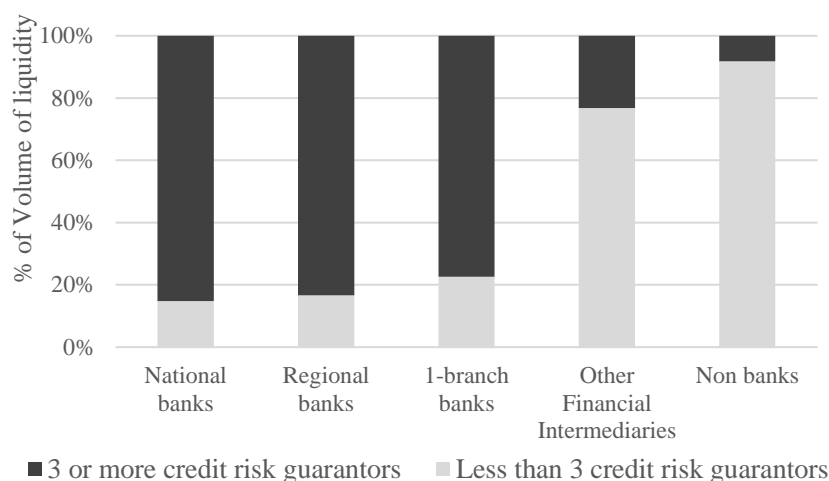
Figure 4: Distribution of liquidity lent and number of credit risk guarantors.
1676 counterparties in 1898.
Source: Authors computation using data from Bank of France rapports d'inspection.

c) Managing banking stress

Archival evidence points that the Bank's policy in case of banking crises was similar to a Bagehot's style lender of last resort. In the three cases of management of the failure of a bank in the late 19th century, the Bank of France follows a two-tier procedure. As part of its regular operations, the Bank increases its exposure to the distressed banks, up to the credit limit decided by the management. It could also provide emergency mortgage loans. When the situation starts being especially critical, the Bank organizes a bail-out of the distressed bank with funding provided both by the stakeholders of the local banking markets and by the Bank.[34] The design of the rescue operation is engineered by one of the supervisors who gathers local stakeholders of the distressed bank. The solvency and risk appetite of the distressed banks are decisive factors in the activation process of the central bank's support. The Bank formulated its principle in the following term: [35]

> "The Bank of France board… always had as principle… to provide its most effective support rather than to rebuilt ruins…But to be helpful, the Bank needs to meet characters, intelligences who start by helping themselves, thus deserving the support…".[36]

The Bank is careful to maintain its requirements when supporting distressed banks. Support is conditional to the disclosure of updated balance sheets, which are scrutinized before a decision is taken.

When the Bank of France considered that an institution was solvent, it provides short-term liquidity. This was notably the case of the bank Camuset[37] from Reims. In 1898, the bank Camuset faced fr.635,000 of losses, following the failure of one of its major clients at a time when it was already dealing with the liquidation of another major client. This loss swallowed the annual profits and 2/5th of the

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[34] Contrary to the lifeboat operation of the CNEP in 1889, the Bank's loan to the distressed institution was guaranteed by the shareholder' personal assets.

[35] Wool crisis in Roubaix, 1899-1901. Source: ABDF crise de Roubaix

[36] « Le Gouvernement de la Banque, … a toujours eu pour principe … de donner son appui le plus efficace plutôt que d'avoir à relever des ruines, parfois irréparables. Elle ne met des mesures à son aide, que les sécurités primordiales que commande la circulation fiduciaire, …le Crédit Public.
Mais pour être utile, il fait que la Banque rencontre des caractères, des intelligences qui commencent par s'aider elles-mêmes, méritant ainsi l'appui qui ne leur est pas marchandé. »Source: ABDF crise de Roubaix

[37] Source : Rapport d'inspection… Reims, 1898.

reserves of the Camuset. These two shocks, being close in time provoked a confidence crisis among depositors and shareholders. However, the Bank of France calculated that the total potential loss on Camuset based on the two failure could amount to fr.875,000 while the total of remaining guarantees amounted to 7,1 million of francs. The Bank then decided to keep refinancing Camuset.

In the case of the bank of Burgundy of Dijon[38], the Bank of France provided in 1896 a first emergency liquidity loan amounting at 2millions to smooth the confidence crisis coming from the failure of one client of the bank of Burgundy. The Bank of France asked for a guarantee of an equivalent amount to be provided by the directors of the bank of Burgundy[39] and made sure that all committed directors were perfectly solvents. But in 1899, the directors didn't follow the Bank of France's advice to sell some assets which could have improved the situation of the bank of Burgundy so the Bank of France refused a year later to provide another emergency liquidity line. The supervisor stated that that the bank of Burgundy was doomed to fail because of a bad management which allowed several long-term investments in dubious businesses[40]. The Bank of France conducted inquiries on the quality of the guarantee the sum it lent to bank of Burgundy to make sure to have a 1 to 1 ratio between risks and guarantees[41].When, in 1901, a scandal of embezzlement of funds by the manager amounting to 1 million francs, for gambling and funding of luxury gifts to his mistress appeared, the Bank of France strongly opposed any further refinancing asked by the directors. The bank of Burgundy had to file for bankruptcy and its manager got arrested. The Bank of France was lending 3.4 million of francs to the bank of Burgundy in 1900 and recorded less than fr.30,000 of losses after the liquidation of the bank in 1902.

The Bank was also considering the systemic risk of the failure of some financial institutions. This was notably the case for the bank Piganeau during stress on the banking sector of Bordeaux in 1898-1899[42]. Piganeau and sons, one of the major bank of Bordeaux, faced important losses following the failure of an important wine trader[43] so the Bank decided to grant them a special loan guaranteed by real estate to meet short-term liquidity needs. A credit line of same size[44] with funds from private consortium of local banks was also monitored by the Bank to make sure that risks would be spread among all the local actors. The Bank justified its choices by the fact that the failure of the house Piganeau could have

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[38] Source : ABDF 1000198201-98, MA.A.1.H.2, Dijon.

[39] In 1896, a surety amounting at 2millions was given by 10 directors of Bank of Burgundy in exchange of the increase by 2millions of the refinancing capacity of the Bank of Burgundy. The failure of "Bargy et cie" caused only fr.150,000 losses for the Bank of Burgundy (which had 7.5 millions of francs of capital) but provoked a run of depositors. Deposits amounted at 4,4millions in the balance sheet of Bank of Burgundy. Source: rapport d'inspection… Dijon, 1895-1896.

[40] The supervisor writes that the directors "hope to limit their losses by selling the Stéanisserie to a business in Lyon, but until now, they had such high expectations that no transaction has been concluded. They were wrong. They should have guaranteed the existence of their bank by all possible means by accepting the million that they were offered recently to." "Ils espèrent atténuer leurs pertes en vendant la Stéanisserie à une société lyonnaise, mais jusqu'ici ils ont eu des prétentions telle qu'aucune transaction n'a pu aboutir. Ils ont eu tort ; Ils devraient assurer à tout prix en acceptant le million qui leur a été offert récemment, l'existence de leur banque » Source : rapport d'inspection… Dijon, 1899.

[41] The supervisor writes that « Thanks to the cautious measures it took, the Bank of France provided for all contingencies and the intrinsic value of the discount presented by the bank of Burgundy strengthened so that guarantees are equal to risks." « grâce aux mesures de prudence qu'elle a prise, la Banque de France s'est mis à peu près à l'abri de toute éventualité et il est certain que la valeur intrinsèque des engagements présentés par la Banque de Bourgogne s'est fortifiée au point de comporter une garantie égale aux risques. ». Source : rapport d'inspection… Dijon 1900.

[42] Source : ABDF – Affaire Piganeau.

[43] Barkhausen et cie.

[44] Both credit lines amounted at five billions. Source: ABDF Affaire Piganeau,

triggered a confidence crisis on the local market and provoked a bank run.[45]A supervisor of the Bank was sent to Bordeaux to monitor the situation day by day and perform risk analysis on Piganeau's balance sheet. The Bank was analysing both individual risks and systemic risks. However, the Bank was dissatisfied by the management of Piganeau of the emergency credit lines and the risk appetite of its manager. When the episode of stress on the banking sector was over, the Bank stopped refinancing Piganeau and encouraged it to file for bankruptcy which they did. The timing was chosen by the Bank to help the financial sector resists the shock, but most of the losses were absorbed by the other banks.

5. **The economic benefit of being wide enough**

By swapping against a generally accepted means of payment, the discount window allows some agents to avoid defaulting. A decision on eligibility is a decision on the extent to which agents can use discount window lending which determines whether the central bank effectively substitutes public funding for market funding. We document the wideness of the discount window and study if the Bank modifies its risk policy during period of income shock on local economies or financial stress of the banking sector.

a) A wide discount window

The Bank allowed a very diverse set of financial intermediaries at its discount window. We identify four types of intermediaries: the three national deposit banks - Société Générale, Crédit Lyonnais and Comptoir National d'Escompte de Paris – regional banks with multiple branches, such as Banque Devilder in North of France, and one-branch banks.[46] The Bank of France also accepted to rediscount non-bank agents, for smaller amounts. Figure 5 splits the discount activity among categories to analyze the repartition of presenters and check whether those financial intermediaries differed with regard to the volume of discounting they were granted access to. Non-banks agents represented 54% of the presenters but only 17% of the volume of discount. One-branch banks represented a quarter of the discounters 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.
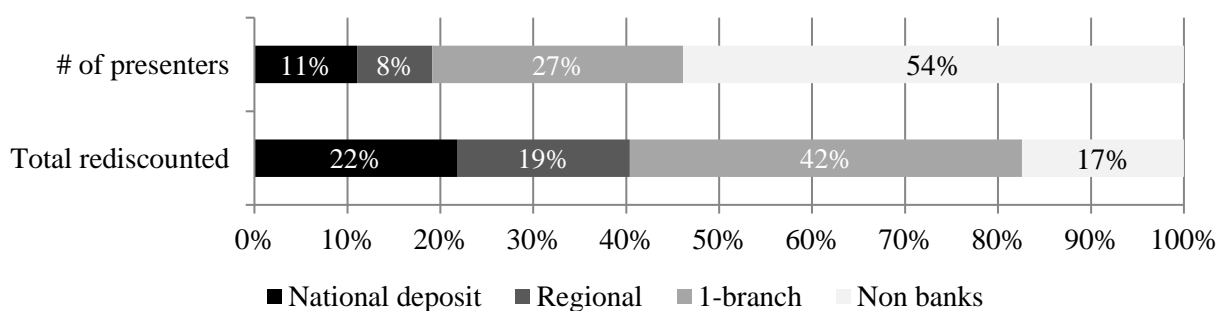
Figure 5: Number of presenters and volume of discount and of bills rediscounted at the Bank of France in 1898 per category of counterparty.
The total number of presenters was 1676 and the volume of discount amounted at 43.3 millions of Francs.
Source: Authors' computation using supervisory reports of 1898.

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[45] « … La chute de la Maison Piganeau, survenant en cette période critique de l'année, eut été une catastrophe régionale dont nul ne pouvait sonder les conséquences. Pour éviter un pareil désastre, la suprême ressource était … une intervention des capitalistes intéressés au salut de la place. »Source: ABDF Affaire Piganeau, rapport de l'inspecteur Sévène.
[46] We based our identification on the description of the activity of the individual provided by the supervisor as well as on the definition of a bank according to Freixas Rochet (2008, p1), see appendix 1.

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'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[47]. Figure 6 presents the decomposition for the different types 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. This share levels at 25% for the one branch banks. This suggests that banks did not differ systematically with regards to their recourse to the Bank of France.
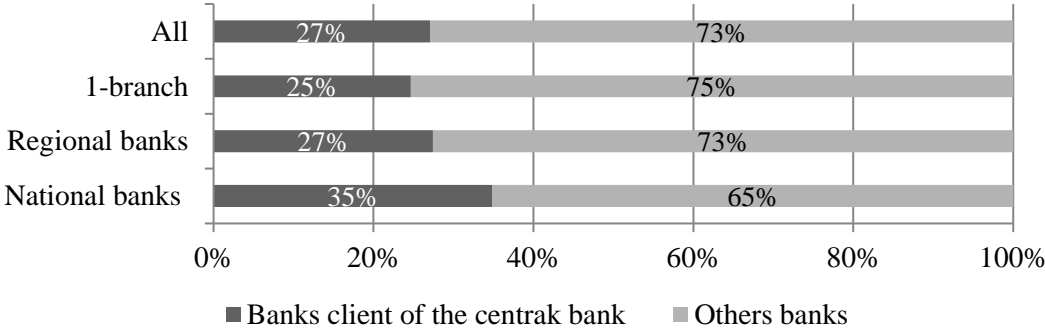
Figure 6: Banks presenting discount at the Bank of France as percentage of banks operated in France.
The number of banks in France in 1898 according to the commercial almanac is 2753, of which 513 are national banks, 496 are Regional banks, 1744 are one branch banks.
Source: Authors' computation from supervisory reports of 1898 and the 1898 commercial almanac.

b) Being wide to smooth local shock

The wideness of the discount window play 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 banking and non-banks without relaxing its standards or taking additional risks.
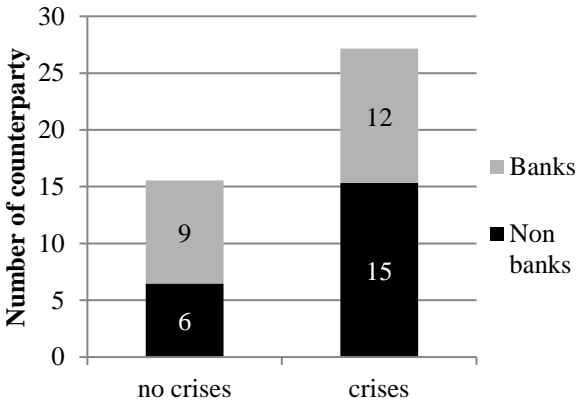
Figure 7: Average number of counterpary by type of agent for branches affected or not by a local crisis.
The total of counterparties of branches hit a crisis is 516 against 1160 for the other branches.
Source: Rapports d'inspection 1898.

Figure 8: Average liquidity provision per counterparty by type of agent for branches affected or not by a local crisis.
The total liquidity provision in branches hit by a crisis is 109fr. mn against 323fr. mn in the other branches.
Source: Rapports d'inspection 1898.

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

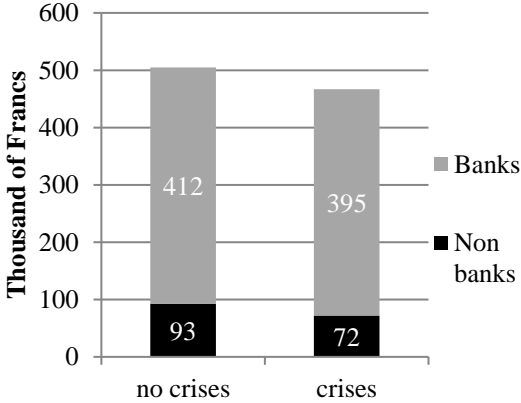Figure 7 reports the difference in average number of counterparties in branch portfolios. Branches in economies hit by a shock accepted a greater number of counterparties at their discount window. The increase of number of counterparties was mainly coming from the non-banks. Figure 8 compares the average liquidity provision at branches in economies hit by a crisis. The average volume of liquidity provision was stable in case of crises or not for both type of counterparties. This shows that special help in case of local stress was mainly channeled through the wideness of the discount window.

To assess quantitatively the risk management framework of the Bank, we next analyse the determinants of the discount decisions, using the cross section of 0589 individuals discounting in one of the 94 branches. We test whether the improvement of collateralization of the presentations was linked to an increase of volume of rediscounted bills through computation of Equation (1).

$$L_{i,b} = \beta_j X_{i,j} + \eta controls_i + \varepsilon_{i,b} \quad (1)$$
$$b \in [1; 94], i \in [1; 1676], j \in [1; 5]$$

$L_{i,b}$ is the volume of liquidity borrowed by each counterparty i received at the branch b, $X_{i,j}$ is the matrix of the five types of guarantee (collateral, number of credit risk guarantors, volume of counterparty risk guarantee, capital and rating of risk appetite) pledged by each counterparty i. Controls include individual variables such as dummies for various occupation categories, being a director of the branch, a dummy for including having a female relative in the management of the business. Standard errors are robust. The estimated coefficients for this baseline model are reported in column one of table 3.

$$L_{i,b} = \beta_j X_{i,j} + \gamma Crises_b + \delta(Crises_b * X_{i,j}) + \eta controls_{i,b} + \varepsilon_{i,b} \quad (2)$$
$$b \in [1; 94], i \in [1; 1676], j \in [1; 5]$$

We also test whether the presence of a local shock determines an increase of liquidity provision. To that end, we compute the equation (2) which consists in the baseline model to which are added a dummy $Crises_b$ equal to one for branches operating in economies hit by a local shock and interactions of this dummy with all guarantees. Controls remain the same.[48]

Table 3: The determinants of central bank liquidity provision

	(1) Liquidity provision	(2) Liquidity w/ Crises
Collateral	0.28***	0.29***
	0.00	0.00
# of credit risk	62.10***	64.54***
guarantors	0.00	0.00
counterparty risk	0.46***	0.37*
guarantee	0.00	0.07
Capital	0.06***	0.06***
	0.00	0.00
Assessment of risk	18.62**	36.37***
appetite	0.04	0.00
Crises		40.28***
		0.00
risk appetite*crises		-65.74***
		0.00
Controls	Yes	Yes
Adjusted R^2	0.670	0.670
Observations	1589	1589

This table performs 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

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[48] We also estimated the model with clustered standard errors by branch and coefficients are stable and significant.

in section 4. Column (2) adds the dummy for crises at branch level interaction between Crises and the rating of risk appetite. Controls for specification (1) and (2) include dummies for each profession, a dummy for being a director of the branch and a dummy for including female relative in the business. Controls for specification (2) also includes non-significant interactions between the dummy Crises and other types of guarantees (collateral, # Credit risk guarantors, counterparty risk guarantor, capital). All samples are winsorized by 1% of top and bottom for the following variables: liquidity provision, capital, collateral, counterparty risk guarantee and number of credit risk guarantors. p-values are in parentheses. ∗, ∗∗ and ∗∗∗ denote respectively statistical significance at the 10%, 5% and 1% levels.

Results of the estimation of Equation (1) show that all types of guarantees were important and significant in the discount decision of Bank of France. The addition of one credit risk guarantor when asking to swap debt against cash at the discount window increases the liquidity provided by 62.1 thousand of francs. Pledging 1,000fr of collateral increased the volume of discount of 280fr. Improving the rating of risk appetite increased the discount by 18.6 thousand of Francs.[49] Improvements in rating of risk appetite are linked to smaller collateral ratio, which is consistent with the fact that this rating reward small risk to liquidity.

The counterparties located in an economy affected by a crisis borrowed 40.3 thousand of Francs of additional liquidity compared 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. A reason is that the extensive margin plays a more important role in explaining the increase of discount volume in time of crises, as shown with figure 7 and 8. When counterparties arrive at the discount window, they tend to get a "neutral" rating by the Bank which will evolve in case of repeated interactions. The increase of risk neutral agents pushes the coefficient downward at the aggregate level. Figure 9 details the proportion of the different attitude toward risk of the counterparties. The proportion of risk takers is smaller by 2 percentage points in the portfolios of branches facing a crisis while the proposition of risk neutral in the portfolios of branches facing a crisis economy is more important, by 16 percentage points. This shows that the Bank of France accommodated an increase of the wideness of its discount window during crises without accepting a greater share of risk-takers among its counterparties.
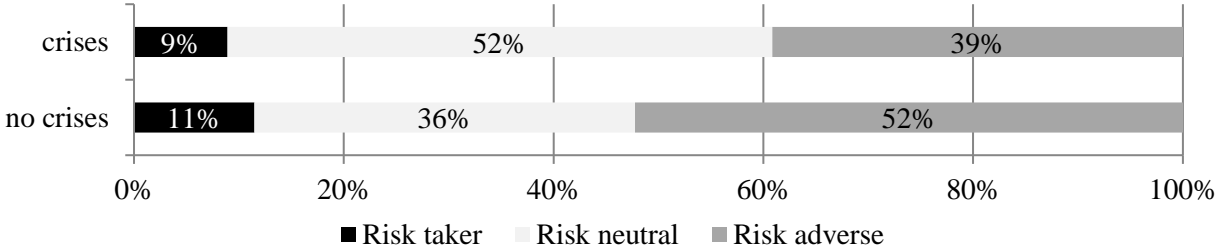
Figure 9: Proportion of the different attitude toward risk of the counterparties of branches affected or not by a local crisis.
The total of counterparties for the branches hit by a crisis in the local economy is 516 against 1160 for the other branches.
Source: Rapports d'inspection 1898.

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[49] We run 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.

c) The importance of relationship banking

We investigate if repeated interactions between the central bank and its counterparties matters in the decision of liquidity provision. While operating a system of payment between Paris and the French regions, between provincial regions and within them, the Bank of France carefully records a vast quantity of information on a diversity of agents, on their business, their capital, their risk appetite... We check whether the Bank valued this information in its activity of lender of last resort by comparing the liquidity lent to new and existing counterparties in the branches operating in an economy hit by a local shock in 1898. We identify the existing counterparties by their presence at the discount window in 1897 while new counterparties are only observed in 1898 and not in 1897. 22% of the counterparties were new at the discount window in 1898.
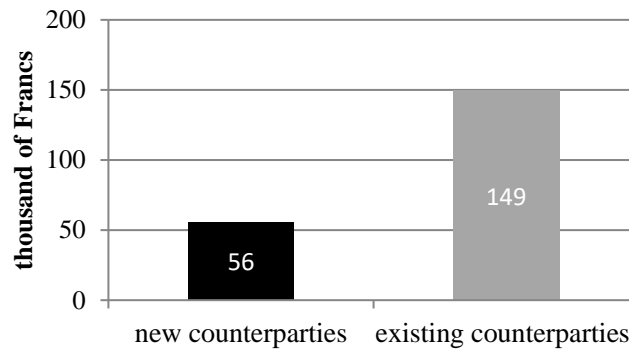

Figure 10: Average liquidity lent to counterparties in regions hit by a local shock in 1898.
The statistics were compiled on 415 individuals, of which 91 were new borrowers, living in the 14 regions hit by a new crisis.
Source: Rapports d'inspection 1897,1898.

Figure 10 shows that counterparties that already benefitted from liquidity support in 1897 (existing counterparties) received on average 149,000 Francs in support from the Bank of France while new counterparties received only 56,000 Francs. The difference between new and old borrowers is important as borrowers that were already screened by the Bank in 1897 received three times more liquidity support when a crisis hit a region than a new borrower. This suggests that, when a crisis starts hitting a region, there is a value for a counterparty to already have been in relation with the Bank in the past. To exclude that the Bank was supporting bad borrowers, we check whether the returning borrowers are of lower or higher quality than the new borrowers by estimating a logit analysis of equation (3).

$$New_i = \beta_0 + \beta_1 Capital_i + \beta_2 exposure\ ratio + \beta_3 risk\ appetite + \beta_4 control + \varepsilon_i \quad (3)$$
$$i \in [1; 1676]$$

New_i is the dependent variable and is equal to 1 if the borrower is a new borrower in 1898 and zero if he was already borrowing in 1897. The independent variables include capital of the counterparty i, the ratio of the exposure compared to the wealth and the assessment of the credit risk appetite. Results of the estimation of equation (3), displayed on table 4column (1), show that the probability of being a new counterparty is inversely correlated with the capital, the ratio of exposure to wealth, and being risk adverse, suggesting that returning borrowers that received more liquidity have a lower ratio of exposure ot wealth, more capital, and are less risk takers than new counterparties.

As the Bank refinances on average a greater number of non-bank counterparties in regions hit by a crisis – see figure 7, we investigate if this result holds true after controlling for guarantees pledged against liquidity. To that end we estimate equation (4) which consists in the baseline model in which we add a dummy equal to one for existing counterparties, a dummy for being a non-financial agent and an

interaction of these two dummies. We compute this equation on the 14 regions hit by a new crisis in 1898.

$$L_{i,b} = \beta_j X_{i,j} + \gamma Existing_i + \delta Non\ bank_i + \alpha(Existing_i * Non\ banks_i) + \eta controls_i + \varepsilon_{i,b} \quad (4)$$
$$b \in [1;94], i \in [1;1676], j \in [1;5]$$

Table 4: Analysis of impact of relationship banking at the discount window

	(1) Logit New counterparties	(2) OLS liquidity provision
Exposure ratio	-1.16***	
	0.00	
Capital	-0.00***	0.06**
	0.00	0.01
Assessment of risk appetite	-0.23***	-25.41
	0.00	0.11
Collateral		0.19
		0.11
# of credit risk guarantors		39.11***
		0.00
Counterparty risk guarantor		0.58***
		0.00
Existing		53.87***
		0.00
Non-bank		5.09
		0.63
Non-bank * Existing		-37.80*
		0.08
Constant	-0.82*	
	0.10	
Controls	Yes	Yes
Adjusted R^2		0.576
Observations	385	396

Column (1) performs logit analysis on the arrival of new counterparties of the Bank of France for regions suffering a regional crisis in 1898. We estimate the probabilities of being a new counterparty at the discount window according to capital, exposure to capital ratio and risk appetite. The definition of the variables as well as descriptive statistics are provided in section 4. The sample is winsorized by 1% of top and bottom for the variables exposure and capital) with controls including dummies for each profession. Column (2) performs a cross-section analysis on the volume of liquidity lent by the Bank of France to its counterparties in 1898 according to pledged guarantees for regions suffering a local crisis in 1898. The definition of the five type of guarantees as well as descriptive statistics are provided in section 4. Existing counterparties is a dummy coding one if the counterparty was already discounting at the Bank in 1897. Non Bank is a dummy coding one if the counterparty is not a financial intermediary. The sample is winsorized by 1% of top and bottom for the variables discount, capital, collateral, counterparty risk guarantee and number of credit risk guarantors) with controls, the share of two signatures discount, a dummy for being a director of the branch and a dummy for including female relative in the business. p-values are in parentheses. ∗, ∗∗ and ∗∗∗ denote respectively statistical significance at the 10%, 5% and 1% levels.

Column (2) of table 4 reports the coefficients estimated for equation (4). The results are coherent with the characteristics of new counterparties: Being an existing counterparty and a financial institution allows to receive an additional 54 thousand of Francs of liquidity compared to new counterparties, while non bank agents who are existing counterparties would receive only 16 thousand of Francs more than new counterparties. This result indicates that the Bank of France lends more generously to financial institutions in case of local crisis than non-financial agents, especially if these financial institutions are long-term customers.

d) Risk management during the local crisis – A longitudinal analysis of the case of Moulins

We focus now on the case of a local crisis at the branch of Moulins. In the 1890s, the counterparties of the branch of Moulins faced a liquidity stress originating in the agricultural sector, which consisted

locally mostly on fattening cattle. The fattening activity was dramatically impacted by an epizootic disease which affected the cattle, preventing it to put on weight, creating potentially a capital loss.[50] A drought hit the region in 1893 and caused the apparition of the cattle disease. Other droughts hit the region in 1895 and in 1898. Between 1898 and 1900, the disease was especially strong and provoked important damages on the cattle.
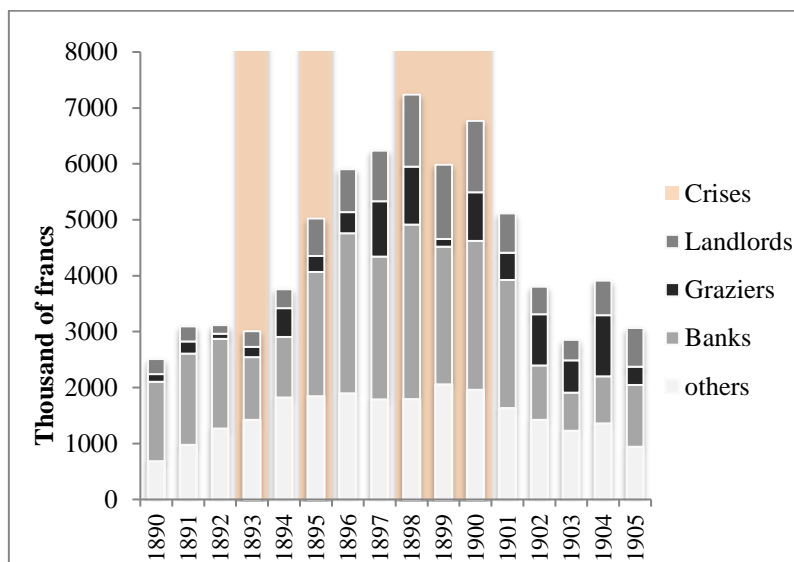

Figure 11: Volume of discount at the branch of Moulins, 1890-1905 per category of presenters.
Source: Rapports d'inspection of Moulins (1890-1905).

Figure 11 presents the evolution of the discount at the branch of Moulins during this episode[51]. The local branch refinanced a greater number of non-financial agents during the crisis than before it. The increase of liquidity provision at the end of the 1890s was characterized by the arrival of debts thought the local banks but also by the arrival of non-financial agents most directly affected by the crisis - the beef cattle famers or graziers. Graziers' debts also arrived through their direct creditors, the local landlords, which were wealthy agents who pledged their capital to rediscount 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 during the crisis. The liquidity allocated to banks nearly tripled between 1890 and the pic of the crisis in 1898. Liquidity allocated to graziers and landlords was multiplied by more than 5 between the first years of the period and the peak of the crisis.

We check how the risk management framework reacted to the increase of the diversity of the counterparties during this crisis episode. We run a panel regression framework as described Equation (5), in which the left-hand side variable is the volume of liquidity lent to a counterparty i on year t as given by the supervisory reports. This model is based on equation. (1) to which we add a dummy for the five years of crises and interactions of the five types of guarantees with the crises. $X_{i,j,t}$ is thus defined as a guarantee of type j pledged by a counterparty i on year t.

$$L_{i,t} = \alpha_j X_{i,j,t} + \beta_2 Crises_t + \beta_3 (Crises_t * X_{i,j,t}) + \beta_4 controls_{i,t} + FE + \varepsilon_{i,t} \quad (5)$$
$$i \in [1; 137], j \in [1; 5], t \in [1890; 1905]$$

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[50] See appendix 2 for details on the fattening crisis.
[51] 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 futher details on Moulins' dataset.

Table 5 reports the result of this analysis. The first regression runs Eq.(1) on the panel data of Moulins and exhibits similar results, all type of guarantees entering with positive and significant coefficients. In the second column, we show that the Bank of France increases its liquidity provision during crises by 20,190fr. In the third regression, we interact the guarantees with the dummy of crises. Only the interaction with lagged rating of risk appetite shows positive and significant coefficient. We conclude that in time of crises, the Bank payed special attention to the risk appetite and conditioned its lending of last resort to agents who proved to be risk adverse.

Table 5: The determinants of liquidity provision decision in time of crisis

	(1) Liquidity provision	(2) w/ Crisis	(3) Crises x rating
Collateral	0.21**	0.21**	0.26*
	(0.03)	(0.03)	(0.05)
# Credit risk guarantors	28.20***	28.47***	27.21***
	(0.00)	(0.00)	(0.00)
Counterparty risk guarantor	76.97***	77.86***	78.54***
	(0.00)	(0.00)	(0.00)
Capital	0.14***	0.14***	0.13***
	(0.00)	(0.00)	(0.00)
Assessment of risk appetite	28.32**	30.08**	13.85
	(0.03)	(0.02)	(0.34)
Crises		20.19*	3.96
		(0.07)	(0.76)
Crises X Risk appetite			56.84**
			(0.05)
Controls	Yes	Yes	Yes
FE	Yes	Yes	Yes
Adjusted R^2	0.456	0.458	0.463
Observations	671	671	671

This table performs 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 individual level. The panel unbalanced and composed by 136 individuals. Column (1) estimates the main specification, using fixed effects by occupation. Variables definition and summary statistics are provided in section 4. 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. Risk appetite and capital are one-year lagged. Controls includes a dummy correcting for seasonal variation (if the supervisory report is written during low agricultural season). Column (2) only adds the dummy for years of crisis. Column (3) adds the interaction between the crises and the lagged rating. Controls for column (3) also includes non-significant interactions between the dummy crises and other types of guarantees (collateral, # Credit risk guarantors, counterparty risk guarantor, capital). p-values are in parentheses. ∗, ∗∗ and ∗∗∗ denote respectively statistical significance at the 10%, 5% and 1% levels.

We investigate whether the increase of liquidity provision is driven by a greater number of counterparties or a greater volume of liquidity lent. We decompose the share of growth of discount due to the variation of discount with existing counterparties and from the contribution of the evolution of the counterparty base. Figure 12 and 13 compare the average number of counterparty and of liquidity provision at the Moulins branch. The years of stress on the local economy due the drought and cattle disease are characterized by an increased number of non-financial counterparties compared to the non-crisis situation and an increased average volume liquidity provided to banks. The Bank of France did not allocated more liquidity on average to non-financial counterparties and reduced the average liquidity lent to them after the crisis, thus diminishing its exposure to them once the economy recovered. Similar decrease can be observed for the average liquidity allocated to banks. The persistence of non-banks at the discount window can be explained by the fact that once these agents complete their applications to open an account the Bank to access its liquidity, they are likely to keep this account open to be able to borrow liquidity again later.
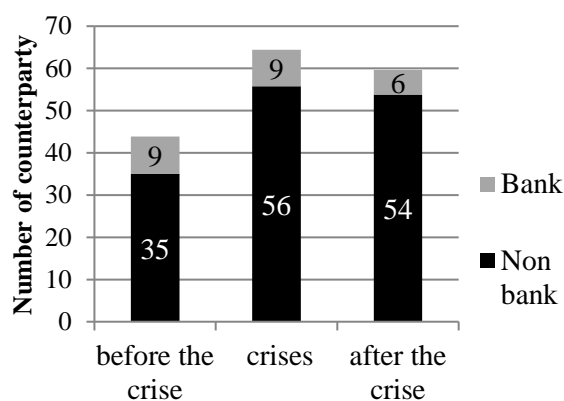
Figure 12: Average number of counterparty by type of agent and type of period from Moulins branch.

Crisis years are 1893, 189, 1898-1900. The years 1890-1892, 1894 and 1896-1897 are pooled in as a "pre-crisis period". The period 1901-1905 is labelled the post-crisis period. The total of counterparties before the crisis is 264. They are 321 for the crisis period and 298 after the crisis.

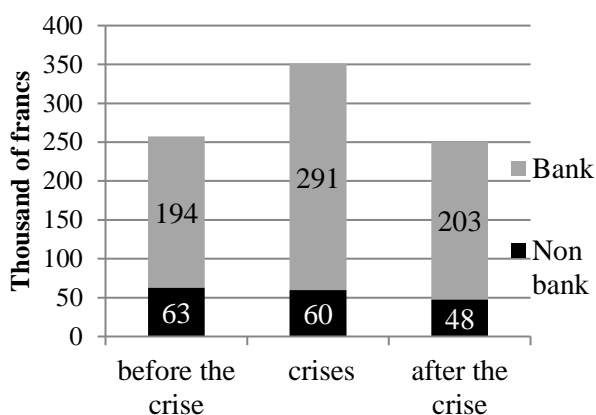Source: Rapports d'inspection… Moulins 1890-1905.

Figure 13: Average liquidity provision per counterparty by type of agent and type of period from Moulins branch.

Crisis years are 1893, 189, 1898-1900. The years 1890-1892, 1894 and 1896-1897 are pooled in as a "pre-crisis period". The period 1901-1905 is labelled the post-crisis period. The total liquidity provision before the crisis is 23.7mn of Francs. It amounts at 28.9mn of Francs for the crisis period and 18.7mn of Francs after the crisis.

Source: Rapports d'inspection… Moulins 1890-1905.

To investigate the relative persistence counterparty by type of agents, we compute the average number of years of presence at the discount window by occupation of counterparty. Table 6 reports the results. The volatility of the presence of the counterparties most affected by the crisis – the graziers and the landlords – decreases significantly after the crisis while the one of banks increases; banks are less likely to be observed at the discount window after the crisis.

Table 6: Mean of presence at the discount window by type of agent and type of period.

	all years	before the crise	crises	after the crise
Banks	52%	55%	54%	36%
Graziers	54%	35%	54%	65%
Landlords	31%	20%	35%	35%
Others	42%	33%	50%	38%

The mean of presence is defined as the average number of years during which a counterparty is reported using the liquidity provision of the central bank. The full sample is composed by 16 banks, 35 graziers, 38 landlords and 47 other counterparties.

Source: Rapports d'inspection… Moulins 1890-1905.

In order to investigate the determinants of the volatility 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 one for counterparty *i* who is present at the discount window in year *t* and absent in year *t-1* and to 0 otherwise. We run a logit regression using equation (6) over the full period.

$$L_{i,t} = \alpha_j X_{i,j,t} + \beta_2 Crises_t + \beta_3 \left(Crises_t * risk\ appetite_{i,t}\right) + \beta_4 controls_{i,t} + \varepsilon_{i,t} \quad (6)$$
$$i \in [1;137], j \in [1;5], t \in [1890;1905]$$

Results are reported in table 7 column (1) show 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

adverse, if there is a crisis and he is not a bank. The breakdown by period, as reported in column (2) to (5) allows observing that the occupation of the counterparty is not a significant factor outside of the crises years. However during the crisis, the main determinants of arrival at the liquidity provision facility are being a non-bank and especially being a risk-adverse non-bank. As the crisis hitting Moulins originates 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 adverse attitudes.

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

	(1) Arrival All sample	(2) Arrival Before the crisis	(3) Arrival Crises	(5) Arrival After the crisis
Collateral	-0.00	-0.01	0.00	-0.00
	0.31	0.16	0.74	0.82
# of credit risk	-0.24**	-0.24**	-0.08	-1.44**
guarantors	0.01	0.02	0.61	0.02
counterparty risk	-0.78***	-0.64*	-0.51	-1.77***
guarantor	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	0.57***	0.56*	-0.66	0.43
appetite	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		-0.07	14.99***	0.23
banks		0.90	0.00	0.77
Constant	-1.69***	-1.16**	-16.04***	-1.25
	0.00	0.02	0.00	0.16
Pseudo R^2	0.054	0.045	0.087	0.103
Observations	883	264	321	298

This table performs a logit analysis on the arrival of counterparties at the branch of Moulins between 1890 and 1905. Except the dummy for crises, all variables are defined at the individual level. The full sample is composed by 136 individuals. Column (1) estimates the specification on the full sample. Variables definition and summary statistics are provided in section 4. 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. Controls includes 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-samples. The years 1890-1892, 1894 and 1896-1897 are pooled in as a "pre-crisis period". The period 1901-1905 is labelled the post-crisis period. p-values are in parentheses. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels.

The risk management framework allows the Bank of France to operate a wide discount window and make profit on this activity. Figure 14 reports the product of the operation of the liquidity provision as well as the profit at the branch of Moulins before, during and after. The branch activities were always profitable over the 1890-1905 period and the increase of the volume of operations during the crisis period even resulted in a higher profit than the rest of the period. This shows that the Bank was able to accommodate a greater diversity of counterparty and increase its refinancing to banks without taking on losses.
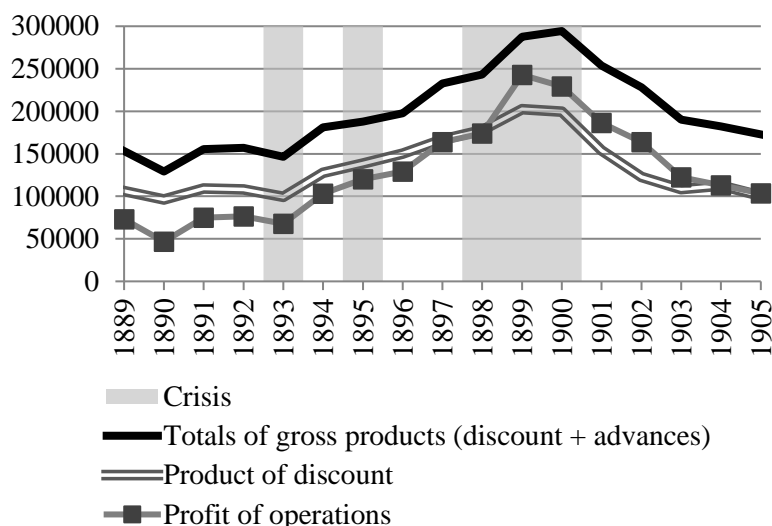
Figure 14: Product and profit of operations at the branch of Moulins, 1890-1905.
Source: Compte rendu, Assemblée générale des actionnaires de la Banque de France.

6. **Conclusions**

The cooling down of financial stress is more efficiently implemented when a central bank opens its liquidity provision to the widest set of counterparties. This results is a folk theorem in macroeconomics that insisted that welfare is higher when the negative income shock are smoothed by an accommodative monetary policy, see for example Sargent and Wallace, 1982 for theoretical evidence. This type of intuition gives ground to the practice by central banks to widen their discount window in times of crisis. But an equally important literature emphasizes the risk associated with operating a wide discount window. Indeed the certainty of the access to the central bank may weaken market discipline and fuel moral hazard and hence future crises. In this paper we use a historical study to document a case in which a central bank operates a wide discount window but implement procedures and tight management techniques to protect its shareholders from the losses associated with risk taking.

We show that, consistently with theory, the Bank of France used a variety of mechanisms to check the impact on risk associated with a wide discount window. 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 pin down the risk management tools that the central bank can mobilised to tame moral hazard, thus pining down the wideness of the discount window and hence the ability of the central bank to stabilize the economy. The harsh creditor law 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. Indeed the current world of payment instruments, with the development of non-bank payment operators, is becoming closer to the French situation of the end of 19th century. Then payments instruments were –partly– dis-intermediated from deposit banking, and run can occur on those instruments. One may speculate whether the wideness of the discount solution was one of the practical solution found by the Bank to deal with the instability that this payment environment could have created. We show in this paper that a central bank can manage a broad access to its discount window while taming the moral hazard consequences that this broad access may bring. The Bank circumvent it by acquiring information on counterparties and using it to discriminate between the riskiness of its counterparties. This is not foreign to the implementation at the discount window of haircuts varying with the ratings of the financial assets.

Appendices

1) Statistics on banks
- Population and size of the banks operated in 1898

We match the banks in our sample of Bank of France clients with the location of one of the 2921 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 gives the information on the address and town –village or city– of each bank. We match the information on the town of the 2921 branches of banks in the Almanac with the GIS coordinates –latitude and longitude– of cities as given by the INED city database. Of the 889 banks that discount at one of the local branch of the Bank of France (outside Paris), the information on 760 banks was matched with their address and city using the commercial almanac. Among these 760 banks, 451 hundred were located in a town that has reached at least once the threshold of 2,500 inhabitants in the period between 1826 and 1990 (source: INED database on urbanization). The 2,500 threshold is the usual minimal definition of a city according to modern French official authorities. We were unable to match the city reported 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 are unable to locate the address and town of 129 banks in the almanac.

We differentiate the national deposit banks from regional banks, one-branch banks and discounters. We follow the assignation given 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 check that the banks identified as regional by the historiography also falls in this category defined by our identification rule. We find no example in Kaufmann (1914), Freedeman (1993) and Plessis and Lescure (1999) of a regional bank defined by the criteria '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, the bank Sappin in Auxerre, the bank Berthier in Auxerre, the Banque de Mulhouse in Belfort, the Comptoir Maconnais in Chalon sur Saone, the bank Moneste in Chambéry, the Banque de Bourgogne in Dijon, the Crédit mutuel de Poligny, the bank Piot in Lyon, the Société Lyonnaise de Crédit, the bank Collet in Lyon, the Société Lyonnaise de dépots et de comptes courants, the bank Sandelyon, the bank Béguet in Moulins, the bank Hours in Moulins, the bank Maudière in Moulins, the bank Rabier in Nevers, the bank Richault in Orléans, the bank Berge in Perpignan, the bank Camuset in Reims, the bank Chapuis in Reims, the bank Bayette in Saint Etienne, Dastugue in Tarbes, De Boussac in Toulouse and Banque Mutuelle in Lyon.

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 ...*[52] 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 branch report on portfolio management contains the same information and shares the same organization 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 describes 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 guarantees the discount under the heading "main obliged and endorsers" ("*principaux obligés et endosseurs*"). In the second and third part, each page of the report has four spaces. The first is for the supervisor comments', the second is for the explanations of the local manager of the branch. In the third, the supervisor can make new observations and the last space is reserved to the "*suite à donner au rapport*". This organization allows a dialogue between the branch and Paris, as the main objective of the report is to assess the quality of the management of the branch.

In each report, for each presenter or endorser, the supervisor has 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).[53] Most of the time, we also know an estimate of the wealth of the presenters or of his capital and reserves when he is incorporated. Each entry also reports whether some of the bills presented for discounting was 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.[54] 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 the information available in the report, our database is by construction a sample of all the counterparties of the Bank as each report only offer a snapshot on the activity during the visits of the supervisors.[55]

Figure A.2 presents an excerpt from the report of Toulouse branch showing an example of a presenter to the discount window operated in Toulouse. The first line indicates the name of the discounted and its occupation (*Courtois* here). The second line informs on the city. The third and fourth lines give the amount of bills discounted payable on Paris or in the other cities (421,000 Francs) and on the city where the branch is located (here Toulouse, for 324,000). On the left of the fourth line, the supervisor reported that bills with a total value of 22,000 Francs were guaranteed by two others persons (out of the 324,000 payable in Toulouse). The amount of securities pledged to guarantee the bills discounted with 2 signatures (295,300 francs) is reported on the fifth line reports while the sixth line indicated the amount of the Lombard (collateralized) lending. The supervisor then describes briefly an assessment on the counterparty notably on his solvency, on 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 equal to 0. On the contrary the dummy was set equal to 1 is the supervisor has reported a positive assessment of the management of the business. The last lines indicated either the main agents

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[52] These reports are digitalized and available on site at the archives of the Bank of France.

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

[54] 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*"

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

endorsed ("*principal obligé*" or first signature) and the other endorsers of the bill ('the second or third signature').[56]
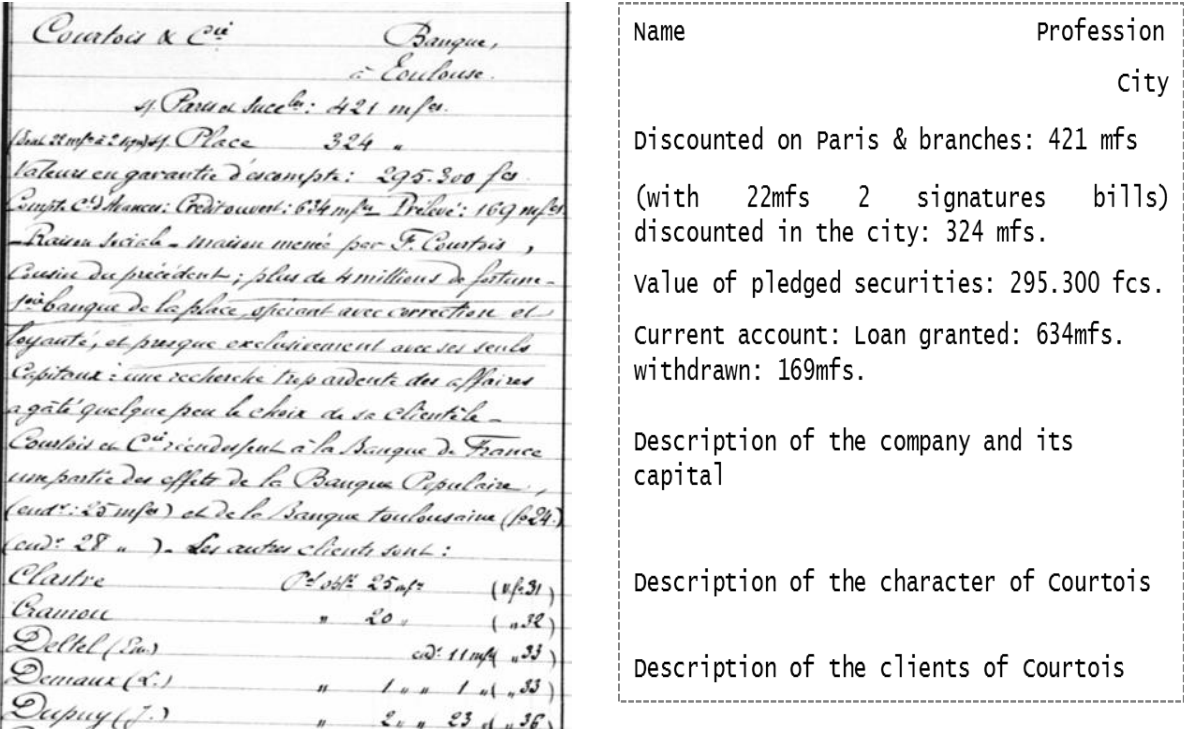

Figure A.1: Excerpt from the Toulouse report of 1898 (left panel) and its description (right panel)

3) Coding local negative shocks (crisis)

We seek to measure financial distress of Bank of France counterparties. We identify episodes of distress from real-time narrative accounts of regional economic conditions prepared by the Bank of France inspector and branch managers. We use two sources: the supervisors' reports which details the state of the portfolio and local economic conditions in the past 12 months and the economic conditions reports, *Rapports conjoncturels*, which were monthly reports send my each branch manager to the 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 look for discussions on these shocks in each 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 1 for the existence of regional shock identified at the branch level.

Table A.1 details each distress episode and mentions which type of counterparties were impacted and located the branch impacted by each episode.

Type of crisis	Explanation	Branch impacted
Agricultural crisis	In the 1890s, an epizootic disease – the foot and mouse disease - affected the cattle, preventing it to put on weight. It appeared in France in 1893 and affected the cattle until 1898[57]. This disease was particularly costly	Moulins Caen Aurillac Bourges

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[56] The list of "obliged" 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")

[57] See notably Vallat (2001).

	for the graziers because the animals caught mouth ulcer and could not eat properly so could not fatten. Some beasts starved to death which provoked important losses for the graziers.	St Etienne Mende Saint Lô Nevers Chalon sur Saône
Industrial crises	Industrial places based on textile such as wool and silk fabrics were heavily impacted by the Spanish-American war as the war let to an interruption of the exports of French textile toward the US. This unanticipated collapse of the sales to the foreign markets arrived at a difficult time as the industry was already under stress imposed by the 1897 US "Dingley Tariff"[58].	Laval Flers Castres Epinal Reims
	Besancon placed suffered in 1898 a crisis of the watch industry and the liquidation of one of the major local company, Wolff & Picard[59].	Besancon
Banking crises	In Carcassonne and in Bordeaux, the stress on the wine traders following the 1897 US "Dingley Tariff" fed back on the main bankers' situations[60].	Carcassonne Bordeaux
	In Reims, the main banks faced losses after two consecutive bankruptcies: one big textile industry and one important wine maker.	Reims
	In Lons le Saunier, an important discount house filed for bankurpcy after the death of its manager[61].	Lons-le Saunier
	In Dijon, the main bank, the Bank of Burgundy is facing runs and stress after the failure of an important chemical industry[62].	Dijon

[58] Source : Rapports conjoncturels 1898.
[59] Source : Rapports d'inspection…Besançon, 1896,1897,1898.
[60] Source : Rapports d'inspection… Bordeaux and Carcassonne, 1897 and 1898
[61] Source : Rapports d'inspection… Lons le Saunier (1898)
[62] Source : Rapports d'inspection… Dijon, Caron (1898)

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