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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 operates a very wide discount window and uses a variety of risk management techniques to effectively subdue risk-taking behaviors and to protect its balance sheet from taking any loss. This allows agents to monetize a very diverse set of capital while limiting the risk of bail-out. We show that this effectively helps the central bank to stabilize the economy from the consequences of negative income shocks.

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 the certainty of receiving liquidity from the lender of last resort.

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 main benefit of a discount window operated by the central bank is to allow monetizing debts, i.e. the conversion of debts into banknotes or central bank reserves. By providing a generally accepted

means of payment, this monetization allows agents avoiding the default. The access to the discount window is defined both by the type of agents that are allowed to monetize their debt –for example banks, shadow banks or non-banks– and by the type of capital that the central bank accepts as collateral for its liquidity provision. Any 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. The wideness is therefore pinned down by the definition of the various forms of capital taken as guarantee.

The operational design of the discount window directly impacts on the ability of a central bank to cope with financial stress. 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 impacting the choice of the 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. 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 (Bignon, Flandreau and Ugolini, 2012). Moreover (i) entry into banking was not a regulated activity and no scheme of deposit insurance was operated (Bignon and Jobst, 2017) and (ii) the government did not intervene in the resolution of failing banks (Hautcoeur, Riva and White, 2015). This allows excluding that the banks' behaviors could have resulted from the expectation of a bailout or the existence of public protection weakening market discipline. Our case study is market discipline with widely accessible liquidity provision by the central bank.

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 faced then a trade-off between allowing a wide access to the discount window and taming moral hazard. We advocate that the Bank sophisticated information system was set to protect its profits from the risks of default of counterparties. We also document that the Bank operated a (very) wide discount window: The discount window was accessible to any trader and the Bank allowed the use of a set of eligible guarantees much greater than the one allowed in any central bank today. We document how the Bank tamed moral hazard by discriminating across counterparties in terms of which guarantees they were allowed to use. We also show that the Bank conditioned the volume of refinancing

on its perception of the risk-appetite of its counterparties. We finally document differences in the use of guarantees during crisis times versus normal times.

The rest of the paper is organized as follows. The next section summarizes the theoretical literature on the access to the discount window and implied risk-behaviors that it may induced. Section 2 presents the historical case and the data we use to document those relations in late 19th century France. Section 3 shows that the access to the Bank's discount window was broad. Section 4 shows that this was directly related to the risk-management framework chosen by the Bank. Section 5 documents how the Bank uses its framework to tame moral hazard. Section 6 concludes.

1. Theoretical insights

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 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 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 panic occurs in connection with the environment in which the bank is operated such as 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). The literature on bank runs distinguishes between belief-driven or informed (or fundamental-based) runs (Gorton, 1988) and derives differences in terms of risk management by the central bank of the discount window. Banking theory insists that guaranteeing a wide access to the discount window may trigger moral hazard behavior weaken the working of market discipline.by encouraging risk taking (Rochet and Tirole, 1996). In particular, it has been argued that the certainty of the access to the central bank may trigger risk-taking behaviors by the banks. It was shown that if runs are purely beliefs-driven, the availability of a lender of last resort facility opens to any bank is sufficient eliminate this cause of run. However, and contrary to situations in which a run is purely belief-driven, 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 is 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 –something that was formally show by Miron, 1986). Second in times of high-enough level of doubts on the solvency of debt issuers, the liquidity of those debts may be negatively impacted, justifying a swap of money against debts. Freeman (1999) has shown that in an economy in which private debt circulates as a medium of exchanges, the existence of negative aggregate shock –a situation akin to a crisis– on a segmented debt market is a rationale for the existence of a central bank facility that convert debt claim into cash, i..e. a mean of payment generally accepted by every agents. Chapman and Martin (2013) have extended this model by allowing banks to be subjected to moral hazard. This created a trade off of the central bank when it decides on the inclusiveness of its discount window operation. The central bank can indeed either accept anyone but at the risk of fueling moral hazard or limit the access to the lender of last resort to align the banks' incentives with the central bank objective.

The decision on eligibility immediately leads to a discussion on the credit risk that the central bank is ready to bear, i.e. on the rule decided by the central bank with regards to the quality of the debt it is ready to purchase. It cannot be disentangled from the discussion of the risk management tools that the central bank can use limit the risk appetite of its borrowers. Various risk management tools have been studied in the literature to be potentially effective in mitigating agency issues arising from discount window. Theory suggests four mechanisms: (i) the screening and monitoring of the risk appetite of the counterparties ; (ii) the building of a reputation by the borrower ; (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 that could have been at play in limiting moral hazard 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.

Moral hazard triggered by discount window lending might originate from imperfect information by the bank on counterparties (Freixas, Parigi and Rochet, 2004). The reason is that a borrower has an incentive to fool a lender either because it can concealed its true situation to the lender or because it can take action to decrease the probability of reimbursement once the lending has occurred.[1] This literature suggests that it is therefore especially important to document the information set of the central bank and the quality of the information it collects.

The central bank can use the reputation of the borrower in terms of risk appetite to limit moral hazard, in a mechanism akin to Diamond (1991). In Diamond 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. There are two consequences for our study. First 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). In the context of our study, and because monitoring is costly to the central bank, this means that 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). Second the lender uses its information to condition the volume lent on the risk appetite or risk portfolio of the banks.

The central bank can also protect itself from the credit risk associated with lender of last resort by asking its counterparties to pledge collateral. If the cost for the lender to monitor borrowers is high relative to revenues of the loan, the pledging of collateral may be a cheaper solution as the asset is seized immediately upon default, thus limiting agency problem (Leland and Pyle, 1977; Smith and Warner, 1979). The pledging of collateral may 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 impacts on the borrowers' willingness to default (Boot, Thakor and Udell, 1991; Holmstrom and Tirole, 1997). Collateralization does not suppress the need to screen borrowers, as there are situations in which the collateralization of assets may amplify adverse selection notably when the decision on interest rate is independent of the decision on collateral (Wette, 1983), as was the case in the situation we study as the Bank of France was forced to lend at a fixed interest rate. It may also be that if the lender offers a menu of options to protect the bank from credit risk, the pledging of collateral is attracting the riskiest borrowers in which case it is important to screen borrowers also on an ongoing basis.

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[1] We do not consider the possibility for the central bank to vary the interest rate with its perception of the default risk of counterparties since the Bank of France was mandated to charge only one interest rate on discount.

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 leads it 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 not unlikely. This issue may be subdued by the design of an appropriate internal governance aimed at limiting principal-agent problem within the organization.

2. The discount window in France: case and data collection

The supply of discount and credit remained unregulated during the whole century. The business model of banks was very different from deposit banking, which appears in the 1860s but generalizes in the 1900s (Nishimura and Yago, 2006). A couple of national deposit banks developed a network of branches during the 1860s-1900s period but their balance sheet was focused on the discount of bills of exchanges of more or less long maturity (Bouvier, 1961; Bonin, 2006). There was therefore little maturity transformation in the main banks, which remains however exposed to roll-over risk risk.

The financial system consisted also of broker dealers and more or less capitalized local discounters (Gille, 1959). Their business model was better thought as some combination of activities of dealers-brokers, hedge funds or investment banks that used fixed-term deposit and personal wealth to finance the economy by rolling over the discounts of bills (Redlich, 1948; Nishimura, 1995). The discounting business was not restricted to financial intermediaries and non-financial discounters retained a sizeable market share. As will be clear later, many merchants and some landowners were active discounters of bills of exchanges (Gille, 1959).

The discount window of the Bank of France was a standing facility, i.e. the Bank stand ready, in each of its branches (*succursales*), to discount bills of exchanges payable in France. Bills of exchange were debt securities whose end-payment was guaranteed by a variety of legal mechanisms.

The Bank purchased bills of exchanges payable at a 3-month maturity if they possessed two layers of guarantees. In the language of the times, it was said that the Bank purchased bills with 3 signatures, which means the signature of the seller of the bills, the signature of the payer of the bills (the drawer) and the signature of a third party that endorse (guarantee) the bills. The end payment of the bills was jointly liable by the persons who signed it to the last person who had discounted the bill. Figure 1

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summarizes the three layers of individuals guaranteeing the end payment of bills. Endorsing a bill committed both the presenter and the endorser to the immediate payment of the bills if the drawer was in default. Therefore if the payment was not made at maturity, the Bank immediately asked first the presenter and then the endorser for the payment. In late 19th century, the Bank of France authorized the endorsement to be substituted by other guarantees, such as marketable assets –i.e. eligible assets that can be seized immediately to cover entirely the credit risk.
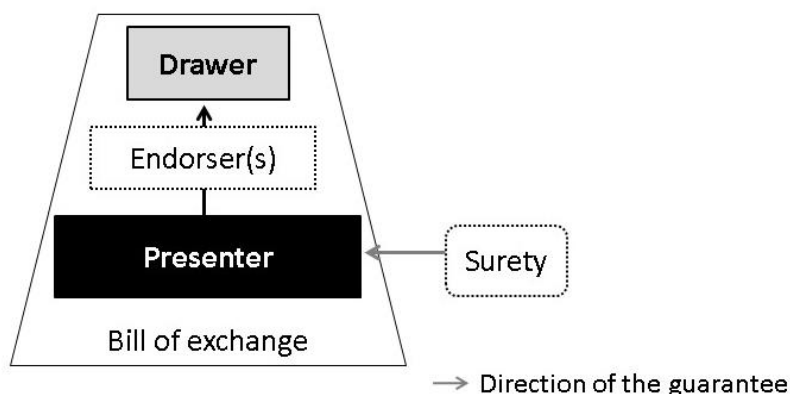

Figure 1: system of guarantees on a bill of exchange

Any individual wishing to present bills at the discount window had to open an account in a branch of the Bank. This requires sharing with the Bank all the legal documentation on his company (notarial deeds, legal notices, company charters) as well as a certificate of worthiness signed by three external persons.[2] This certificate could be replaced if the local manager produced a detailed report on the worthiness of the prospective client, after conducting an "unofficial inquiry".[3] The final decision to accept the opening of an account was made by the headquarters. At the headquarter in Paris, the Bank aggregated those pieces of information in the Clients' files, which were continually updated, and in which any evolution in company size, in capital, in risks taken were recorded,[4] while updates on mortgage statements were required yearly.[5] Any update was to be sent bi-monthly by the branch to the headquarters. The branch local manager was responsible for information collection and was helped notably by a controller in charge of supervising the branch registries.[6]

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[2] Règlement des Succursales, Banque de France, tome 1, p214. Archives of Bank of France.

[3] 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.

Je vous recommande particulièrement de vous montrer prudent dans les enquêtes officieuses qui précèderont l'admission ou le refus des comptes, car les décisions que prendra la Banque à cet égard dépendront principalement des renseignements que vous aurez recueillis et de votre avis personnel. »

[4] 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

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

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

The wideness of discount window depended directly from the number of branches operated on the territory. This was linked to the fact that bills of exchange were debt instruments payable in a specific place, which implies that the bank only accept bills in locations in which the Bank could have collected the payment at the bill maturity (Bignon and Jobst, 2017). In late 19th century the bank operated niches in every county of the state, and sometimes up to 11 branches in the most dynamic county (the district called « North »).

The screening of counterparties, i.e. the collection of information on discounters, was made at the branch level. The decision to accept a bill at the discount window followed the following process. The manager of a branch was the chair of the committee in charge of the screening of presenters and endorsers of bills along with local directors of the Bank who were also shareholders. He was responsible to bring elements of background on the presenters to the committee. The decisions of this committee were locally reviewed by a censorship committee composed of three local shareholders designated as censors by the headquarters of the Bank. They were also reported on a weekly basis to the headquarters' portfolio committee composed of Parisian shareholders. On the contrary to the directors who were mainly local economic actors, the censors were in their great majority accountant general or notaries. These local censors reported directly to the Parisian directors[7] on the activity of the branch as well as on the attitude of the managers. For example, in 1899, a Parisian director reported to the governor of Bank that a manager refused the access of accounting ledger to a censor.[8]

The avoidance of biases in the discount decision was helped by the exclusion of the Bank branch managers and local directors from the discount window. The former could not present any bills[9] while the latter were subjected to very strict constraints of collateralization. They had to own between five and fifteen shares of the Bank which were kept by the Bank as guarantee of their management. These precautions aimed at avoiding cronyism in the choice of discount. The other employees of the branch also had to own few shares as guarantee of their tasks.

The cross-checking of the information collected by the branch was monitored continuously by a group of a dozen of supervisors of the branches (*inspecteurs des succursales*). In charge of screening and monitoring the activity of the Bank branches, they visited each branch during an average 2–week visit and collect information on the management of the branch and on the counterparties of the Bank. Their role was to check all discounted bills, the accuracy of accounting books and to evaluate the local portfolio. They also verified the work of all employees of the branches, sometimes discovering small thefts in the cashbox.[10] They could discuss with the local directors and attend the different committees of the branch.[11] Each visit was followed by the production of two reports on the management of the branch the first one on the portfolio management and another one the administrative management. These reports were read by local managers and the headquarter portfolio controllers.

The supervisory reports were part of a multi-layer system of information and controls which allowed the central bank to limit the risks within its network of branches. The management of the discount operations was monitored by the headquarter of the Bank. The governor and the directors representing the shareholders decided on each discount operation but in the local branches, their decision making

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[7] The local censors participated to the Annual report and reported

[8] « refus opposé par le Directeur d'une Succursale, à la demande que lui faisait un Censeur de prendre connaissance de la feuille des engagements » PVCG 11.07.1899

[9] Source: Ordonnance du roi du 25 mars 1841 sur les comptoirs d'escompte de la Banque de France. AD Nancy, 1ETP 22, Lois et statuts, an VIII – 1885:

[10] Notably, in 1891, in Bourg, an employee stole 100,000frs by imitating the signature of the manager in the accounts and ran away when the supervisor caught him. Source: ABDFPVCG 17 décembre 1891.

[11] Source: Rapport d'inspection… Sedan, 1898.

authority was delegated to local managers[12] (the head of a branch) who acted as intermediaries between the Bank directors and borrowers. These managers were appointed among three candidates proposed by the Bank through national decrees of the French government.[13] This tight management implied a daily surveillance operations and employees within a framework defined very precisely by the regulations of the Bank.

We collect all the information on the presenters to the discount window as given in the supervisory report of counterparties of the Bank, both the value of the bills that they presented to discount and the value of the bills that they have guaranteed. 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.[14]

The reports also indicate in its introduction the negative productivity or income shocks on the local economy. On 1898 for example 22% of the economy in which the branches were operated experienced some negative shocks. Nine crises were related to the capital-intensive activity of fattening the young beefs that was caused by the arrival of the foot-to-mouth disease. Seven were hit by an industrial crisis triggered by the reduction of exports caused by the Spanish-US war in Cuba.

Troubles of funding on local banks were reported in the introduction of the branch supervisory report. The reports mentioned that a couple of banks in five branches out of 94 had experienced troubles to fund their day-to-day business in 1898. For example in Dijon the Banque de Bourgogne (Burgundy bank) lost deposits for embezzlement of funds to his mistress by the manager. In Reims, the failure of a broker in champagne trigger doubts on the solvency of bank Camuzet which lost deposit as a result. In Bordeaux, the failure of a wine broker with which the bank Piganeau was deeply involved trigger a run on the bank. Other troubled banks were located Carcassone and Lons-le-Saunier. Deposit insurance and bank regulation have been identified as one arrangement that prevent bank run but none exist in France before 1914.

The reports do not allow observing the reason for why a counterparty has asked the Bank for a discount but we can exclude that this was due to a (systemic) bank panic in the definition of Calomiris and Gorton (1991).[15] Eligibility for the discount window was not restricted to banks, as there was no regulation specific to banks. Rather the Bank of France was mandated to refinance at a fixed interest rate any trader of a good standing (reputation). Although there were a couple of big and well diversified banks, the banking system also comprised many small banks that may have been prone to bank panics. In this situation the central bank could lend to the banks with liquidity needs, and to decide on the need to liquidate the Bank or continue the funding through the discount window.

Each branch report contains the same information and shares the same organization in three parts. Each report 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

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[12]Source: Règlement des Succursales, Banque de France, tome 1, p10. ABDF& Ordonnance du roi du 25 mars 1841 sur les comptoirs d'escompte de la Banque de France. AD Nancy, 1ETP 22, Lois et statuts, an VIII – 1885

[13] Regulations of branches stated that "l'Administration central […] ne peut voir et diriger que de loin ; […] le directeur d'une succursale doit tout voir et tout diriger de près", see Règlement des Succursales, Banque de France, tome 1, p12. ABDF

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

[15] The defintion of a panic is as follows « A banking panic occurs when bank debt holders at all or many banks in the banking system suddenly demand that banks convert their debt claims into cash (at par) to such an extent that the banks suspend convertibility of their debt into cash or, in the case of the United States, act collectively to avoid suspension of convertibility by issuing clearing-house loan certificates » (Calomiris and Gorton, 1991, p. 112)

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).[16] 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.[17] The supervisor also systematically mentioned whether the client has guaranteed (endorsed) some bills for other clients of the Bank and all his endorsements.

Figure 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 endorsed ("*principal obligé*" or first signature) and the other endorsers of the bill ('the second or third signature').[18]

We hand-collected data on the presenters of discount to Bank of France in 1898. We chose 1898 because it was a quite normal year in terms of discount activity, and hence is representative on the regular Bank's operation. In the end we have information on 1,676 counterparties that represented about 7% of the bills purchased by the Bank in 1898. We also have collected a time series of the counterparties of the Moulins branch of 883 observations representative of 136 individuals over the 1890-1905 period. This time series allows discussing the reasons that may have explained both the evolution of the assessment of risk-appetite of counterparties by the Bank and the volume discounted.

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[16] In 52 instances the supervisor copied a balance sheet of the firm.
[17] for details on the third signature or on direct discount, see Leclerc, 2010,p. 54-5 or Rapport d'Inspection, Limoges, 1898, "*garanties remplaçant la troisième signature*"
[18] The 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")
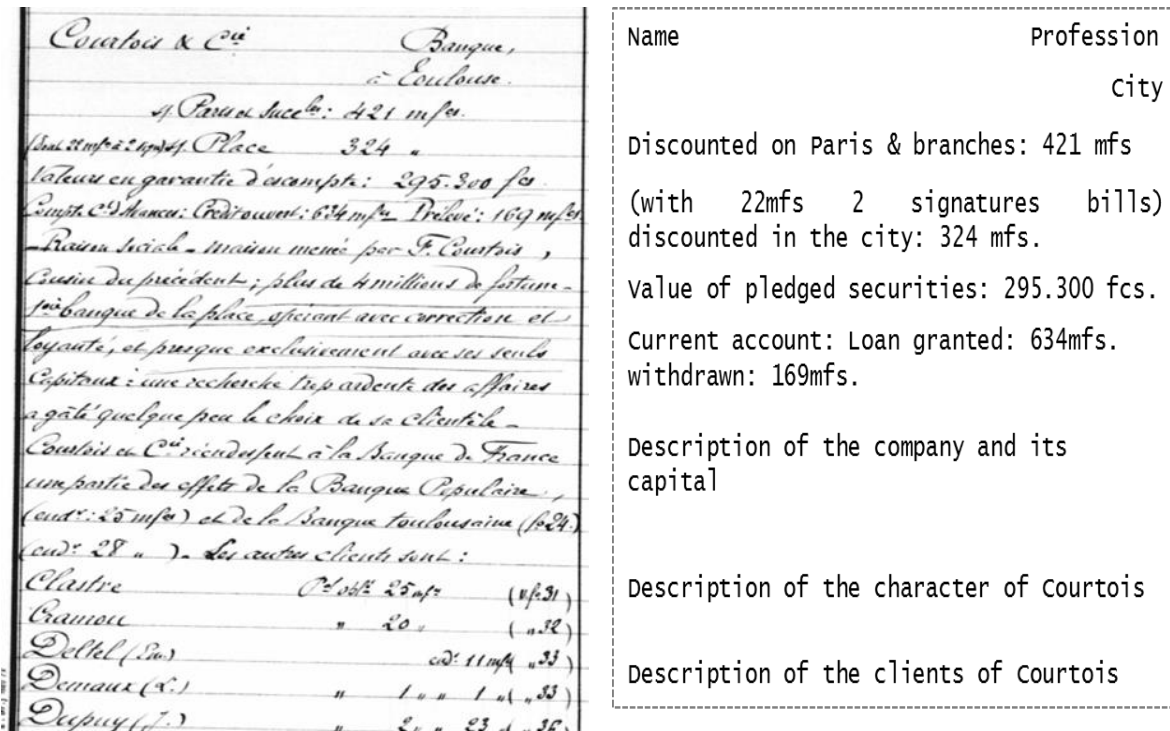
Figure 2: Excerpt from the Toulouse report of 1898 (left panel) and its description (right panel)

3. A broad discount window

The Bank discount window allowed this diverse set of financial intermediaries to accommodate local funding shock on the local economy or to compensate for the failure of other financial intermediaries. When a war reduced trade or when a disease decimated the cattle, the revenues of the local economy were reduced and the local industries required bridge funding that the banks and discounters accommodated. Any shock to the local economy translated into an increase of the volume of bills drawn on distressed firms, and triggers an increase of the duration of the bills. If the funding shock was big enough and, given that banks operated with very few maturity transformation, negative shock also increased the demand for banknotes and hence the activity of the Bank discount window.

Among the Bank's counterparties, financial intermediaries represented 85% of the discount of the Bank of France branches in 1898, all the types of bankers in business were represented. We identified as financial 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. We also included discounters, individuals using their own capital to rediscount bills and other individual providing financial intermediary services.[19]

The Bank of France also accepted to rediscount non-bank agents, for smaller amounts. Figure 3 splits the discount activity among presenter categories, thus allowing to check whether those financial intermediaries differed with regard to the volume of discounting they were granted access to and in terms of number of endorsers present on their bills. Non-banks agents represented only 15% of the volume of discount and the endorsers of their papers represented 6% of the total of endorsers on bills

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[19] 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).

rediscounted at the Bank of France. 48% of the total of endorsers was brought by the one-branch banks but the total volume of discount of this type of financial intermediaries amounted only at 39% of the total of discount. National deposit banks and regional banks were similar in term of share of discount and number of endorsers.

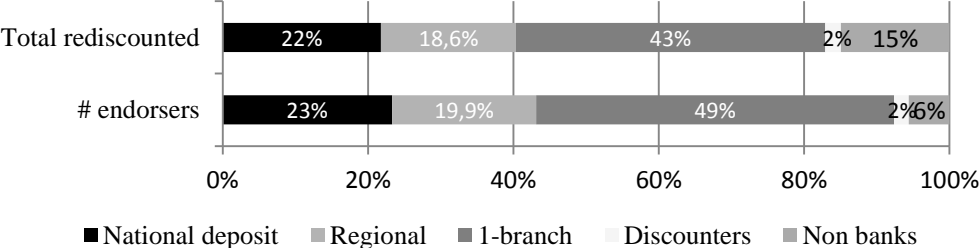|	National deposit	Regional	1-branch	Discounters	Non banks
Total rediscounted	22%	18,6%	43%	2%	15%
# endorsers	23%	19,9%	49%	2%	6%

Figure 3: Volume of discount and total number of endorsers of bills rediscounted at the Bank of France in 1898.
The total volume of discount amounted at 43,3 millions of francs and the total endorsers at 3573.
Source: Rapports d'inspection.

We now want to document how the use of the discount window varies with local stress on a local economy. We chose to focus on the branch of Moulins a town in an agricultural district of the centre of France heavily specialised in cattle breeding. Fattening beefs was a very capital-intensive activity, it's a form of cattle breeding consisting in buying beefs at age 1 in early spring, feed them for a year and selling them to the butcher at the end of the year. Because the beefs were paid by weight, the activity could have been very profitable if the beefs ate well or loss-making.

In the 1890s, a very hot summer in 1893 reduced the volume and quality of the pastures thus weighting on the profit of fatteners while an epizootic disease affected the cattle, preventing it to put on weight. Observing how those shock on a capital intensive activity impacted the refinancing of the local economy is therefore especially interesting. We unfortunately do not observe private banks but we can use the report on the activity of the Bank of France branch to document how the discount window reacted to those shocks.

Figure 4 plots the volume of discount at the branch of Moulins, by category of presenters for the period 1890-1905. Bankers at Moulins included two branches of national deposit banks, eight one-branch banks and four discounters. Fatteners were cattle breeders hit by a cattle disease and critical weather, landlords were local rentiers rediscount bills of local farmers and fatteners. Other agents included wine makers, farmers and the small local industry. Shadow bars indicate the years of crises of the fattening sector.

We observe that the discount to banks nearly tripled between 1890 and the pic of the crisis in 1898. Discount to fatteners and landlords was multiplied by more than 5 between the first years of the period and the pic of the crisis. The branch of Moulins refinanced a greater number of non-financial agents during the crisis than before it. The number of banks within the branch portfolio remained stable during the period but the number of fatteners went from four before the crisis to twenty six discounting bills during the crisis.
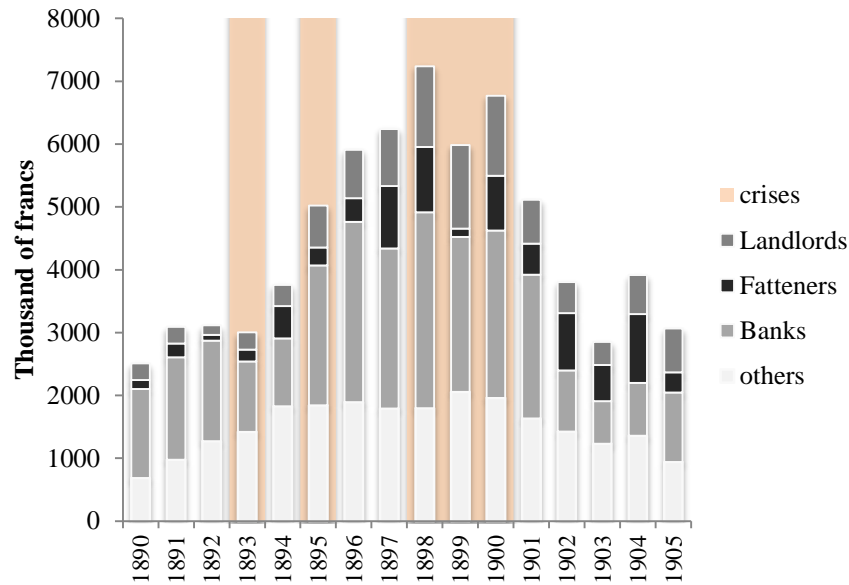
Figure 4: Volume of discount at the branch of Moulins, 1890-1905 per category of presenters. Source: Rapports d'inspection of Moulins (1890-1905).

4. How to be wide enough? Variety and use of collateralization strategies

The wide diversity of counterparties is partly explained by the absence of regulation or law regulating entry into the banking activity, except for the privilege of issuing banknotes. Indeed the Bank could not discriminate against non-banks and hence allowed agents that acted as shadow bank to be eligible to the discount window. There is however another reason for the Bank to have been able to accommodate a very diverse set of counterparties: the Bank used a very wide variety of collateralization strategy. In a developing economy in which not everybody have access to financial markets, and where agents held very different forms of capital that were not liquid, this allowed the Bank to monetize diverse forms of capital, and hence to not ration access by lack of adequate protection against the credit risk. The fact that the Bank was a profit maximizing institution may go a long way to explain why the Bank was that creative in terms of eligible collateral.

To align the incentives of the borrower with the interest of the bank, the Bank of France required every counterparty to have the bills they presented guaranteed. We identify four types of guarantees reported in the supervisory reports.

First the Bank only accept bills guaranteed by an endorser, usually a bank. The endorsement was a commitment by the endorser to pay the bill immediately in case of default of the payer.

Second the endorsement could have been replaced by the pledging of marketable securities as collateral. 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. [20]

Third a variant to the pledging of securities consisted in pledging a "surety" –a provision of the Napoleonic code called *aval*– that consists in a legal document in which someone commits to reimburse

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[20] Source: AD Isère, 1ETP 1 – 18 Répertoire des circulaires.

on demand the debt of a failed debtor up to a certain predetermined limit. This guarantee could also have been seized immediately upon default, thus limiting agency problem.

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). The Bank screened the wealth of each presenters. The wealth 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. Thus lending against the guarante of the accumulated wealth did not entail an important credit risk given that the wealth could have been seized in a failure procedure and knowing that the Bank could have waited to recuperate its claim as it faced no liquidity risk given its right to issue banknotes.

Finally the Bank assessed the risk appetite of agents. Risk appetite was judged by the Bank supervisors and branch managers. The reviews of the Bank included qualitative assessments of risk culture and internal governance of the financial intermediaries.

Supervisors accumulated soft information on the counterparties and then converted this information into ratings. They assessed 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"[21].

Risk management was 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 were also assessed, 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"[22] or bankers Salzeda in Bayonne described as "manag[ing] quite well the house but are arduous. They discount with 2 signatures –including to young – The bills that they presented therefore need to be selected"[23].

Finally the business model was also assessed, for example discounter Legendre in Blois was recorded as "usurious rates; questionable clients"[24] 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 quite good guarantees"[25]. We use the qualitative assessment available in the Bank of France supervisory report to build a rating of risk appetite of the counterparties.

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

[22] 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.

[23] 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.»

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

[25] 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 »

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.

The guarantees pledged varied between the different types of counterparties. Figure 4, 5 and 6 displays the reported guarantees per category of counterparties. Financial intermediaries discounted around 40% of the value their wealth, which was sizeable upon default according to the bankruptcy, against 10% for the non-financial agents. 15% of the discount of regional and one branch banks was guaranteed by securities, against 31% for other financial institutions and 86% for non-banks. Non-financial agents mainly rediscounted two signatures bills and securities. Their rediscount was also covered up to 40% by sureties.

Banks had a very limited use of sureties to guarantee their discount but relied extensively on endorsements. This is in line with the theory stating that pledging collateral ex ante is especially useful if the bankruptcy procedure is not efficient enough (Bester, 1994). Other financial intermediaries were similar to current shadow banks, the Bank required more collateral than for banks. As showed in figure 5, 85% of banks' discount was done by banks with three different endorsers of more on their presentations. Less than 10% of non-banks had three or more different endorsements on their presentation. Figure 6 displays the discount volume according to risk appetite rating. The Bank of France prioritized lending to risk adverse counterparties especially in the case of banks as they were the ones with larger off-balance sheet exposure. Non-bank agents who were risk taker were mostly absent from the discount window while the Bank accepted a bigger prevalence of risk takers among managers of branches of National banks as in case of default, the headquarters would be reimbursing.
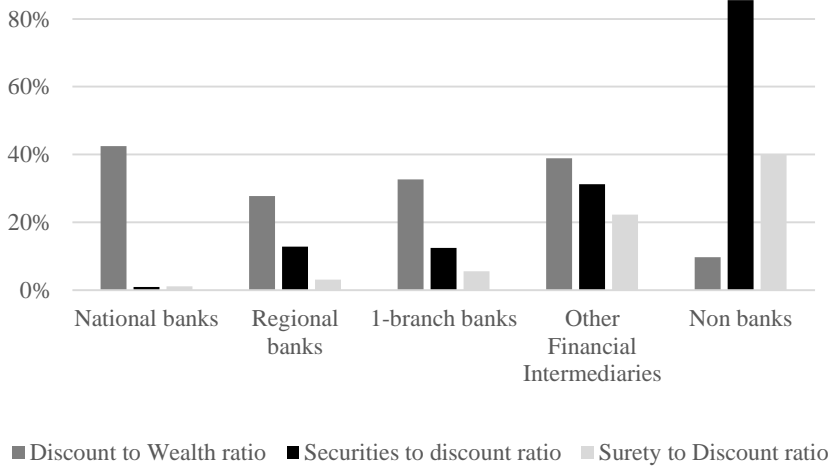

Figure 4: Wealth, Securities and Sureties compared to discount per category of counterparties. 1676 counterparties in 1898.
Source: Authors computation using data from Bank of France rapports d'inspection.
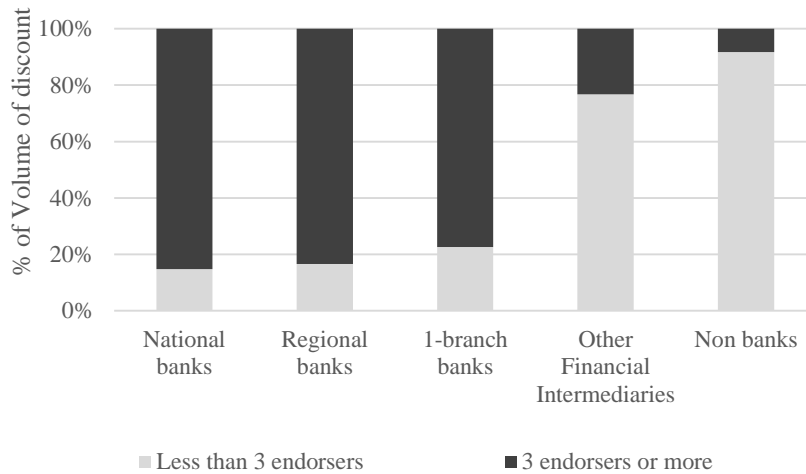
Figure 5: Distribution of discount per category of counterparties and of number of endorsers.
1676 counterparties in 1898.
Source: Authors computation using data from Bank of France rapports d'inspection.
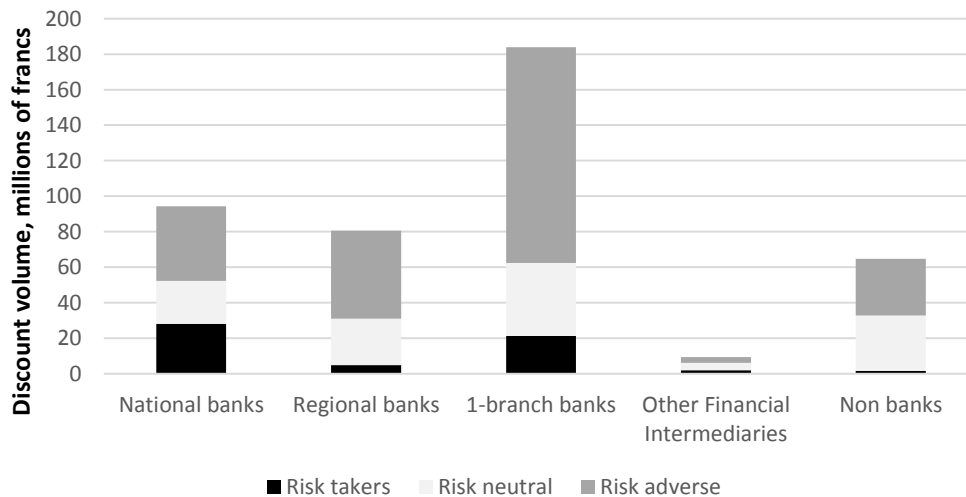

Figure 6: Distribution of discount volume per category of counterparties and of risk appetite.
1676 counterparties in 1898.
Source: Authors computation using data from Bank of France rapports d'inspection.

To assess quantitatively the risk management framework of the Bank, we next analyse the determinants of the discount decisions. 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).

$$d_{i,s} = \beta X_i + \gamma controls_{i,s} + \varepsilon_{i,s} \qquad (1)$$

Where d is the volume of discount received by each individual i received at the branch s, X_i is the matrix of the five types of individual guarantee (number of endorsers, surety, security, wealth and rating of risk appetite). Controls include individual variables such as dummies for profession categories, being a director of the branch and a branch level variable with a dummy per branch.

[table 1]

Table 1 displays the result of this analysis for the cross-section of counterparties in 1898. It shows that all type of guarantees were important and significant in the discount decision of Bank of France. The addition of one endorsement to the bills presented at the discount window increased the rediscount by

64.93 thousand of francs and increased the collateral ratio by 3%. Pledging 1,000fr securities increased the volume of discount of 300fr. Improving the rating of risk appetite increased the discount by 17,430fr. The coefficients are stable and significant whether we analyse the discount volume or the total exposure of the counterparties – including off-balance-sheet exposures. Improvements in rating of risk appetite are linked to smaller collateral ratio, which is coherent with the fact that this rating reward small risk to liquidity.

[table 2]

Table 2 presents the marginal effect of the different type of guarantees on the volume of discount. It shows that the addition of five endorsers increased the volume of discount by 399,400fr. An improvement of the rating of risk appetite allowed the counterparty to rediscount 11,680fr more. These variations applies mainly to banks. Other financial intermediaries and non banks who relied more on hard collateral such as securities and surety faced a smaller marginal effect when they pledged additional guarantees, e.g. pledging 183,070fr more of security increase the volume of discount by 54,000fr.

5. How was the risk framework used during crises period?

We now test how the risk management framework was used during a local crisis that hit one of the branch of the Bank in the 1890s. We want to know how the Bank used its information system to limit credit risk during a phase of broadening of the diversity of counterparties.

The crisis hitting the branch of Moulins originated in the agricultural sector which locally consisted mostly on fattening cattle. We show in figure 7 that the Bank accepted at the discount window a larger number of non-financial agents directly affected by the crisis as well as shadow banking without relaxing its standards or taking additional risks. Figure 7 presents the evolution of the discount at the branch of Moulins, as reported by supervisors. The total discount of the branch picked at the end of the 1890s. We identified the years of crisis thanks to reports on the local economy[26]. This increase of discount was characterized by the arrival of bills thought the local banks but also through direct discount of the agents most directly affected by the crisis i.e. the fatteners, as well as their direct supporters, the local landlords. Landlords were local wealthy agents who pledged their capital to rediscount bills drawn mainly on fatteners.
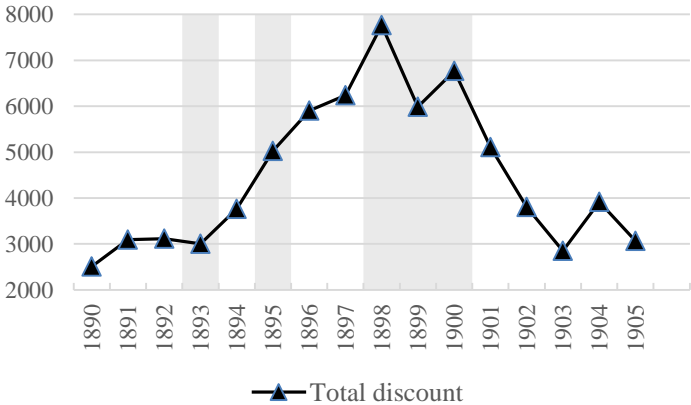

Figure 7: Total discount portfolio of Moulins' branch as reported by the supervisor, yearly.
Shaded area marks the crisis.
Source: Rapports d'inspection of Moulins, various years 1890-1905.

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[26] Source: ABDF Résumés mensuels des rapports des directeurs de succursales.

We check how the risk management framework reacted in case of crisis. We run a panel regression framework as described Equation (2), in which the left hand side variable is the volume of discount as given by the supervisory reports. This model is based on eq. (1) to which we add a dummy for the five years of crises and in which we interact the guarantees of discount with the crises.

$$d_{i,s} = \beta_1 X_i + \beta_2 Dcrisis + \beta_3 (Dcrisis_s * X_i) + \beta_4 controls_{i,s} + FE + \varepsilon_{i,s} \qquad (2)$$

Table 3 reports the result of this analysis. The first regression runs Eq.(1) on the panel data of Moulins and exhibits similar results, all five type of guarantees entering with positive and significant coefficients. In the second column, we show that the Bank of France increased its rediscount 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 3]

We investigate whether the lending of last resort is driven by the extensive or intensive margin. 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. We use the "mid-point" growth rates, as Davis, Haltiwanger & Schuh (1996), and compute them for discount for individual i at year t as $\Delta d_{i,t} = 2 * \frac{d_{i,t} - d_{i,t-1}}{d_{i,t} + d_{i,t-1}}$

Table 4 reports the results. Column (1) displays the results for the regression of the mid-point growth rate of discount for all counterparties at Moulins between 1890 and 1905 while the sample of column (2) excludes the counterparties that are always present throughout the period. We find that the variations of discount are mainly driven by the effect of the evolution of the counterparty base. In time of crisis, the counterparties of the Bank guaranteed their borrowing using securities as collateral, something that may be linked to the fact that many non-traders showed up at the discount window.

The extensive margin analysis is reported in column 3 to 6. Columns 3 and 5 compares for normal times the odd ratios of entering/exiting the pool of counterparties. $Entry_{i,t}$ and $Exit_{i,t}$ are equal to 1 when an individual enters (exits) the pool of counterparties discounting bills at the Bank of France at time t and equal 0 when the counterparty remains at the discount window with no movement.

In normal time, the odds of entering the pools of counterparties is about 1,7 greater for individuals with a better rating of risk appetite than for others. In such times, the addition to one endorsement on the bills presented in year $t-1$ is linked to an increase of 82% of the odds of stop discounting bills at the Bank of France in year t. This result indicates that financial intermediaries (who mostly used endorsements as guarantee of their bills see section 3) are volatile at the discount window in normal times.

Columns 4 and 6 compare the odds of entering/exiting between normal time and crisis years. An improvement of the rating is linked to an increase of 24% of the odds of entering in a year of crisis. This shows that the Bank of France rewarded risk adverse attitudes, especially in time of crises. Financial intermediaries have a greater tendency to stop using the discount facility in years of crisis than non-banks. As shown in column 6, the addition to one endorsement on the bills presented in year $t-1$ is linked to an increase of 106% of the odds of exit during a year of crisis against exiting a year of normal time.

[table 4]

Finally we perform a cross-section analysis of the impact of diverse negative productivity or income shocks on the discount activity at the Bank in 1898. We observe two main types of shocks: the arrival of the foot-to-mouth disease which affects several agricultural departments and the textile industry crisis coming the reduction of exports following the Spanish-US war in Cuba. Table 5 reports the results of the analysis, based on a cross-section of all counterparties. In districts hit the industrial shock, the addition of one endorsement is associated with an increase of the discount volume by 107,870 fr compared 69,710fr in departments not hit by a crisis; adding 1,000 Fr of surety is associated with an increase of 1,360 fr in districts hit against 440fr in others. In both types of crisis, a higher rating lowers discount by the Bank. A reason may be that the extensive margin plays a more important role in explaining the increase of discount volume in time of crises, consistently with results in table 3. When counterparties arrived at the discount window, they tend to have a "neutral" rating by the Bank, which on aggregate reduce the coefficient downward.

[table 5]

Conclusion

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, see for example Quinn and Roberds (2015) for historical evidence. Bignon and Jobst (2017) have exhibited one case in which a wider discount window stabilized better an economy hit by multiple income shocks.

But there is an equally important literature that emphasizes the risk associated with the operation of a wide discount window. Indeed banking and finance theory have insisted that the certainty of the access to the central bank in times of stress weakens market discipline and fuel moral hazard and hence future crises. This literature has characterized the situation in which this may occur. 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 of the wide access to its 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 tool that the central bank can use to check the moral hazard incentives of its counterparties, thus pining down the wideness of the discount window and hence the ability of the central bank to stabilize the economy following income shocks or in case of contagion across agents after a negative productivity shocks. 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. Similarly the absence of a regulatory definition of banks forbade the Bank to restrict its operations to the bank only, thus allowing a much more diverse set of counterparties at its discount window.

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Appendix

Table 1: The role of guarantees for discount decision in 1898

	(1) Discount	(2) Exposure	(3) Collateral ratio
# endorsers	64.93***	65.24***	0.03*
	(0.00)	(0.00)	(0.08)
surety	0.52***	0.51***	
	(0.00)	(0.00)	
securities	0.30***	0.31***	
	(0.00)	(0.00)	
wealth	0.04***	0.04***	
	(0.00)	(0.00)	
rating	17.43*	18.78**	-0.14**
	(0.06)	(0.05)	(0.04)
Controls	Yes	Yes	Yes
Adjusted R^2	0.708	0.708	0.032
Observations	1589	1589	1578

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 wincorized dataset of counterparties (wincorized by 1% of top and bottom for the variables discount, wealth, securities, surety and number of endorsers). All variables are defined at the individual level. Discount is the total of bills maturing within the next 3 months purchased by the bank of France from an individual. # endorsers is the number of endorsements of the presentation, surety is the sum of sureties supporting a counterparty, securities is the total of securities pledged against the presentation, wealth is the sum of real estate and financial assets and rating is the constructed grade of risk appetite. Controls includes dummies for each branch, dummies for each profession, 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. Column (2) displays the same regression, exchanging the left-hand side variable for exposure which is the sum of the bills presented at the discount window and endorsements taken by each counterparty (off-balance-sheet exposures). Column (3) has the same specification but the left-hand side variable is now the collateral ratio of each counterparty. Collateral ratio is the ratio of discount on the sum of surety, securities and capital. 11 observations are dropped from the main wincorized sample for having no surety, security or wealth recorded. p-values are in parentheses. ∗, ∗∗ and ∗∗∗ denote respectively statistical significance at the 10%, 5% and 1% levels. See section 2 for details on the data.

Table 2: Marginal effects of the guarantees on discount

VarName	Coefficient	Mean	St Dev	Marginal effect
Exposure		285.7	1073.97	
Discount		258.25	716.7	
Reputation	17.43	0.375	0.67	+11.68
# endorsers	66.93	2.132	5.48	+399.4
securities	0.3	55.143	183.07	+54.9
Capital	0.04	1052.354	2383.12	+95.3
Surety	0.53	25.030	107.69	+57.1
Share direct discount	35.26	0.145	0.334	+11.78

Table 3: The role of guarantees for discount decision in time of crisis

	(1) Discount	(2) w/ Crisis	(3) Crises x rating
securities	0.21**	0.21**	0.26*
	(0.03)	(0.03)	(0.05)
# endorsers	28.20***	28.47***	27.21***
	(0.00)	(0.00)	(0.00)
D.surety	76.97***	77.86***	78.54***
	(0.00)	(0.00)	(0.00)
L.wealth	0.14***	0.14***	0.13***
	(0.00)	(0.00)	(0.00)
L.rating	28.32**	30.08**	13.85
	(0.03)	(0.02)	(0.34)
D.crises		20.19*	3.96
		(0.07)	(0.76)
D.crises X L.rating			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 in Moulins between 1890 and 1905 according to pledged guarantees. Except the dummy for crisis, 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. Discount is the total of bills maturing within the next 3 months purchased by the bank of France from an individual. # endorsers is the number of endorsements of the presentation, surety is the sum of sureties supporting a counterparty, securities is the total of securities pledged against the presentation, wealth is the sum of real estate and financial assets and rating is the constructed grade of risk appetite. Rating and wealth 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 (securities, endorsers, surety and wealth). p-values are in parentheses. ∗, ∗∗ and ∗∗∗ denote respectively statistical significance at the 10%, 5% and 1% levels. See section 2 for details on the data.

Table 4: Analysis of the extensive margin

	1	2	3	4	5	6
	Δdiscount	Δ discount unstable	Entry years no crises	Entry x crises	Exit years no crises	Exit x crises
D.crises	0.55***	0.55***				
	0.00	0.00				
securities	0.00	-0.00	-0.00	0.00	0.00	-0.00
	0.66	0.89	0.18	0.36	0.65	0.24
# endorsers	0.04***	0.05	-0.31***	-0.07	-0.20*	0.36*
	0.00	0.16	0.00	0.90	0.05	0.06
D.surety	0.99***	1.04***	-1.04***	-0.11	-0.70***	1.47**
	0.00	0.00	0.00	0.78	0.00	0.02
rating	0.29***	0.32***	0.53***	-1.43***	-0.21	-0.17
	0.00	0.00	0.00	0.00	0.33	0.64
wealth	0.00***	0.00***	0.00	-0.00	0.00	0.00
	0.00	0.00	0.41	0.38	0.12	0.98
rating*crises	-0.22	-0.24				
	0.12	0.13				
#endorsers*crises	-0.01	-0.03				
	0.69	0.52				
securities*crises	0.00*	0.00**				
	0.05	0.04				
D.surety*crises	-0.05	-0.04				
	0.75	0.81				
wealth*crises	-0.00***	-0.00***				
	0.00	0.00				
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted /pseudo R^2	0.324	0.335	0.053	0.096	0.026	0.071
Observations	903	858	562	180	577	146

This table reports analyses on the extensive margin of the discount volume granted by the Bank of France to its counterparties in Moulins between 1890 and 1905 according to pledged guarantees. Except the dummy for crisis, all variables are defined at the individual level. The panel unbalanced and composed by 136 individuals.

Column (1) displays the results of a panel regression with fixed effects per occupation of the growth rate of the discount on the guarantees. Column 2 shows the coefficients for the same specification on the dataset that exclude the individuals present during all the period. Thus it studies the extensive margin. The columns 3 to 6 displays results for logit regression with different dummies on the left hand side of the equations. The model of column 3 test the probability of entering the pool of counterparties during normal time, the dummy codes 1 if an individual starts/return discounting at the discount window between 1891-2, 1894, 1896-7, 1902-1905 and 0 if the individual is discounting for a second or more consecutive year outside years if crises. Column 5 performs the same test but examining individual who stop discounting at the Bank. Column 4 compares the entry during years of crises and the entry during normal time, the dummy codes 1if an individual start discounting at the Bank during a year of crisis and 0 if he starts discounting during normal times. Column 6 performs the same test but for those who stop discounting at the Bank. In the models 5 and 6, the right-hand side variables are all lagged by one year. Controls for all regression a dummy correcting for seasonal variation (if the supervisory report is written during low agricultural season). P-values are reported under the coefficients. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels. See section 2 for details on the data

Table 5: Impact of different shocks on the discount activity

	(1) Discount	(2) Exposure
# endorsers	69.71***	70.23***
	0.00	0.00
surety	0.44**	0.44**
	0.04	0.04
securities	0.28***	0.29***
	0.01	0.01
rating	38.16***	41.28***
	0.00	0.00
wealth	0.04***	0.04***
	0.00	0.00
fatteners crisis	21.44	29.24
	0.36	0.22
surety*crisis fat.	0.09	0.07
	0.74	0.78
rating*crisis fatteners	-78.31***	-82.08***
	0.00	0.00
#endorsers*crisis fat.	-19.83**	-19.94**
	0.01	0.01
wealth*crisis fat.	0.01	0.01
	0.57	0.64
textile crises	-15.48	-11.90
	0.81	0.86
surety*textile crises	0.92**	0.91**
	0.02	0.02
rating*crisis textile	-74.17**	-82.81**
	0.04	0.02
#endorsers*textile crises	38.14**	37.97**
	0.04	0.04
wealth*textile crises	-0.03*	-0.03**
	0.06	0.04
Adjusted R^2	0.714	0.715
Observations	1478	1478

Discount is the total of bills maturing within the next 3 months purchased by the Bank of France from an individual. Exposure is the sum of the discount from this individual and the guarantees provided by this individual to other bills presented at the discount window (off-balance-sheet exposures). The discount, wealth, securities and surety variables are wincorized from the top 1% and bottom 1% (as is the number of endorsers). All variables are defined at the individual level except the crisis variables that are at the branch level. Crisis is a dummy equal to 1 if the branch had reported that a local industry is hit by an income or productivity shock. A fattener crisis is triggered by the badmouth disease. An industrial crisis is triggered by the impact of the Spanish-US war in Cuba and hit the textile industry. Controls includes a set of dummies for each central bank branch, dummies for each profession, a dummy for banking crisis and the related interactions, a dummy for being a director of the branch and a dummy for including female relatives in the business. Are also included a dummy for banking crises is triggered by a run on deposits suffered by a local bank and the interactions between the banking crises and the guarantees. P-values are reported under the coefficients. *, ** and *** denote respectively statistical significance at the 10%, 5% and 1% levels. See section 2 for details on the data.