FLOATING A "LIFEBOAT":
THE BANQUE DE FRANCE AND THE CRISIS OF 1889

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ABSTRACT

When faced with a run on a "systemically important" but insolvent bank in 1889, the Banque de France pre-emptively organized a lifeboat to ensure that depositors were protected and an orderly liquidation could proceed. To protect the Banque from losses on its lifeboat loan, a guarantee syndicate was formed, penalizing those who had participated in the copper speculation that had caused the crisis bringing the bank down. Creation of the syndicate and other actions were consistent with mitigating the moral hazard from such an intervention. This episode contrasts the advice given by Bagehot to the Bank of England to counter a panic by lending freely at a high rate on good collateral, allowing insolvent institutions to fail.

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1. Introduction

In this paper, we recover the history of the Crisis of 1889, when the Banque de France (BdF) quickly intervened, ensuring that a run on the Comptoir d'Escompte (CdE), one of the largest banks in France, did not turn into a general panic. The remedy for this banking crisis, the most severe in late nineteenth century France, was not a pure British Bagehot-style lender of last resort operation (LOLR) but a divisive and contested intervention, resembling more a modern "lifeboat" or "bailout" operation, supplemented by additional liquidity for the market. By providing loans to the insolvent CdE, the BdF guaranteed that depositors would have continued access to their accounts while the bank was liquidated in an orderly fashion and a new bank was formed and capitalized. Similar modern interventions, such as the rescues of Long Term Capital Management in 1998 or Bear Stearns in 2008, have led critics to complain that central banks that deviate from Bagehot's rule create moral hazard, inducing greater losses in subsequent crises. Yet, in contrast to the modern experience with lifeboats the BdF and the Ministry of Finance, backed by the contemporary French legal system, took prompt actions in 1889 that had the potential to mitigate this problem. Banks, including their management and directors, that had contributed to the debacle were quickly compelled to absorb losses arising from the collapse of the CdE; many officials were purged; and other penalties imposed. This strong response may have contributed to the absence of major crisis in France for the next quarter century.

This type of central bank intervention would appear to be ruled out in the U.S. today. In reaction to the Federal Reserve's lending programs during the financial crisis of 2008, the Dodd-Frank Act of 2010 altered Section 13(3) of the Federal Reserve Act that had, since 1932, given the Fed discretionary authority to lend to "any individual partnership, or corporation" in "unusual and exigent circumstances." The Fed used this authority beginning with the Great Depression

through the Crisis of 2008 (Fettig, 2008), though there were long-standing complaints that it had been misused (Schwartz, 1992; Goodfriend, 2012). Emergency assistance in Section 13(3) now requires that the Board of Governors consult with the Secretary of the Treasury, before implementing a new lending program, which should provide liquidity to the financial system, not aid an insolvent or failing firm and be collateralized sufficiently to protect taxpayers (U.S. Senate, 2010; Office of Inspector General, 2010). While this policy shift implies that there is no case to be made for pre-emptive intervention with insolvent firms, the French experience in 1889 may suggest otherwise.

After reviewing the extant literature, we describe the origins of the crisis, arising from an effort to control the world copper market and measure the damage inflicted on the CdE. In the third section, we examine whether the run on the bank had begun to spread before the authorities intervened and detail the debate at the BdF and Ministry of Finance over the plan to rescue the CdE. Next, we show that the BdF's intervention was primarily a lifeboat operation with modest extra liquidity supplied to other banks and the markets. Fifthly, we analyze the determinants of membership in and contributions to the guarantee syndicate, intended to absorb losses from the lifeboat operation, finding that, in addition to capacity to pay, responsibility for the debacle was an important factor. In the final section, we discuss the penalties imposed in the aftermath of the crisis that may have minimized the moral hazard arising from the BdF's actions.

2. A Lost Episode

Our article seeks fill an important gap in the literature of the evolution of the lender of last resort (LOLR) function of central banks, drawing on archival materials at the BdF and other primary sources. Often influential in contemporary policy debates, historical evidence on how a central bank should operate as a LOLR is primarily informed by the classical view of the Bank

of England (BoE), first put forward by Henry Thornton (1802) and reaffirmed by Walter Bagehot (1873). They ordained that a central bank should respond to a financial crisis by lending freely at a high rate of interest on all good collateral, preventing illiquid but not insolvent banks from failing. Summarizing this view, Humphrey (1975) and Bordo (1990) point out that it was not the duty of the LOLR to prevent financial shocks but neutralize them once they had occurred by preventing the spread of a panic from failing insolvent institutions to sound ones. To be successful, a central bank must clearly state its policy in advance and follow through consistently. .

Recent research on the BoE has identified when and how it became a LOLR. Before the Overend-Gurney Crisis of 1866, the Bank rationed credit, exacerbating panics. Afterwards, it set the bank rate above the market rate, providing loans to all that had good collateral, as determined by the Bank's meticulous bookkeeping (Bignon, Flandreau, and Ugolini, 2012; Flandreau and Ugolini, 2013). With more limited data, Bignon, Flandreau, and Ugolini (2013) also find that after the 1850s, the BdF's discount policy followed a similar evolution. But, central banks did not simply follow Bagehot's advice in the late nineteenth century. Unfortunately, the secondary literature on the BoE has paid little attention to the lifeboat operation during the 1890 Barings crisis. Clapham's (1945) classic history provides the most detailed but still very limited account. Calomiris (2011) correctly recognized its importance in a brief passage, with Giannini (2011) suggesting that support for the CdE in 1889 was a model for the BoE's action the following year. In France, the first major lifeboat was launched to rescue the Paris Bourse in 1882 (White, 2007).

Contemporaries were aware of the dangers of such actions, and the 1889 lifeboat provoked an intense debate by policy makers on the proper role for a LOLR.[1]

Researchers curious about the BdF as a LOLR might reasonably turn to the studies of the U.S. National Monetary Commission (1909-1912), prepared as the U.S. Congress considered the establishment of the Fed. Two volumes treat the BdF; yet, the first (Liesse,1909) gives only a cursory description of the 1889 rescue and the second (Patron, 1910) omits it entirely, which may have led modern authorities on central banking (Goodhart, 1988; Grossman, 2010) to offer only brief comments on the 1889 episode. Direct evidence on the BdF as a LOLR is found in the Commission's interview with the Governor of the BdF, Georges Pallain, conducted by Benjamin Strong---later President of the New York Fed. Pallain was asked: "Does the amount and the character of credit granted to other banks depend on the amount and the character of their accounts at the Bank of France?" He answered, sounding very much like Bagehot:

> There is no fixed rule, and although the balance of the account is not a matter of indifference, it is more especially the quality of the paper presented which fixes the extent of the credit. In periods of crisis in 1830, 1848, in 1870 in 1889, the general council of the Bank did not hesitate to come to the assistance of establishments which were in difficulties, but which held assets of unquestioned character and value, by extending to them the largest possible credits (Aldrich, 1910, p. 207).

The Governor may have been citing the BdF's statutes, but they were *not* the rules the BdF played by during the Crisis of 1889, as the CdE was deeply insolvent.

The French literature is not much more illuminating. Published in an obscure mining journal, the best study of the events leading to the collapse of the CdE is by Bertrand Gille (1968). Yves Mollier (1991) provides further details, mixing facts and allegations; but neither he

[1] See for example, Banque de France, Conseil Général, procès-verbaux, March 1889. These are the minutes of the the Council of Regents, the BdF's board of directors. Debate also broke out in the Chambre de Commerce et d'Industrie de Paris, March 20, 1889, Archives de la Chambre de Commerce et d'Industrie, Box 2ETP/1/A 25".

nor Gille treat broader questions of monetary policy. The volumes published on the bicentenary of the BdF (Feiertag and Margairaz, 2003) make only passing references to this crisis. The most recent BdF history by Yves Leclercq (2010) devotes a scant nine pages to the management of crises, and his coverage of the CdE skirts the LOLR issue.[2]

The BdF's very success at preventing the run on the CdE, which today would be termed a "systemically important financial institution"—a "SIFI"—from creating a panic may be responsible for its low historical profile. We reconstruct this history from contemporary records, most notably from the archives of the BdF and the other leading banks, and new data from a variety of long-overlooked sources.

3. A Scheme to Corner the Copper Market, Its Failure, and the Crisis

In the 1880s, the French banking industry was split into two basic groups: (1) the large limited liability banks that raised substantial funds from deposits and engaged in a wide range of commercial and investment banking activities - Crédit Lyonnais, Société Générale, the CdE, and the Banque de Paris et de Pays-Bas (BPPB), dominated this group; and (2) the private banks that focused on merchant and investment banking, financed mostly by capital- the biggest private banks were known as the *haute banque*, led by the Paris House of Rothschild. In this period, there was no deposit insurance or implicit guarantees of banks, and rumors of a bank's troubles could cause a run. As the economy had been in the doldrums since the stock market crash of 1882 (Bouvier, 1960; White, 2007) with real GDP failing to reach its previous peak until 1888 (Lévy-Leboyer and Bourguignon, 1990), banks saw their profits squeezed and shareholders their dividends shrink. The weakness of the economy was mirrored in the unsettled politics of the

[2] Niall Ferguson's history of the Rothschilds (1999), only mentions the CdE and misleadingly credits Rothschild with prompting the Banque de France to "avert a complete collapse."

French Third Republic. The government hoped that the Universal Exposition of 1889, marking the centennial of the French Revolution and scheduled to open on May 6, would showcase its economic potential and political accomplishment.

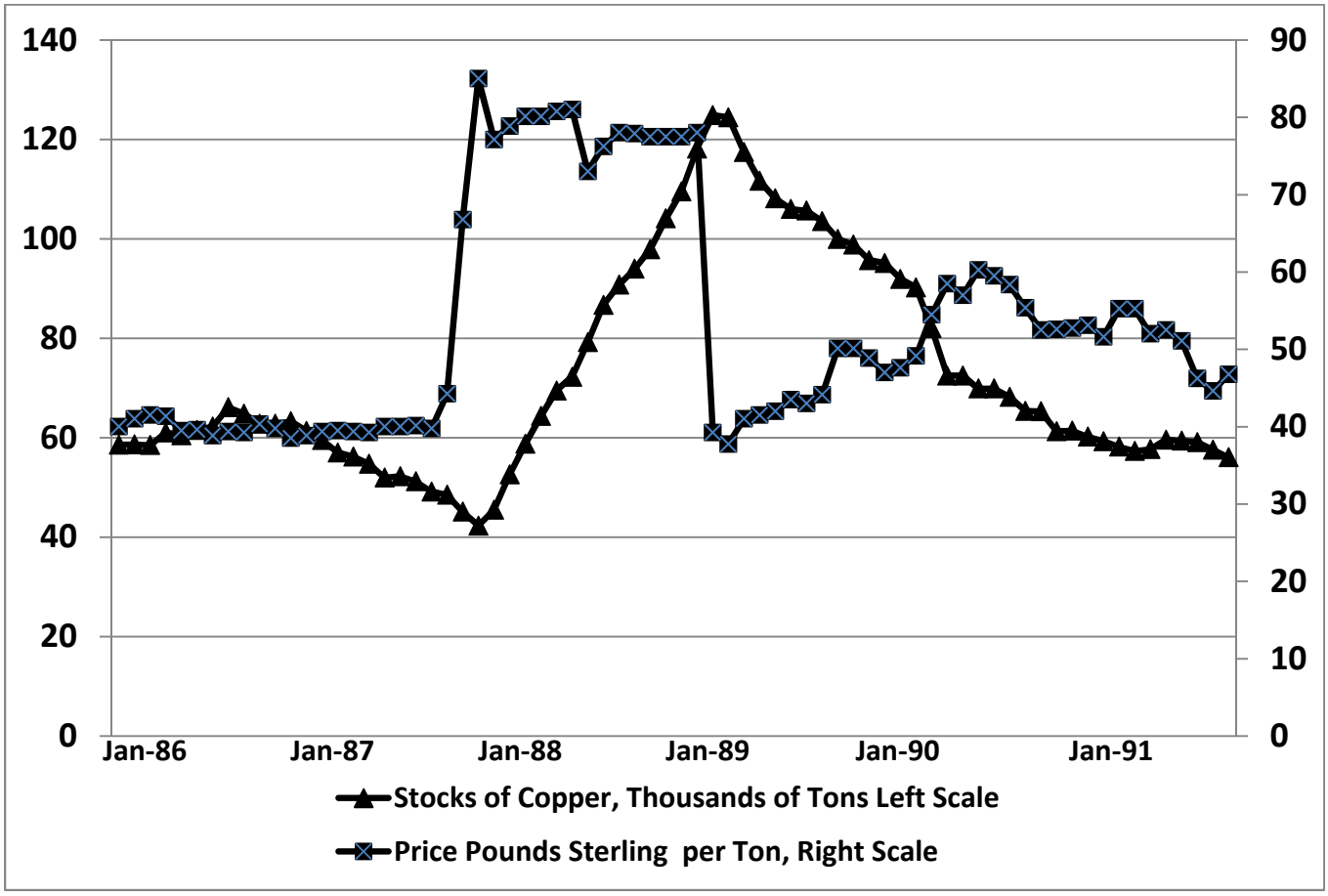
The Crisis of 1889 had its origins in the efforts of Pierre-Eugène Secrétan to forge a worldwide monopoly of copper. Secrétan, an innovative engineer, was co-founder and CEO of the Société Industrielle et Commerciale des Métaux (SdM), a leading industrial concern. His acquisitions of existing copper stocks and purchases of contracts for future delivery from mines were widely known and discussed in the press, even though the details of his machinations remained obscure and the subject of rumors. In essence, the SdM became a highly leveraged commodities company that used off-balance sheet derivatives to speculate in copper.

Industrial and agricultural demand for copper had expanded rapidly during the 1880s. New uses were found for copper, from cables for transmission of electricity to copper sulfate to battle the scourge of phylloxera in the vineyards. World production increased from approximately 20,000 tons per year in the middle of the century to 250,000 tons by 1888. Although Chile and Australia had traditionally been the dominant suppliers, an increasing share of production came from the U.S., where new mines were opened in the 1880s. In spite of an increasing demand, these new supplies drove prices down from over £70 a ton in the early 1870s to £40 a ton in 1886.

In September 1887, Secrétan organized a syndicate composed primarily of members of the *haute banque* to provide credit to purchase existing stocks of copper. Purchases drove up prices from £40 per ton to over £80 by December 1887. As seen in Figure 1, British and French copper stocks began to rise. If support for Secrétan's scheme had remained within a circle of metals companies, wealthy investors and private investment banks, there would have been large

losses if the price crashed, but it is unlikely there would have been a banking crisis. However, Secrétan began to draw upon the support of the commercial banks. Their aid was essential, as the modest capital of the SdM did not provide a credible guarantee to buy the copper when the futures contracts fell due; hence, guarantees from the banks were necessary.

Figure 1
Copper Prices and Stocks, 1886-1891.



Source: Archives of Crédit Lyonnais. "Statistics of copper", from Henry Merton & Co.

Normally, commercial banks would not have funded commodities speculation on a grand scale, as their obligation to depositors mandated a lower tolerance for risk than the *haute banque* had; but the overlapping management relationships between the SdM, private banks, commercial banks, and the BdF created conflicts of interest. The opportunity to profit from the copper

scheme induced some of the conflicted parties to take advantage of the information asymmetries vis-à-vis their boards, shareholders and the public and bring the resources of their institutions to Secrétan's assistance. Most notably, the CdE provided substantial on-balance sheet credits for warehoused copper and vast off-balance sheet guarantees for the SdM's forward contracts. The bank was compromised because its president, Eugène Denfert-Rochereau, was seduced by Secrétan with the connivance of the chairman of the board, Edouard Hentsch, of the *haute banque* firm of Hentsch frères et Cie and other board-members involved in the copper scheme. All stood to gain considerably as individuals, while the CdE pleased its shareholders by maintaining its dividends even as other banks cut back. The next most seriously compromised bank was the BPPB, where Edouard Joubert, member of the syndicate in his own account, was vice-president.

Although there were knowledgeable copper scheme insiders at the BdF, they failed to inform all the members of the Council of Regents. The connections between the officials of the banks and the regents of the BdF did not necessarily raise alarms because they could also be viewed as beneficial, providing the central bank with important intelligence about the condition of the banks. However, the temptation to profit hugely from the rise in copper prices seems to have led some compromised regents and auditors to remain silent, buying shares in mining companies and the SdM when it doubled its capital in 1888.

BdF's insiders could have revealed the increasingly dangerous condition of the CdE and the SdM when they participated in the BdF's quarterly examination of its major borrowers.[3] In the first report of the year, on February 23, 1888, the condition of the SdM was examined by Alphonse de Rothschild who remarked that it was "a serious business conducted with

[3] Borrowers included banks and businesses. The results of this survey were inscribed as the minutes of the Conseil Général. This report or *vérification* recorded the credits outstanding to each borrower, basic capital, a simple rating and some comments. The Regents rotated surveillance, perhaps to improve monitoring.

intelligence."[4] In the next report on March 24, Rothschild commented favorably on the CdE. Left uninformed by these examinations, the "outside" regents slowly gained a window on the copper scheme through the BdF's exposure to copper warrants---loans to the SdM collateralized by warehoused copper that were guaranteed by the signature of a bank. These warrants were part of the BdF's regular lending; but it granted an exceptionally large request on May 18, 1888 after an appeal by Georges Girod, a director of both the SdM and the CdE (Banque de France, Conseil Générale, 18 mai 1888). Girod was no stranger to the Régents, as he was a partner of the regent Alfred André in André, Girod et Cie. The SdM was offered a line of credit of 52 million francs for 40,000 tons of copper, valued at 1300 francs per ton (65% of the market price) with the BdF noting the unusual nature of the loan.

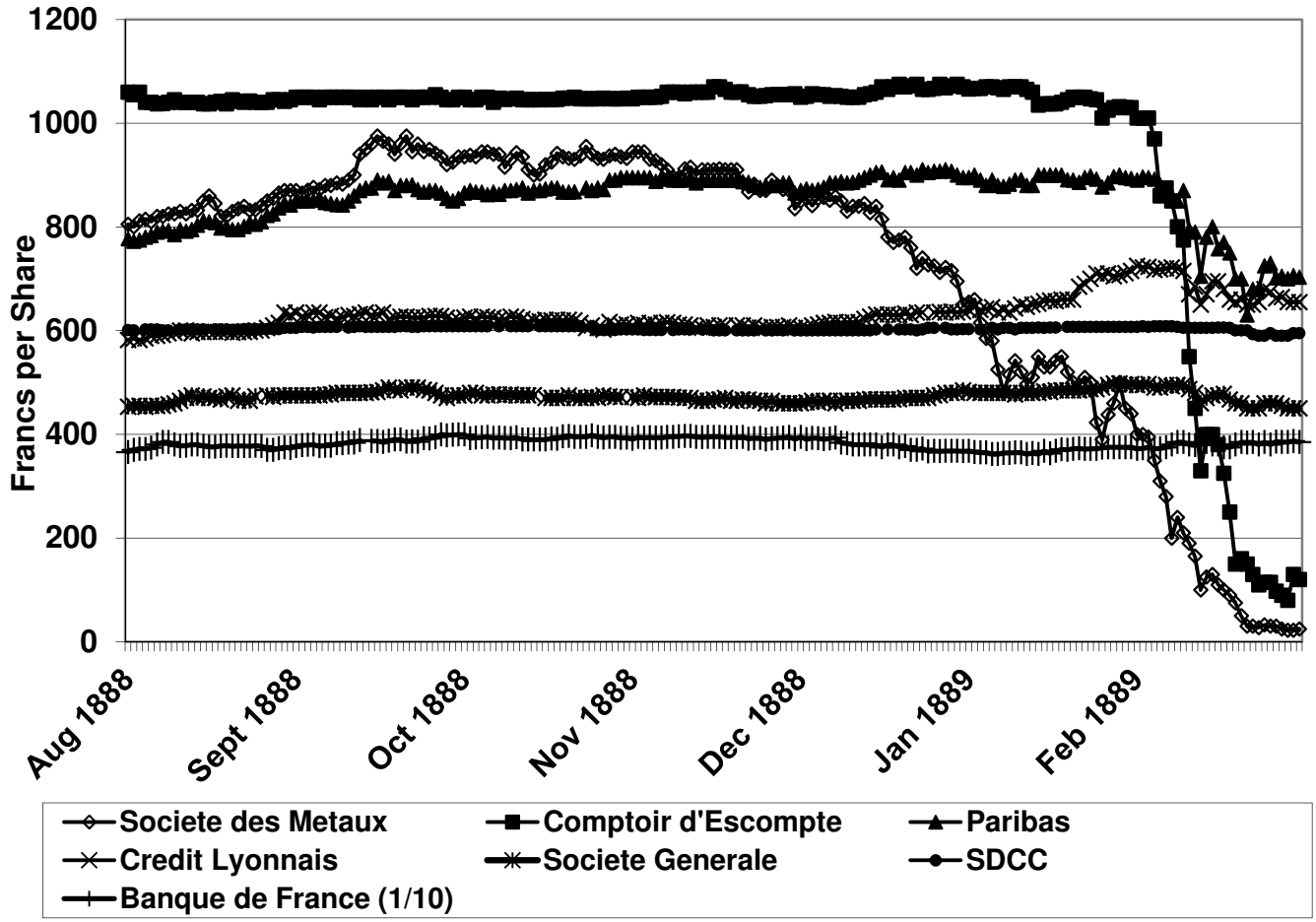
In spite of Secrétan problems in obtaining additional finance to sustain the price of copper, the market did not register any apprehension throughout the summer and fall of 1888. As evident in Figure 2, the public did not perceive that there was any danger to the banks. All bank stocks, even those of the CdE and the BPPB, remained essentially flat for the rest of the year. The SdM reached a peak of 975 francs in September 1888 and drifted down towards 900 at years end, reflecting the rising stocks of warehoused copper in Figure 1 that the market observed.

Nevertheless, falling prices for the SdM's stock made the BdF apprehensive, given its large advances to the SdM, collateralized by copper warrants. As these fell due in late 1888, some banks refused to renew their guarantee and the CdE stepped in to provide a signature. The regents took note of the CdE's growing disproportionate share of guarantees. Further alarms were sounded when copper began to dip in February 1889 and Sécretan, desperate for more

[4] Banque de France, Conseil Général, Procès-verbal de la séance du 23 Fevrier 1888. The role of the Rothschild was the subject of fierce debate, being accused of motivating the syndicate and then provoking the crisis by withdrawing to eliminate a rival.

funds to sustain copper prices, tried to organize the Compagnie Auxiliaire des Métaux, which was quickly seen to be a shell company, with little new equity.

Figure 2
Share Prices for Banks and the Société des Métaux.
August 1888-March 1889



Source: Compagnies des Agents de Change de Paris, 1889. Bulletin de la cote. Cours Authentique et Officiel. Paris, for August 1888-March 1889
Note: The price of the stock of the Banque de France is divided by ten to fit on the graph.

On February 27, 1889 several regents asked the Governor, Pierre Magnin to interview Joubert and Girod about the warrants. The following day, the Governor reported that quality of these credits were declining; and Rothschild proposed to send telegrams to the American mines to request a renegotiation of the forward contracts, announcing that he had lent the CdE 6 million

francs to meet rising withdrawals. Magnin promised to interview Denfert-Rochereau and obtain answers to a detailed written questionnaire. On March 2, 1889, the Governor presented the results of his meeting with Denfert-Rochereau, showing that the CdE had sustained huge losses. It was a rude shock. The BdF was owed 78.8 million francs by the CdE. Then, on March 5, 1889, Denfert-Rochereau committed suicide; and a full-scale run hit his bank

Table 1 presents estimates of the losses sustained by the CdE, using three sources. In addition to Denfert-Rochereau's March 1, 1889 declaration to the Governor of the BdF, two other documents provide measures of the CdE's problems: the April 13, 1889 balance sheet of the SdM given to the Judicial Tribunal on March 21, 1889 by Secrétan for the bankruptcy procedure and the April 29, 1889 estimate of the CdE's liquidators, Moreau and Montchicour.

Panel A of Table 1 gives an estimate based on the March 1 information. Line 1 represents the credits of the CdE, largely discounts on copper warrants to the SdM. In addition, the CdE was liable for the SdM's copper warrants that were discounted at the BdF because it had given a guaranteeing signature. This obligation is shown on line 2; so that the total obligation of the SdM to the CdE was 96.2 million francs (the sum of lines 1 and 2). Line 3 shows the total liabilities and capital of the SdM, 276.3 million. From this sum, the credits from the Compagnie Auxiliare de Métaux in line 5 and the SdM's equity capital in line 4 need to be subtracted. The debt of the SdM to outside creditors was thus 224.6 million francs, as seen on line 6. The 96.2 million francs due to the CdE represented 43% of this total, shown on line 7. Against these liabilities, the SdM had 154,900 tons of copper (line 8), which if valued at the March 1st price of £40 per ton, represented assets of 156.1 million francs listed on line 9. If we suppose that the CdE's share of this collateral is the same as its share in SdM's debts (an optimistic hypothesis), the CdE's share of these assets would be 66.9 million francs on line 10. Then the loss to the CdE

Table 1
Losses to the Comptoir d'Escompte.
(millions of francs, unless otherwise incated).

	Panel A	
1	CdE credits to SdM	68.1
2	SdM Warrants Guaranteed by CdE	28.1
3	Total Liabilities and Capital of SdM	276.3
4	Capital of SdM	37.4
5	Debt to CAM	14.3
6	Debt of SdM to outside creditors (3-4-5)	224.6
7	Share of CdE (1+2)/6	43%
8	SdM's copper (tons)	154,900
9	Value of (8) at £40 per ton	156.1
10	CdE share of copper (7*9)	66.9
11	Direct Loss to the CdE (1+2-10)	29.3
	Panel B	
1&2	CdE credits to the SdM	116
6	Total Liabilities of SdM	300.4
4a	Unsecured junior debt	43.7
6a	Debt of SdM to secured creditors (3-4)	256.7
7	Share of CdE (1/6)	45%
8	SdM's copper (tons)	124,000
9	Value of (8) at £43 per ton	136
10	CdE share of copper (7*9)	61.5
11	Direct Loss to the CdE (1&2-10)	54.5
	Panel C	
1&2	CdE credits to the SdM	146.5
9a	SdM's copper (tons) serving as collateral	67,827
9	Value of (9a) at £40 per ton	67.8
11	Direct Loss to the CE (1&2-9)	78.7
11a	Additional "minor" losses	2.9
11b	Total Direct Loss to the CdE	81.6
	Guarantees for forward contracts	
13	To be delivered in 1889 (tons)	43,900
14	To be delivered in 1890 (tons)	52,700
15	Indirect CdE Loss if Guarantee for £70 and market price is £40	115.9
	Total Loss including guarantees	
16	Total Loss (panel A)	145.2
16	Total Loss (panel B)	170.4
16	Total Loss (panel C)	197.5

Sources: Banque de France, Conseil Général, Procès-Verbal March 1, 1888. Archives, Banque de France. Moreau and Montchicour, April 29, 1889.

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was 29.3 million francs. In addition to these direct losses, the CdE had also guaranteed payment at approximately £70 per ton for the SdM of the delivery of large quantities of copper in 1889 and 1890 (lines 13 and 14), which if the copper were only worth £40 per ton when delivered would cause a loss shown on line 15 of 115.9 million francs. The total potential loss for the CdE was thus 145.2 million francs on line 16.

Panel B estimates the losses of the CdE, based on the April 13 balance sheet provided by Secrétan to the Judicial Tribunal. Total credits of the CdE to the SdM in lines 1 and 2 were estimated to be higher, 116 million francs. Total liabilities of the SdM were now set at 300.4 million (line 6), which when the unsecured junior debt (line 4a) is subtracted, leaves the secured debt of the SdM to outside creditors (line 6a) at 256.7 million francs. Line 7 reports the CdE's share, 45%. The copper holdings of the SdM in line 8, if valued at £43 ,the price on April 13th, would give it assets of 136 million francs, shown on line 9. The CdE's share of these assets would be 61.5 million francs on line 10 (again assuming its credits are as well secured as the average secured creditors), leaving a direct loss to the CdE of 54.5 million shown on line 11 of Panel B, nearly double the direct loss in Panel A. If added to the indirect loss of 115.9 million from line 15, the total loss would be 170.4 million francs on line 16 for Panel B.

Both of these estimates of losses---145.2 million and 170.4 million francs---would have easily wiped out the CdE's 80 million francs of capital, but only if the mines' contracts were not restructured, something the French participants had been seeking unsuccessfully in the last month before the collapse. On the other hand, both rely on data provided by interested parties—Secrétan and Denfert-Rochereau—whose incentive was to minimize their losses. The picture from the *liquidateurs* was much worse, as seen in Panel C. Credits of the CdE to the SdM were higher on lines 1 and 2, 146.5 million francs. The collateral of the CdE credits, on line 9a,

valued at £40 in line 9, implied a direct loss on line 11 of 78.7 million, to which another 2.9 million losses should be added (line 11a) for a total direct loss of 81.6 million (line 11b)---which alone would wipe out the CdE's 80 million francs of capital. If the guarantees from line 15 are added, the total direct and indirect losses would reach 197.5 million francs on line 16 for Panel C. The CdE's credits to the SdM of this last panel seem to be in line with the estimates of the auditor appointed by the court hearing lawsuits following the crisis. According to these estimates, the CdE's credits to the SdM on December 31, 1888 were 172.2 million francs. Noting that the SdM's position vis-à-vis the CdE did not change significantly in the first three months of 1889, the auditor relied on the liquidators' estimates[5].

Consequently, in most optimistic case, the CdE needed the guarantees to be abandoned in order to survive; in the second one it had to be liquidated even if the guarantees were to be abandoned; in the third and more likely case, it was deeply insolvent. Depositors rightly fled, when knowledge of this situation become public. .

4. The Creation of a Lifeboat

On the evening of March 7, 1889 following two days of steady withdrawals of deposits and a failed private attempt to raise support for the CdE, the Minister of Finance, Maurice Rouvier, summoned the Governor and leading bankers to his office.[6] Although there are no records of this late night meeting, it was certainly tense, lasting from 10 p.m. to 2 a.m. The Minister was blunt: if the CdE did not receive 100 million francs before opening, the rising number of withdrawals would force it to stop payments. The Minister expected the BdF to lend 100 million francs, with the CdE's entire assets serving as a guarantee. This request was in

[5] Rapport de M. Flory au Procureur Général de la République (August 31, 1889), p. 51 and 56, box 132 AQ 117 3, Archives Rothschild, Archives Nationales du Monde du Travail (Roubaix).
[6] Banque de France, Conseil Général, Procès-verbaul de la séance du 7 mars 1889.

violation of the statutes of the BdF, which required that discounts only be provided for three name paper or two name paper collateralized by the highest quality securities. To protect the BdF against potential losses, the Minister required the formation of a syndicate of banks to absorb any losses up to 20 million francs.

At 9 a.m. the following morning, Friday, March 8, 1889, an hour before banks opened for business, the Governor convened an extraordinary meeting of the regents[7] He read a letter from the Minister who insisted they act. An influential regent, Frédéric de Pillet-Will interrupted to ask what collateral would be provided. The Governor responded that it would be notes issued by Secrétan on the SdM and endorsed by the CdE, revealing it was dubious collateral not permitted by the BdF's statutes. To justify this extraordinary exception, Magnin argued that the bank's failure would be a terrible blow to the French economy. The minutes summarized his argument:

> There is no doubt that this imposes a heavy obligation on the Banque, but M. le Gouverneur hopes that the good faith shown to the Comptoir would ease that responsibility and that the Banque would be rewarded for its self-sacrifice and confidence. He chose the word good faith because a moral guarantee [underlined in the minutes] is, perhaps, what is required. A standard approach is not sufficient. If the Banque agrees to come to the aid of the Comptoir under these conditions, it will have rendered a great new service to the Parisian financial market, business in general, and the nation.[8]

Following this declaration to aid an insolvent institution, the Governor faced hostile questioning rarely seen in the minutes of the Council.

The industrialist Fernand Raoul-Duval observed that some of the guarantors for the BdF loan were "notoriously involved in the copper syndicate" and asked whether there was reason to fear that the collateral was inadequate. This question was inflammatory, given that some of the signatories were regents' banks. One target, André, responded simply that the guarantees were

[7] Banque de France, Conseil Général, Procès-verbal de la séance extraordinaire du Vendredi 8 Mars 1889, à 9 heures du matin.
[8] Banque de France, Conseil Général, Procès-verbal de la séance extraordinaire du Vendredi 8 Mars 1889, à 9 heures du matin.

sufficient. Next, Pillet-Will spoke of the great risk to which the BdF would be exposed by this credit and pointed out that even if the CE's assets were acceptable as collateral, their transfer to the BdF might be contested by other creditors. He estimated that a guarantee of 75 not 20 million francs was necessary. André countered that it was impossible to follow the rules; the key was to stop the panic. Opponents of the Minister's proposal demanded further assurances for the BdF, but supporters argued that there was no time left. When the proposal was put to a vote, eleven regents voted for and four against, barely reaching the required super majority for the motion to pass. The defeated regents were enraged. Pillet-Will felt that he and the BdF had been betrayed by the insiders---including Rothschild. In an act without precedence since the founding the Banque, Pillet-Will resigned in protest: after three generations, his family;s bank now no longer had a representative on the Council of Regents..

The CdE quickly drew on its loan to meet the demands of depositors, taking 94 of the 100 million francs by March 15. 1889.[9] Even though it was initially believed that the CdE had sufficient good assets to cover any liabilities beyond the 100 million franc loan, it became obvious there was a gaping hole in its balance sheet. On Saturday, March 16, 1888, the Governor and representatives of the leading banks were again summoned to a meeting at the Ministry of Finance. The bankers were informed that the Minister wanted the creation of a new institution to replace the CdE and that a new 40 million francs loan from the BdF was required to prevent the CdE bank from collapsing. For this credit, there would be a new guarantee syndicate of banks to cover the first 20 million francs of losses.[10] Another extraordinary meeting of the regents was called the next day, Sunday, March 17, 1889. Bowing to the Minister, the Council

[9] Banque de France, Comité des Livres et Portefeuilles, Procès-verbal, 13 et 15 mars 1889.
[10] Banque de France, Conseil Général, Procès-verbal de la séance extraordinaire du Dimanche 17 Mars 1889.

of Regents voted 13 to 2 to give an additional loan of 40 million francs.[11] These funds were immediately drawn upon by the CdE and the run abated, as the Ministry and the BdF signaled their commitment to depositors. With threat of a panic having receded, an orderly liquidation of the CdE could proceed without a fire sale of assets.

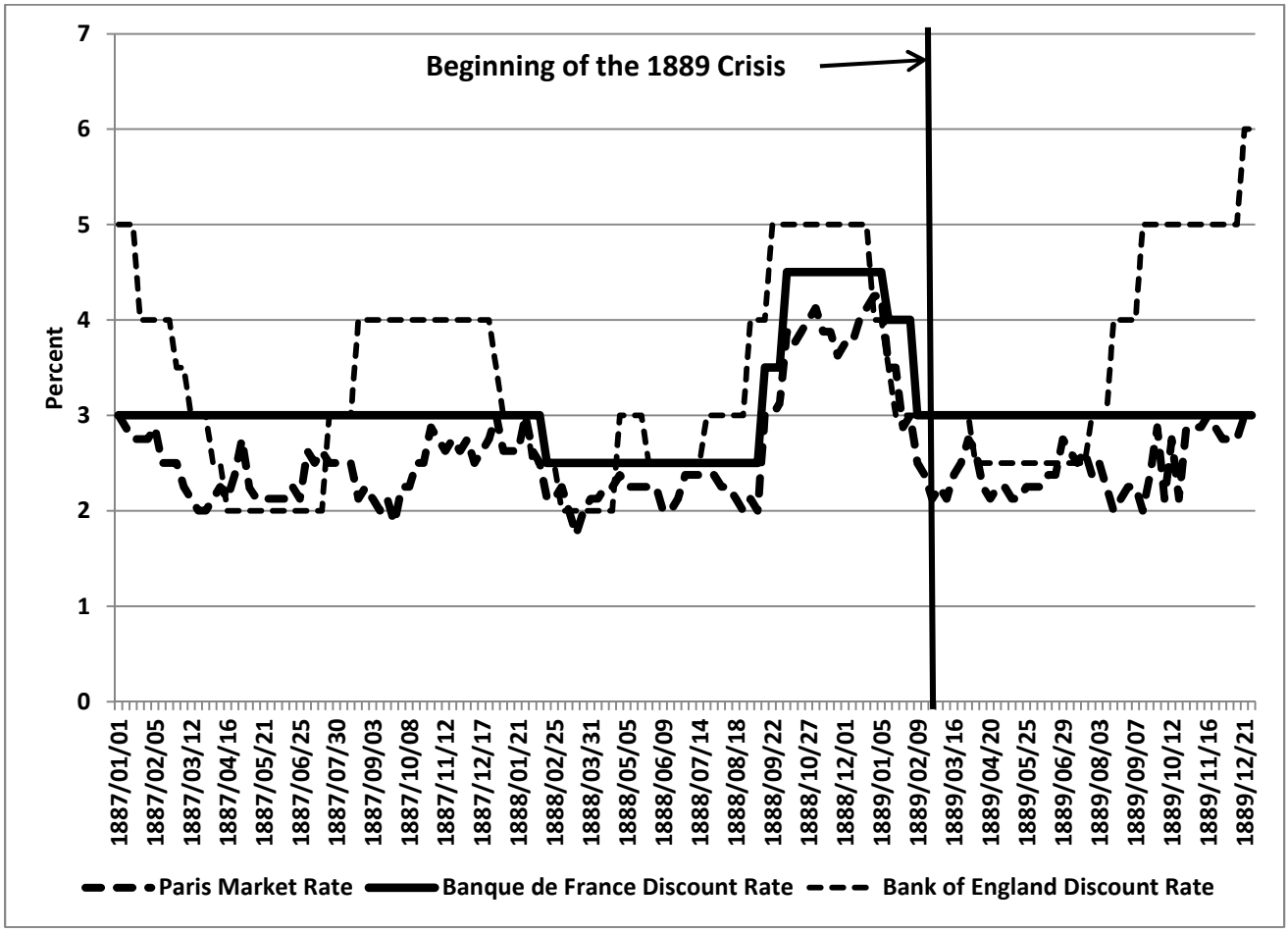
The question whether the BdF's quick intervention prevented a panic presents a difficult counterfactual that runs would have been limited to the CdE because the public could determine whether other banks were solvent. But, to use an anachronistic term, the CdE was a "systemically important financial institution" and neither the Minister of Finance nor most of the Council wanted to chance a panic. Regents on opposite sides of the debate agreed that a panic caused by the CdE would be severe. Rothschild wrote to his London cousin that such a crash would "hit the commercial and financial center even harder than the collapse of Union Générale;" while Pillet-Will told his fellow regents that "the fall of the Comptoir would be an immense disaster, everyone agrees on that."[12] This concern reflected the fact that the CdE was the second oldest chartered bank (after the BdF), the second largest bank of deposit in Paris, the leading source of funding for French foreign trade, a supplier of credit to small and medium Paris businesses, a major investment bank, providing credit to the stock market with substantial off-balance sheet activities, and a manager of important financial operations for the French government.[13]

The potential threat to the financial system cannot be read in the behavior of interest rates, as these typically do not jump until the panic begins. Responding to cuts in the discount

[11] Conseil des Régents, Banque de France, Procès-verbal de la Séance extraordinaire du Dimanche 17 mars 1889.
[12] This 1882 failure precipitated a stock market crash and long recession. Alphonse to Nathan Rothschild, Letter (March 7, 1889) Rothschild Archives (London) and Banque de France, Conseil Générale, procès-verbal de la séance extraordinaire du Vendredi 8 Mars 1889, à 9 heures du matin.
[13] It should be noted that there is no robust definition of a SIFI. Most definitions currently adopted simply measure size though they wish to identify the institutions that are so highly interconnected that a failure could trigger a financial collapse.

rates of the BdF and the BoE, French market rates were falling in the months immediately preceding the crisis (See Figure 3). Similarly, when Baer Stearns was rescued from collapse in March 2008, while its stock prices were tumbling from October 2007, interest rates did not budge, as was the case for the CdE's rescue; and they only rose with the announcement of Lehman's bankruptcy with the Fed's abstention from action after six months of sharp decline in the price of the bank's stock.[14]

Figure 3
Discount Rates of the Banque de France and the Bank of England
and the Paris Money Market, 1887-1889.



Source: The Economist. 1887-1889.
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[14] For example, see the movement of Libor rates and high and low corporate bond yields, Federal Reserve Bank of St. Louis, FRED, http://research.stlouisfed.org/fred2/categories/22

Table 2
Stock Returns for French Banks.
February 27, 1889-March 30, 1889.

Date	BdF	BdEP	BPPB	CdE	CL	SDCC	SG
February 27 1889	0.27	0.36	0.67	0.00	-0.41	0.16	0.00
February 28 1889	0.54	0.00	-0.11	0.00	0.14	-0.16	0.40
March 1 1889	-0.80	0.00	-0.34	-3.96	-0.83	0.16	-1.41
March 2 1889	0.27	-0.36	-1.23	-11.34	0.14	0.00	0.00
March 4 1889	0.54	-0.54	-1.02	1.74	0.28	0.00	1.02
March 5 1889	1.33	-0.36	-1.38	-2.86	0.28	0.00	-0.40
March 6 1889	1.32	-0.55	-1.16	-5.88	-0.28	-0.16	0.41
March 7 1889	0.00	-1.28	2.35	-3.13	-0.69	-0.33	0.00
March 8 1889	-1.30	-2.78	-8.62	-29.03	-6.29	0.00	-1.62
March 9 1889	-0.26	0.00	-0.63	-18.18	2.24	0.00	-1.44
March 11 1889	0.26	-1.90	-10.76	-26.67	-5.11	0.00	-4.17
March 12 1889	1.32	2.91	10.64	21.21	3.08	0.00	2.17
March 13 1889	-1.30	0.00	2.56	0.00	3.73	0.00	1.06
March 14 1889	0.00	-0.94	-5.25	-5.00	0.00	0.17	0.00
March 15 1889	-1.32	-0.95	1.58	-14.47	-2.16	0.00	0.63
March 16 1889	0.00	-0.96	-2.60	-23.08	-2.94	-0.17	-2.30
March 18 1889	1.33	0.00	-6.67	-40.00	-0.76	-0.83	-1.50
March 19 1889	1.32	-0.97	0.00	6.67	0.76	0.00	0.00
March 20 1889	-0.26	0.00	-10.00	-6.25	-1.52	0.00	-2.17
March 21 1889	0.26	-1.96	7.94	-13.33	0.00	-1.17	0.00
March 22 1889	-1.30	0.20	0.00	-15.38	0.77	-0.51	0.00
March 23 1889	1.32	2.79	6.62	4.55	3.82	0.00	2.22
March 25 1889	-1.30	0.00	0.69	0.00	-0.74	0.85	0.00
March 26 1889	1.58	0.00	-3.84	-15.22	-1.93	-0.84	0.00
March 27 1889	-0.26	-0.97	0.43	-7.69	0.45	0.00	-1.09
March 28 1889	0.00	0.00	-0.71	-11.11	-1.50	0.00	-1.10
March 29 1889	0.52	0.39	0.86	62.50	0.00	0.85	0.00
Marc 30 1889	-0.52	0.00	-0.42	-7.69	0.00	0.00	0.00

Source: Compagnie des Agents de Change de Paris, 1889. Bulletin de la cote. Cours Authentique et Officiel. Paris.
Abbreviations: BdF, Banque de France; BdEP, Banque d'Escompte de Paris, BPPB, Banque de Paris et des Pays-Bas; CdE, Comptoir d'Escompte; CL, Crédit Lyonnais; SDCC, Société de Dépôts et des Comptes Courants; SG, Société Générale.

Empirically it is difficult to measure even an incipient panic because daily deposit data for this period are rare. However, following contemporary studies, bank stock prices can be used to follow the bank run (Wall and Peterson, 1990; Goldsmith-Pinkham and Yorulmazer, 2010). Stock prices in Figure 2 reveal how, in early March, the stock of the CdE and to a lesser degree the BPPB were dumped and prices tumbled. Table 2 reports the daily returns for leading Parisian banks during the crisis month of March. The returns are calculated using the first price of the day so that the return for March 8 reflects all the news that the market received between the opening of the market on March 7 and the opening on March 8. While the rest of the market was relatively quiet, news of Denfert-Rochereau's visit to the Governor on March 1 may have leaked out and the CdE shares' prices begin to tumble, with an 11.3% drop. His suicide on March 5 brought a further decline. Extraordinary meetings at the Ministry on the night of March 7 and before the banks opened on March 8 saw drops of 29.1% for the CdE and 8.6% for the PBBP. The 100 million francs lifeboat calmed the markets. The insufficiency of this credit then led to drops for the CdE and smaller declines for the BPPB. The March 18th 40 million francs loan seems to have steadied the market for bank stocks with the exception of the CdE, which continued to fluctuate with news of its liabilities and plans to recapitalize the bank. While certainly not conclusive evidence of a potential panic, these returns reveal why French officials would have considered one imminent if drastic actions were not taken.

5. The Lifeboat and the Provision of Additional Liquidity

Although the BdF created a lifeboat to preserve the CdE, there may also have been a need to make liquidity generally available to the market. However, it appears to have played a supporting rather than a dominant role in halting a panic. Bignon, Flandreau and Ugolini (2012) show that the hallmark of the BoE's LOLR actions à la Bagehot were to keep the discount rate

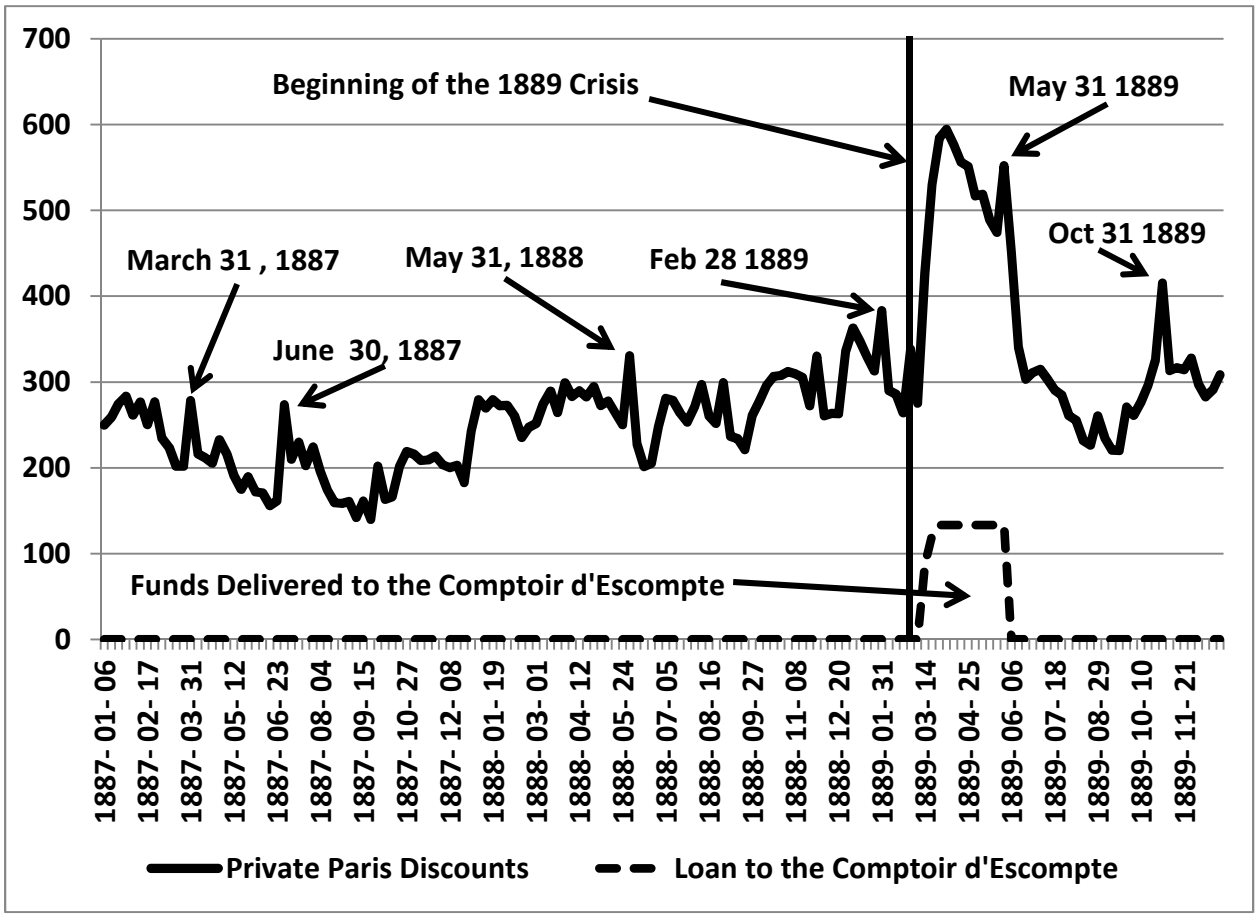
above the market rate, lending freely to all who had acceptable collateral. White (2007) also provides graphical evidence that the BdF followed a similar discount policy.[15] To measure the 1889 policy mix of lifeboat and additional liquidity requires a determination of the discounts that exceeded any increase driven by interest rates, clearing and settlement on the Bourse, or other factors.[16]

The BdF's and BoE's discount rates and the Paris open market rates[17] for 1887-1889 are shown in Figure 3. The open market rate is believed to represent the rate for the best paper bought by the big banks.[18] Operating in the world's dominant money and capital market, the BoE's discount rate was closely followed by BdF and other central banks; but the BdF with its huge gold reserves did not feel it necessary to respond to every BoE discount rate change. When the BoE raised its rate from 2.5 to 3% in July 1888 and then 4% in August, the BdF responded with a lag, increasing its discount rate from 2.5 to 3.5% on September 13. Falling gold reserves prompted the regents increase their rate to 4.5% on October 4 after the next BoE announcement.[19] These rates remained in force for the next three months. Rates began to drop in early 1889. On January 10, 1889, the regents cut the discount rate to 4%, following the BoE's drop to 4%.[20] Then in quick order, shadowing the London rate, the BdF lowered its rate to 3.5%

[15] The BdF conducted monetary policy by providing discounts and advances. During the years 1888 and 1889, advances were almost steady at 130 million francs with a standard deviation of 4.5 million, whereas the mean and standard deviation for discounts were 313 million and 89.5 million francs. .
[16] Data on the BdF's balance sheets come from Babeau (n.d.).
[17] The Economist's reported rates are for the end of each week (the magazine's source is believed to have been Crédit Lyonnais), whereas the Banque's balance sheet data is mid-week. For example, the Banque's balance sheet is reported for January 24, 1889 while the date of the Economist's rate is January 26, 1889. The rates for discounts and advances are those prevailing that week or the new rate if there was a change. The rates are similar to monthly rates reported in the National Bureau of Economic Research's Macro History database, http://www.nber.org/databases/macrohistory/rectdata/13/m13017.dat. Crédit Lyonnais is quoted as source of the U.S. National Monetary Commission's rates.
[18] Bazot G, Bordo M., and Monnet E., "The Price of Stability, the Balance Sheet Policy of the Banque de France under the Gold Standard, 1880-1914," typescript.
[19] Conseil de Regénts, Banque de France, Procès-verbal de la Séance du Jeudi 4 Octobre 1889
[20] Conseil de Regénts, Banque de France, Procès-verbal de la Séance du Jeudi 3 Janvier 1889

on January 24 and 3% on February 7, 1889.[21] This rate remained unchanged through the crisis through to March 1890, and did not respond to the BoE's discount rate cut during the first week of April 1889 to 2.5%,[22] keeping it above market rates and suggesting a Bagehot-style crisis rule.

Figure 4
Discounts by the Banque de France, 1887-1889 (millions of francs).



Source: Babeau (n.d.), Banque de France, Conseil Générale des Régents and Comité des Livres et Portefeuilles, procès-verbaux, March to May 1889.

In addition to the cost of funds, the demand for discounts depended on the Paris Bourse. Clearing and settlement of trades for the second largest securities market in Europe required substantial funding. While most funding could be obtained from other intermediaries, the BdF

[21] Conseil de Regénts, Banque de France, Procès-verbal de la Séance du Jeudi 24 Janvier 1889 and 7 Fevrier 1889.
[22] Banque de France, Compte Rendu (1888 and 1889).

lent directly to market operators who had accounts at the bank. The largest segment of the market was not spot trades but trading in forward contracts, often on borrowed funds (*reports*) and entailing counterparty risk. A quick drop in securities prices could lead to a scramble for liquidity, as happened spectacularly in 1882.[23] There were two settlement periods (*liquidations*), one mid-month and the second end-of-month. Spikes in the volume of discounts in Figures 4 are often the first end-of-month settlement day. The biggest surge in discounts is, of course, the discounts offered to the CdE, which reached a level of 133.2 million francs on March 20, 1889 and then began to decline in May when the liquidators began to sell off the CdE's assets paying off its creditors, including the BdF.

To determine how much additional liquidity was provided to the Paris market over and above the loans to the CE, the value of private (non-government) discounts outstanding will be modeled as an AR(1) process with the change in log of the private discounts (ΔlnPD) depending on the change in the interest rate differential between the BdF's discount rate and the Paris market rate (ΔIntDiff). To capture, the demand emanating from the Bourse, we have created a matrix of dummy variables, one for each day of each settlement period, with the mid-month settlement having five days and the end-of-month settlement having six days. The end-of-month settlement was bigger as it handled all government bonds, the bonds of the City of Paris, and shares of the BdF, Crédit Foncier, and all listed railways. It was believed that the biggest demand for liquidity was on the first day when borrowing contracts (*reports*) were due. The dummies for the five middle-of-the-month settlement days are M1, M2, M3, M4, and M5 and the six end-of month settlement days are E1, E2, E3, E4, E5, E6. Using the Bayesian Information

[23] The collapse of the Paris market after the failure of the Lyon bank Union Générale brought about the bankruptcy of the Lyon Bourse and nearly caused the demise of the Paris Bourse, which was avoided by a lifeboat operation by the BdF. See White (2007).

Criterion, the model (equation 1) selected has one lag for the private discounts variable and two lags for interest rate differential variable.

$$(1) \qquad \Delta LnPD_t = \beta_0 \Delta LnPD_{t-1} + \beta_1 \Delta \text{IntDiff}_t + \beta_2 \Delta \text{IntDiff}_{t-1} + \beta_3 \Delta \text{IntDiff}_{t-2} + \beta_2 M1_t + \beta_3 M2_t + \beta_4 M3_t + \beta_5 M4_t + \beta_6 M5_t + \beta_7 E1_t + \beta_8 E2_t + \beta_9 E3_t + \beta_{10} E4_t + \beta_{11} E5_t + \beta_{12} E6_t + e_t$$

Equation 1 is estimated using weekly data for two separate periods: (1) August 26, 1871 to December 27, 1888 and (2) June 1, 1882 until December 27, 1888. The shorter second period was included to ensure that the disruptions caused by the post-Franco-Prussian War of 1870-1871 reparations and stock market crash of early 1882 did not affect the estimation. The last observation, December 27, was selected to permit observation of any pre-emptive increases in liquidity provided prior to the run on the CdE. The results are shown in Table 3.

For both samples, the lagged dependent variable and the interest rates variables and lagged values all have the expected signs. It is interesting to note that for the dummy variables that are intended to capture the demand from the Bourse, the strongest effect is the first day of the end-of-month settlement---the spikes seen in Figure 4. The estimates for the longer period are used to predict the discounts given from January through May 1889. The predicted discounts at week t are equal to the actual lagged discounts plus the predicted increase. The additional "Bagehot" liquidity provided by the BdF is equal to the actual discounts less both the predicted discounts and the credits to the CdE.

During the months of January and February 1889, there was no anticipatory increase in discounts, as the model over-predicts the volume of the discounts. Nevertheless, the model under-predicts the increases in discounts for the crisis month of March 1889. There are four weeks---March 14, 21, and 28 and April 4---when there might be considered additional

"Bagehot" liquidity being indicated by the model, raising the level of discounts by 49, 79, 44, and 23 million francs. Given the models standard error of 31 million francs for a mean value of 330 million francs of discounts, these are not extraordinarily high values. However, it is notable that the additional 79 million francs of discounts occurred in the same time frame as the second 40 million francs credit to the CdE. Additional liquidity given to the market would be consistent with markets remaining jittery with some bank stock prices taking new hits, as seen in Table 2.

Table 3
Banque de France Private Discounts in Paris.
(dependent variable = $\Delta LnPD_t$).

	Full Sample 1871-1888		Restricted Sample 1882-1888	
	Coefficient	t-statistic	Coefficient	t-statistic
$\Delta lnPD_{t-1}$	-0.185	-6.18	-0.233	-4.75
ΔIntDiff	-0.032	-2.35	-0.067	-2.16
$\Delta IntDiff_{t-1}$	-0.053	-3.75	-0.097	-3.04
$\Delta IntDiff_{t-2}$	-0.063	-4.62	-0.133	-4.29
M1	0.022	1.42	0.018	0.64
M2	-0.047	-2.85	-0.049	-1.46
M3	-0.033	-1.96	-0.048	-1.53
M4	-0.003	-0.25	-0.007	-0.31
M5	-0.006	-0.47	0.010	0.34
E1	0.233	13.37	0.282	8.65
E2	0.004	0.27	-0.007	-0.22
E3	0.010	0.63	0.017	0.58
E4	-0.029	-2.17	-0.071	-2.79
E5	-0.022	-1.34	-0.029	-0.89
E6	-0.129	-6.69	-0.120	-3.38
Constant	0.001	0.13	0.000	0.00
No. of Obs.	903		344	
Adjusted R-Sq	0.283		0.366	
F-Statistic	24.78		12.66	

This LOLR activity à la Bagehot appears to be an important complement to the lifeboat operation but not the primary focus of policy. Its magnitude is best seen relative to Paris Bourse

demand on the most important settlement day. The average spike in discounts for this day is calculated using this day's regression coefficient, E1. For the full sample, the average E1 day added discounts of 88 million francs, with a range of 74 to 103 million francs, using the 95 percent confidence interval.[24] Viewed from this perspective, additional discounts were within the normal augmented demand on the peak settlement day. Thus, it is not surprising that there was no discussion of these discounts in the minutes of either the Council of Regents or other committees. Their attention was riveted on halting the run on the CdE and organizing its recapitalization as the Comptoir National d'Escompte (CNEP).

6. The Design of the Guarantee Syndicate

The significance of a key feature of the CdE's lifeboat---the two 20 million francs guarantee syndicates pushed by the angry Minister of Finance---has been wholly over looked in previous literature. Their design strongly suggests that the intention was for those behind the copper scheme to bear much of the cost CdE's collapse, which could potentially mitigate the moral hazard arising from aiding the insolvent bank. This action was certainly spurred by the fact that it was widely known that members of the financial community had exploited for personal gain conflicts of interest arising from holding positions at multiple institutions.

Information on 20 million francs guarantee syndicate for the 100 million francs loan is shown in Table 4.[25] The names of the contributing banks are in bold face: their share capital, their rank by the size of their capital relative to all banks in Paris, and their contributions are given in the first four columns; also included are the largest banks that were not part of the syndicate. In this table, the entry for the CdE refers to the assessment not on the bank but on its board of directors. Visual inspection of Table 4 reveals that there was no simple link between

[24] For the restricted sample, the average jump was 68 million with a range of 43 to 95 million francs.
[25] A complete table of the second 20 million francs syndicate has yet to be discovered.

Table 4

The First 20 Million Franc Guarantee Syndicate:
Membership, Contributions and Hypothetical Alternatives.
(Millions of Francs, Syndicate Members are in Bold Face Type)

Bank	Capital	Rank	Syndicate	Hypothetical	Predicted
1	2	3	4	5	6
Banque Imperiale Ottomane	250	1	0.6	3.4	1.05
Crédit Lyonnais	200	2	1.0	2.7	1.08
Crédit Foncier de France	155	3	2.0	2.1	1.05
Société Générale	120	4	0.5	1.6	1.05
Comptoir d'Escompte de Paris	80	5	2.5	1.1	1.81
Société de Depôts et de Comptes	80	6		1.1	1.02
Banque d'Escompte de Paris	65	7	1.0	0.9	1.06
Banque de Paris et des Pays-Bas	62.5	8	2.2	0.9	2.32
Crédit Foncier et Agricole d'Algerie	60	9		0.8	
Creédit Industriel et Commercial	60	10	0.3	0.8	1.05
Société Anonyme Le Crédit	60	11		0.8	
Compagnie Fonciere de France	50	12		0.7	
Rothschild frères	50	13	3.0	0.7	2.92
Société Marseillaise	40	14		0.5	
Banque Maritime	30	15		0.4	
Crédit Mobilier	30	16	1.0	0.4	1.05
Banque de Constantinople	25	17		0.3	
Banque Parisienne	25	18		0.3	
Stern, A.J. et Cie.	25	19	1.0	0.3	1.05
André, Girod et Cie	10	36	1.0		1.19
Heine et Cie	10	40	1.0		1.05
Hentsch frères	7	45	1.0		1.30
Pillet-Will	5	58			0.785
Goguel et Cie	5	52	0.3		1.05
Vve. Kinen et Cie	5	59	0.2		1.05
Mallet frères	4.5	60	0.3		1.18
Vernes et Cie	4.5	61	0.3		1.39
Hottinguer	2	76	1.0		1.25

Sources: Capital: Annuaire-Alamanch du Commerce (1888) and Archives de Paris, Archives du Tribunal de Commerce, Actes de Société. Contributions: Banque de France, Conseil Général, Procès-verbal, 8 Mars 1889.

the size of a contribution and a bank's capital. Instead, the banks involved in the copper scheme seem to have been assessed large contributions. These included small banks, far down the list in terms of their rank size. Two joint-stock banks at the scheme's center—the CdE and PBBP--

were hit with relatively big assessments, for their size. The deeply involved private bankers---Hentsch, André, Girod et Cie. and the Rothschild are on the list.

One way to view the intentions of the Minister of Finance for the design of the guarantee syndicate is to consider what it might have looked like if allocations had been made only according to ability to pay, as measured by a bank's capital. Column 5 in Table 4 examines this hypothetical alternative by selecting the largest 19 banks and apportioning contributions according to their individual share of their aggregate capital. Several large banks that were left out would have been forced to join and a number of smaller banks would have been omitted. For banks remaining in the syndicate, the share allocation would have been significantly different. This comparison suggests that inclusion in the syndicate and the size of contributions were influenced by a bank's participation in the copper scheme. To identify the conflicted participants in the copper scheme and provide a measure of their involvement, we employ two approaches. First, we examine the overlapping directorships and management, using network analysis to measure the degree to which institutions were connected and implicitly conflicted. Secondly, to identify conflicted participants, we employ the 1888 subscription list to the SdM's stock and bond issue, which provided the firm with the means to further the copper scheme. The subscriptions to the SdM's stock and bond issue are shown in Table 5.

For the first approach, we have collected information on all the Paris banks, including limited liability banks, partnerships and proprietorships.[26] For the limited liability banks we have identified their CEOs and vice-CEOs (*directeurs* and *sous-directeurs),* members of the boards of directors, and their internal auditors (*censeurs*). For private banks, we identify the lead partners or owners. We have also included the senior management for the SdM. As might be imagined,

[26] Our primary sources are Paris' Annuaire-Almanach du Commerce for 1888 and the partnership agreements in the Archives of the Tribunal de Commerce in the Archives de Paris (D 32 U3).

Table 5
Contributions to the Doubling of the Capital of the Société des Métaux, 1888

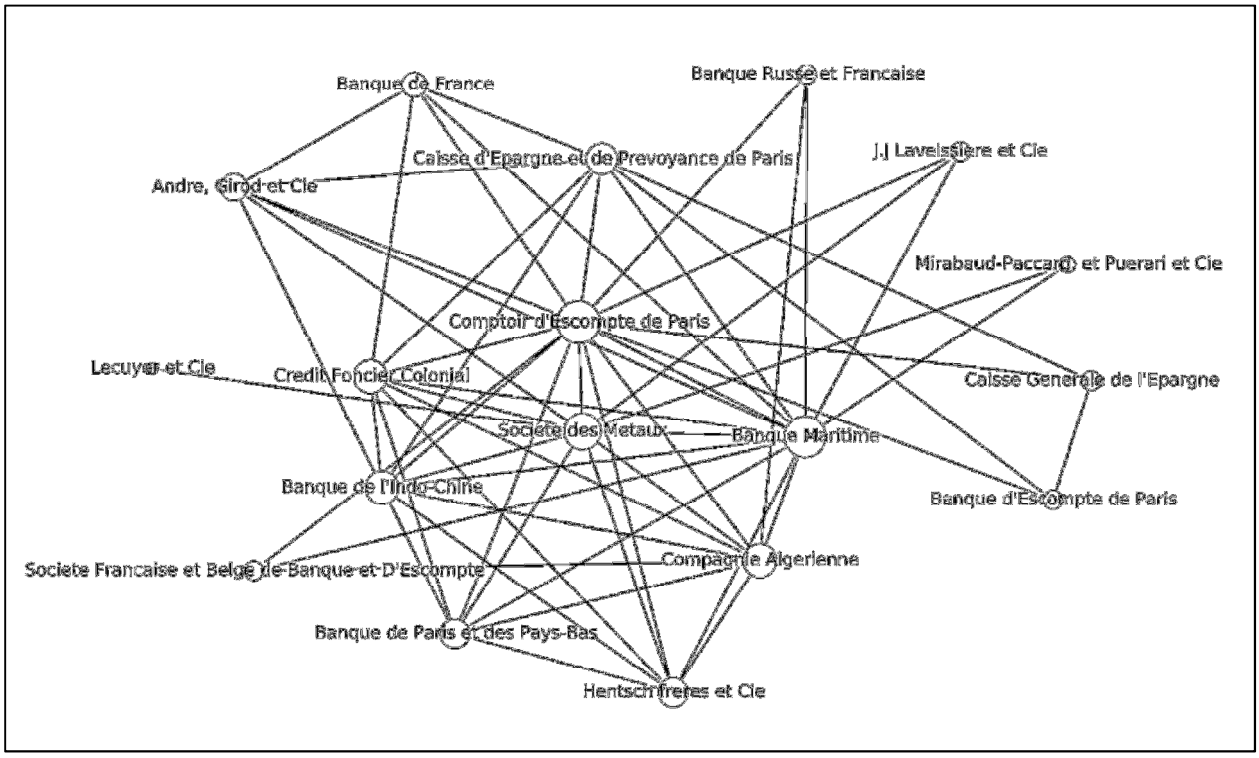
Bank or Banker	Total Invested	Invested by Principals	Number of Individuals Involved
1	2	3	4
Andre, Girod et Cie	376,050	376,050	1
Banque de France	8,198,500	0	9
Banque de l'Indo-Chine	1,328,525	0	3
Banque de Paris et des Pays-Bas	4,237,150	3,409,900	2
Banque de Roumanie	701,800	0	2
Banque d'Escompte de Paris	20,060	20,060	1
Banque Imperiale Ottomane	2,732,450	0	5
Banque Maritime	1,615,233	0	8
Banque Russe et Francaise	175,525	25,075	2
Berard	50,150	50,150	1
Cahen d'Anvers0	451,200	451,200	1
Caisse d'Epargne et de Prevoyance de Paris	6,619,300	0	6
Compagnie Algerienne	1,804,950	0	3
Comptoir d'Escompte de Paris	2,055,475	2,055,475	13
Credit Foncier Colonial	1,052,775	0	3
Credit Lyonnais	91,348	91,348	3
Demachy et F. Seilliere	350,900	350,900	1
Gillet fils aine	16,048	16,048	1
Hentsch	726,950	726,950	1
Hottinguer et Cie	551,550	551,550	1
Mallet freres et Cie	350,900	350,900	1
Mirabaud-Paccard, et Puerari et Cie	927,550	927,550	1
Morel	25,075	25,075	1
Pillet-Will	551,550	551,550	1
Rothschild frères	5,015,000	5,015,000	1
Thomas	100,300	100,300	1
Vernes	927,550	927,550	1
Worms	20,060	20,060	1

Source: File for the Société des Métaux, Archives of the Banque de Paris et Pays-Bas, Paris. May 10, 1888.

these measures of involvement in the copper scheme are far from perfect. For example, while most private bankers protected their investments in banks and companies by sitting on the board of directors, the Rothschild did not. Alphonse de Rothschild was only a regent of the BdF and a

member of the board of the government-sponsored Caisse d'Epargne et Prevoyance de Paris; but the House of Rothschild had a long history of large investments in mining and had, bought up copper stocks, gaining controlling interest in Rio Tinto, a giant copper company (Avery, 1974; López-Morell, 2013). On the other hand, there are the puzzling cases of the Veuve Kinen et Cie and Heine et Cie. who joined the syndicate but appear absent from the copper scheme.

Figure 5
Overlapping Directorships and Management, 1888.



Note: Each line connecting a bank or the Société des Métaux represents one or more individuals who held positions as senior managers or members of the board of directors in both institutions, indicating an opportunity to exploit a conflict of interest during the scheme to corner the copper market. The larger size of a circle indicates a larger number of connected individuals.

Figure 5 depicts all overlapping directorships and management for all Parisian banks that had at least one connection to either the CdE or the SdM, with the size of bank's circle reflecting the number of its connections. As is readily seen, there was tight network among a core of

institutions. Two measures of centrality or connectedness used in network analysis are deployed here to measure the conflicts of interest---degree centrality and eigenvector centrality (Borgatti, 2005). Degree centrality it is the sum of all the edges (an edge is a line representing individuals who hold two positions) that connect a vertex (a bank) to other vertices (banks). The number of lines or individuals connecting two institutions is taken as a measure of the strength of the conflicted relationship between the two institutions. Degree centrality here is the number of managers or directors that a bank has in common with the CdE or the SdM. Eigenvector centrality emphasizes that not all connections are equal. The idea behind this measure is that connections to a vertex that are themselves influential or well-connected should give that vertex more influence. Values for eigenvector centrality are calculated from the eigenvalues of the adjacency matrix which is an n by n symmetric matrix (n = number of banks) and the elements are the number of connections between ith and jth banks. Degree and eigenvector centrality are calculated for connections with the CdE (DegreeCE and EVCE) and the SdM (DegreeSM and EVSM) and thus focus on whether a direct connection for a bank to either institution created an exploitable conflict of interest that may have used in the formation of the guarantee syndicate.

For the second approach, we measure conflicts of interest by using participation in SdM's issue of shares and bonds that doubled its capital in 1888, facilitating its effort to drive up copper prices.[27] The goal was to raise 20 million francs, most of which was taken up by bankers who claimed 15,201,240 francs. As seen in Table 5, the largest subscriber was Rothschild frères requesting (2,515,000 francs of bonds and 2,500,000 francs of shares). The next largest contributor was PBBP, requesting 3.4 million francs of shares and bonds. The CdE asked for 2.1 million francs of securities. Measuring involvement by this list is tricky because purchases of these securities were made largely by individuals who had multiple affiliations and yet the

[27] Subscription list, Banque de France Archives, box for the Société Industrielle et Commerciale des Métaux.

assessment of contributions to the guarantee syndicate was by institution. Consequently, we use this list to construct three measures of conflicts of interest shown in the columns: (2) the purchases by the managers and directors of a bank and the bank itself, though this leads to some double counting---TC2xSMK, (3) the purchases by a bank or by its managers and directors who had the bank as their primary affiliation (e.g. they were the CEO rather than a member of the board)---PC2xSMK, and (4) the total number of individuals at a bank who made purchases---NS2xSMK.[28]

To determine if the Minister of Finance sought to use the guarantee syndicate to discipline banks in addition to assessing contributions according to capacity to pay, one could regress the contributions on our measures of conflicts of interest and bank capital.[29] In this formulation, equation 2 for the contribution that banks made to the guarantee syndicate in millions of francs (G_i) would be a function of both the capacity to pay (BC_i) and the conflict of interest measures, CI_i. Other factors may have played a role. The number of directors and managers who were members of the Legion d'Honneur, LH_i was included as an explanatory variable.[30] Membership in the Légion, a high governmental honor, might influence selection into the syndicate if it was believed that they ought to help out in this crisis or if they should or should not be punished for involvement. We include a dummy variable, $LL_{i,}$ to indicate if the bank was a limited liability bank rather than a proprietorship or partnership.

(2) $$G_i = \alpha_0 + \alpha_1 BC_i + \alpha_2 CI_i + \alpha_3 LH_i + \alpha_4 LL_i + u_i$$

[28] The BdF and the Caisse d'Epargne had many regents and directors investing in the scheme. Given that they were quasi-government institutions, they will not be included in the analysis. It should be noted that the BdF was also potentially penalized as it would have to absorb any losses in excess of the 20 million francs provided by both guarantee syndicates.

[29] The guarantee syndicate appears have been required by the Ministry of Finance, though the BdF helped in the negotiation of membership and contributions.

[30] Our source is the Annuaire Almanach de Commerce (1888).

OLS estimates with three measures of CI_i are shown in Table 6, displaying the coefficients and the t-statistics.[31] For the two reported centrality measures (degree centrality for the CdE in column 1 and degree centrality for SdM in column 4), the estimates are very similar. From a base contribution of approximately 500,000 francs (the constant), a bank capital of 100 million francs added 400,000 francs and each connection to the CdE or for the SdM another 116,000 to 138,000 francs, with neither limited liability nor the Legion d'Honneur playing significant roles. The OLS estimate (Column 7) that uses the conflict-of-interest's measure drawn from the subscription list (PC2xSMK) captures some relationships missed by the visible networks. Here, the base contribution is nearly the same but the effect of bank capital is lowered, so that 100 million francs of capital only adds another 100,000 francs to a contribution while a one million franc subscription adds 407,000 francs. Thus, the Rothschilds who bought 5 million francs of the SdM issue, have 2 million of their 3 million francs contribution explained by this variable.

However, the challenge in estimating this model is that selection into the syndicate was not random. Although the syndicate was organized in haste, it may be reasonable to presume---especially given hard negotiation in the late night meeting---that the Ministry first identified banks that should be members of the syndicate (reflecting both capacity to pay and guilt) and then determined their contributions (perhaps weighting guilt more heavily). The correct approach to this problem is to pursue a two stage regression approach, where the first stage estimates the determinants of being induced to join the syndicate and the second estimates the determinants of the contribution to the syndicate, with a Heckman correction for the selection bias.

[31] The other conflict of interest measures yield similar results.

Table 6
Determinants of Membership and Contributions to the First Guarantee Syndicate.

	1	2	3	4	5	6	7	8	9
	OLS	Member Probit	Contrib Heckman Model	OLS	Member Probit	Contrib Heckman Model	OLS	Member Probit	Contrib Heckman Model
Constant	0.503	-1.039	0.147	0.486	-1.046	0.216	0.526	-1.384	1.049
	2.79	-3.77	0.3	2.64	-3.88	0.57	3.07	-4.57	5.57
Bank Capital	0.004	0.053	0.004	0.004	0.055	0.005	0.001	0.059	0.001
	4.26	2.56	3.22	4.19	2.73	3.74	0.55	3.36	0.83
DegreeCE	0.116	0.166	0.138						
	3.13	1.6	3.47						
DegreeSM				0.153	0.232	0.232			
				3.04	2.04	3.93			
PC2xSMK							0.407	2.566	0.372
							3.41	2.17	3.92
Limited Liability	-0.046	-2.075		0.001	-2.09		0.086	-1.18	
	-0.12	-2.85		0	-2.85		0.22	-2.61	
Legion d'Honneur	0.002	-0.073		0.004	-0.083		0.032	-0.111	
	0.05	-0.63		0.40	-0.83		0.96	-1.46	
No Obs	19	98	19	19	98	19	19	98	19
Adjusted R2	0.592			0.582			0.622		
F-Statistics	7.53			7.28			8.40		
Wald Ch2		13.46			19.16			0.82	
Prob Ch2		0			0			0.336	
Rho		0.623			0.521			-1	
Sigma		0.467			0.464			0.825	
Lambda		0.291			0.242			-0.825	
Rho=0		0.62			0.44			12.86	
Prob Ch2		0.432			0.506			0	

The first stage of analysis will be a probit regression, specified in equation 3, to examine the determinants of membership. Membership of the ith bank in the guarantee syndicate, M_i is

(3) $$M_i = \beta_0 + \beta_1 BC_i + \beta_2 CI_i + \beta_3 LH_i + \beta_4 LL_i + \epsilon_i$$

There are 98 observations to estimate the probit model but only 19 for equation 2. As is well known, there are problems with the small sample properties for models that correct for

selection bias; however, the results are similar to the OLS estimates. There is one more cautionary note; the potential explanatory variables are the same for both equations 2 and 3, so that there are no obvious instruments to identify them. However, when we use LH_i and $LL_{i,}$ to identify the membership equation, $LL_{i,}$ appears to do the job while having no influence on the OLS estimates. In spite of these problems, the combined equations predict the allocation of contributions fairly well.

In equation 3, the limited liability variable is negative and significant in all three specifications (Columns 2, 5 and 8), with a marginal effect to the probability of 25%, implying that the *haute banque* rather than the limited liability banks were considered to bear more responsibility for undermining the CdE. Share capital has a significant effect and the unreported average marginal effect ranges from 0.008 to 0.011, implying that an extra 1 million francs of capital would increase the probability of selection by 0.8 to 1.1%. One additional overlapping directorship or official with the CdE, increased the probability of selection into the guarantee syndicate by 3.1%. The effect for the SdM variable was 3.8%. An additional subscription of 1 million francs increased the probability of selection by 3.6 percent. Taken all together, they imply that, if a bank was a limited liability one, it would be only included in the syndicate if it were very large, with a copper scheme association adding to the likelihood. For the *haute banque* deep involvement in the copper scheme was the key factor. The columns 3, 6 and 9 of Table 6 reports the combined equations in a Heckman selection model using the same conflict-of-interests' measures as in the other columns. Once membership to the syndicate is accounted for, the constant term is smaller and the effects of capital and all three conflict of interest variables are similar to the contribution equation estimated by OLS.

As the chosen subscription variable (PC2xSMK) appears to better capture some important relationships, the model estimates from Columns 8 and 9 in Table 6 are used to generate estimated contributions in Column 6 of Table 4.[32] Banks with modest capital have predicted contributions equal to the constant of 1.05 million francs, which compares to the median actual contribution of 1 million francs. The CdE, BPPB, and Hentsch frères have larger estimated contributions of 1.81, 2.32, and 1.30 million francs, reflecting their role in the narrative. The estimate of 2.92 million for the Rothschilds nearly matches their actual contribution of 3 million francs.[33] Given this evidence, it is hard to avoid the conclusion that the apportionment of potential losses from the collapse of the CdE was intended to fall heaviest upon those deeply involved in the copper scheme.

7. Aftermath and Cleanup: Setting Incentives

The SdM filed for bankruptcy on March 21, 1889, under a new legal procedure (*liquidation judiciaire*) that halted payments to creditors, while the firm continued in operation. As for the CdE, its board resigned; and on March 23, 1889 the bank filed for a private liquidation, under the authority of the Tribunal de Commerce, which appointed a liquidator on March 30. However, liquidation became a long drawn-out process because several law suits and the need to avoid dumping copper stocks on the market to ensure a maximum recovery. Most importantly for the CdE, its guarantees for the forward contracts were ultimately annulled by decisions in France, by the Cour de Paris on December 18, 1890, and in the United Kingdom, by the High Court of Justice, on July 31, 1890 on the grounds that they were against the freedom of trade (Art. 6 of the Civil Code) and incompatible with the bank's statutes.[34] These decisions

[32] The estimated equations with the network variables produced similar results.
[33] Pillet-Will's potential contribution is included. His resignation may well have released him from any obligation.
[34] Rapport des liquidateurs à l'assemblée générale des actionnaires du Comptoir d'Escompte, January 30, 1892.

shifted losses to mine owners, although these may have been minimal if they had not started to mine the copper. Although the dismissal of its off-balance guarantees could not have been foreseen in March 1889, this development greatly improved the ability of the CdE to pay its creditors with shortfalls covered by penalties and other assessments.

In the meantime, the CdE owed the BdF 173 million francs (the two loans for 140 million plus other credits of 33 million francs). As the price of copper was still very low when the 100 million loan fell due on June 8, 1889 and the 40 million loan on June 18, 1889, the BdF negotiated a settlement with the CdE and SdM signed on July 26, 1889. The bottom line was that the BdF would accept ownership of 53,000 tons of copper in exchange for a reduction of the CdE's debt of 65 million francs. Rising copper prices and successful sales of other assets enabled the BdF to realize 162.3 million francs by December 29, 1890, leaving a debt of 10.7 million francs.[35] Although the CdE still had its finances entangled with the SdM, which had to resolve claims from the mines and other creditors, the BdF accepted a final payment for settlement with the CdE, by cutting the interest payments it was due.[36] Thus, the guarantee syndicates were not called upon to make the BdF whole, thanks primarily to the unexpected recovery of copper prices. The BdF also cleaned its house of conflicted senior officials. Two internal auditors, P. Tessionnière and Ernest Baudelot, who had been on the board of the CdE were dismissed (Banque de France, Assemblée Générale, 1889).

To resurrect the CdE and minimize disruption to the Paris market, the Minister of Finance and the BdF promoted a new Comptoir National d'Escompte de Paris (CNEP). The CdE's head office, branches and clientele were sold to this reincarnation in exchange for 40,000 founders'

[35] To this debt was added 1.5 million francs that Sécretan owed the BdF.

[36]This favourable outcome was not anticipated by the BdF. At its 1889 General Assembly, the Governor announced that while the 100 million francs would be repaid, it would necessary to establish a 4 million francs reserve against potential losses on the remaining credits to the CdE.

shares in the CNEP that were distributed to the former shareholders of the CE for their acquiescence. The CNEP was founded with a capital of 40 million francs, half of which was paid in; and Louis Jules Ernest Denormandie, a former Governor of the BdF, assumed the office of president. The capital was almost entirely subscribed by the former shareholders of the CdE. Deposits flowed in, reaching 125 million francs in five months (Comptoir National d'Escompte de Paris, 1889). On November 5, 1889 the CNEP's General Assembly decided to raise the bank's capital to 80 million francs.

Four principal figures in the copper scheme were sued by the liquidators of the SdM and the CdE for their roles and prosecuted in criminal court for *accaparement* (seizing a market and raising prices to consumers) and fictitious accounting. Secrétan and his close associate Joseph-Emile Laveissière, member of the CdE's board and President of the SdM's board, were sentenced to 6 and 3 months of prison. These sentences were commuted on appeal into 3 months for Secrétan and no prison time for Laveissière, because the *accaparement* charge was dropped[37]. In Secrétan's agreement with the SdM's liquidators, he ceded almost all his property, worth 5.7 million francs. The liquidators of the CdE and the SdM pursued the boards of the companies. Faced with a law suit, the members of the CdE's board settled with a payment of 24 million francs; and the liquidators of the SdM extracted 50 million francs from its former board members. As CEO of the CdE, Hentsch was the subject of an additional law suit by the liquidators because of his "special responsibility" which was settled by a payment of 1.6 million francs (Le Figaro, January 3, 1891). Perhaps most serious, for all board members, were suits arising from Article 1382 of the Civil Code that permitted current and former shareholders to obtain damages when the companies were determined to have engaged in false accounting and

[37] Although the criminal courts dropped the *accaparement*, charge, the civil courts did not and use it to nullify the forward contracts, appealing to Articles 6 and 1382 of the Civil Code.

distribution of fictitious dividends. Payment was compelled, as failure could result in prison, and some board members went bankrupt, while others like Secrétan and Hentsch were financially ruined (Jannet, 1892).

8. Lessons from History?

Attempting to draw strong lessons from any historical episode is difficult given that circumstances vary from crisis to crisis, but the events of 1888-1889 do offer valuable insights into the conduct of a central bank that was able to pre-emptively limit the damage from the collapse of a "systemically important financial institution." However, one caveat should be offered at the outset. Financial crises in the nineteenth century, in France, the U.S. and elsewhere, usually had their origins in the exploitation of conflicts of interest by one or few institutions. Adopted in the mid- to late twentieth century, systemic incentives to take risk, arising from deposit insurance, Too-Big-To-Fail and other policy-originated incentives have magnified the shocks to the financial system, making the tasks of a LOLR more difficult.

In spite of the different environment of the late nineteenth century, this pre-emptive action by the BdF, prompted by the Minister of Finance, is notable. The central bank engineered a lifeboat to rescue the CdE in 1889 so that it could be liquidated in an orderly fashion and a new CNEP could be organized. Backed by a discount window that readily provided loans to a troubled market, a general panic was prevented by this lifeboat operation. The BdF---with no promise of any funds from the government---offered the insolvent CdE large loans collateralized by questionable assets. The central bank was protected from losses by a guarantee syndicate of bankers that was coerced to give guarantees of 40 million francs against losses the BdF might sustain. Court decisions nullifying forward contracts and the subsequent rise in the price of copper reduced losses to the CdE made the deployment of the guarantee syndicate unnecessary.

Judges imposed heavy payments of damages to CdE's and SdM's board members. As contemporaries knew, the danger from this intervention was that it might encourage banks to take bigger risks in the future in the knowledge that the BdF would come to their rescue. The assignment of shares in the guarantee syndicate and the legal system's punitive responses would have mitigated the moral hazard, though the precise effects are hard to measure. While one cannot easily run a counterfactual, these actions may have contributed to the absence of further French financial crises in the pre-1914 era.

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