Bad News Bankers: Underwriter Reputation and Contagion in Pre-1914 Sovereign Debt Markets[*]

Sasha Indarte[†]

Wharton

December 31, 2020

Abstract

This paper uses new bond-level data on sovereign borrowing and defaults during 1869-1914 to quantify a reputation-based channel of contagion via shared financial intermediaries. Concerns over reputation incentivized Britain's merchant banks, who underwrote sovereign bonds, to monitor, advise, and occasionally bail out sovereigns. Default signaled to investors that a merchant bank was not as willing or able to write and support quality issues, indicating that its other bonds may underperform in the future. Consistent with reputation-based contagion, I find that comovement between defaulting and non-defaulting bonds is six times larger when the bonds share an underwriter. To isolate the causal effect of a shared underwriter, I exploit *within-country* variation in bonds' underwriters. Testing predictions from a dynamic game that models underwriter reputation-formation, I find further evidence supporting reputation as the mechanism, as opposed to alternative explanations. These findings highlight that the reputation of intermediaries that monitor and intervene in crises can be a powerful source of contagion unrelated to a borrower's fundamentals.

JEL Classification: F3, F4, G1, G2, N2

---

1 Introduction

Financial crises are often global in nature and characterized by sudden and sharp spillovers of financial distress (Kaminsky, Reinhart and Vegh, 2003). Rapid asset price comovement can quickly send distress rippling across regions and asset classes. A better understanding of threats to financial stability requires knowing the channels that facilitate such contagion.[1] However, empirically quantifying individual channels of contagion is difficult because unobserved global, regional, and market-level shocks also contribute to asset price comovement.

This paper uses new data and features of early sovereign bond markets to isolate and quantify a channel of contagion arising through the reputation of shared intermediaries charged with monitoring borrowers. Pre-1914, the merchant banks underwriting sovereign bonds could take costly, but difficult to verify, actions to reduce default risk. This included due diligence in the underwriting phase, providing debt management and macroeconomic policy advising, exerting influence to encourage repayment, and short-term liquidity assistance to meet scheduled payments. When default occurred, this sent investors a signal not only about the sovereign but also about the underwriter's willingness/ability to exert effort to bolster bond performance. Such damage to the underwriter's reputation could spread financial distress if investors revise beliefs about the likelihood of default on the underwriter's other bonds. Similar channels could arise for modern monitors such as underwriters, credit rating agencies, and lead lenders in lending syndicates. However, there is little prior empirical evidence on the ability of this type of channel to facilitate contagion. This historical setting offers a unique opportunity to isolate contagion stemming from shared monitors.

The main empirical finding is that sharing an underwriter can lead to significant contagion. Using an event study, I estimate the impact of sharing a defaulting bond's underwriter on a the price of a non-defaulting bond. I find that comovement between defaulting and non-defaulting bonds during default is six times higher when sharing an underwriter. On average, 30% of a defaulting bond's price decrease is passed on to bonds sharing its underwriter (as opposed to 5%). Guided by a model of underwriter reputation formation, I present additional evidence suggesting that reputation for monitoring is the mechanism underlying this contagion. Together, these results indicate that monitor reputation can be an important channel of contagion outside of borrower fundamentals. This suggests that policies and contract features that incentivize monitors to build reputation can be a useful tool for enhancing financial stability.

The empirical analysis employs newly-digitized bond-level data. I manually record over 200 sovereign defaults occurring between 1869-1914, including the bonds involved and often the month of default. My sources are the annual reports produced by the *Corporation of Foreign Bondholders* (CFB), a group of British investors that formed in 1868 to collectively bargain with sovereigns during defaults. I also record bond characteristics, which I then use to man-

---

[1]Throughout, "contagion" in this paper refers to asset price comovement.

ually link bonds to monthly price data digitized from the *Investors Monthly Manual* (IMM).[2] To my knowledge, this paper is the first, along with contemporaneous work in Meyer, Reinhart and Trebesch (2019), to link monthly price data to precise information on the timing of defaults. The dataset constructed here focuses on a smaller time period than Meyer, Reinhart and Trebesch (2019) but it employs a broader definition of default, capturing more events from this era.[3] It also records additional characteristics of bonds and defaults, such as the underwriter or presence of collateral. The linked data set contains 21,542 monthly observations from 1,027 bonds, in 105 defaults, across 75 countries and six continents.

To identify the effect of a shared underwriter, the research design exploits *within-country* variation in bond exposure to underwriters. In the pre-1914 era, it was common for many countries to have outstanding bonds issued through several out of fifty or more potential underwriters. By using country-year fixed effects, the research design compares bonds at the same point in time, subject to the same country-level risks, but with different underwriters. This approach to identification disentangles the effect changes in country-level factors from sharing an defaulter's underwriter (Khwaja and Mian, 2008). Contagion is identified from the spread that opens up between non-defaulting bonds within the *same* country in response to another bond's default.

A distinct identification concern centers on the interpretation of the effect of sharing a defaulting bond's underwriter. Namely, does the estimated effect impact non-defaulting bonds through changes in the underwriter's reputation or another channel? This interpretation follows under the assumption of an exclusion restriction: that sharing a defaulter's bank impacts non-defaulter's bond prices *only* through damage to the underwriter's reputation for monitoring.

To shed light on the mechanism, I empirically test the predictions of a model of reputation formation. The model is a dynamic game with one underwriter (a long-run player), a sequence of short-term investors, and a sovereign (a passive player). Each period investors choose whether or not to purchase a bond issued through the underwriter. If issued, the sovereign encounters a crisis with some probability. The underwriter chooses to either pay a cost to fight the crisis, which prevents default with some probability, or can do nothing and allow the crisis to turn into default. Investors observe history of defaults but do not directly observe whether a crisis occurred.

The model captures the moral hazard and adverse selection characterizing the relationship between an underwriter and investors. Underwriters have either a low or high cost of fighting a crisis, known to the underwriter but unknown to the investors. A high cost of effort creates moral hazard, discouraging the underwriter from fighting. Investors have a common

---

[2]The IMM data were digitized by William Goetzmann and K. Geert Rouwenhorst. The data are hosted by the Yale School of Management at https://som.yale.edu/imm-issues.

[3]Here, default is defined as either missed payments (coupon or principal) or changes to bond contract terms that negatively affected the net present value of the bond's expected cash flows. The latter category includes modifications to sinking funds and the rehypothecation of collateral. This broader definition helps capture small defaulters that are often omitted from other historical records.

prior over the likelihood that the underwriter is the low-cost type. They face adverse selection when choosing whether or not to purchase a bond from an underwriter, hoping to avoid a high-cost underwriter.

When default occurs, investors are not entirely sure if this happened due to a lack of fighting or an unsuccessful attempt to fight. But default damages the underwriter's reputation, leading investors to revise downwards their belief that the sovereign is low-cost. Similarly, when repayment occurs, investors are not entirely sure if this happened due to a lack of a crisis or if the underwriter successfully fought a crisis. But a lack of default improves reputation, leading to a stronger belief that the underwriter is low-cost. In terms of pricing, default erodes an underwriter's reputation, leading to lower bond prices as investors expect future default to occur with a higher probability. If reputation becomes sufficiently low, investors will stop purchasing bonds through the underwriter.

I empirically examine several predictions of the model. First, if the likelihood of success when fighting a default is lower, default has a smaller impact on the price of the underwriter's other bonds. Intuitively, default is a weaker signal about the underwriter's type when preventing a default is harder. To explore this, I estimate how contagion varied with the size of the default, measured by the share of the underwriter's outstanding bonds involved in the default (weighted by principal). The idea is that a larger default is one that would have been harder to prevent. Consistent with reputation, I estimate that the impact on prices of sharing a defaulting bond's bank is *smaller* when the default is larger.

This finding is at odds with an alternative explanation centered on real wealth effects. For example, contagion could also arise if bond markets are segmented by issuer (e.g., investors prefer to only purchase bonds issued by Barings). In this scenario, missed coupon payments on one bond could motivate the investor to sell off other bonds, depressing the price of non-defaulting bonds from the same issuer. A larger default would lead to more contagion, in contrast to the empirical finding described above.

Second, additional signals about the occurrence of a crisis or the cost of preventing default lead to stronger revisions of beliefs. In practice, selective default could serve as such a signal. In this era, it was not uncommon for a country to default on a subset of its bonds (this occurs for 36% of the sample's observations). Default sends a more negative signal when another underwriter's bond for the same country escapes default. Conversely, avoiding default can send a positive (or less negative) signal about the underwriter that avoided default.

Consistent with this, empirically I find that sharing a defaulting bond's underwriter has a *larger* impact on prices when the default is selective. I also find that, within selective defaults, sharing the underwriter of a *non-defaulting* bond whose sovereign *defaulted* on average is associated with higher bond prices.

Third, I explore how initial reputation affects contagion. In general, the relationship between initial reputation and the price change following default is non-monotonic (U-shaped, specifically). At extremely high or low levels of reputation, investors already have strong be-

liefs, and default leads to a smaller price decrease. In intermediate ranges, default has a more negative impact on bonds sharing the defaulter's underwriter.

In the data, I proxy for initial reputation using the number of defaults in the past year involving a bond issued by the underwriter. I find that the effect of sharing a defaulting bond's underwriter is *larger* when banks have *fewer* recent defaults. This suggests that in the sample period, on average banks were in a low reputation region, where increases in reputation are associated with more contagion. This suggests an interesting paradox can arise empirically: maintaining a good reputation by avoiding default can reduce contagion, but when default occurs contagion can be more severe.

Related Literature. The Eurozone Debt Crisis shifted the focus of sovereign debt research to international contagion and, in particular, the role of financial intermediaries who hold sovereign debt as well as the organizations in position to bailout sovereigns (e.g., Park, 2014; Farhi and Tirole, 2016, respectively). The role of financial intermediaries in spreading financial turmoil in early global sovereign debt markets is more akin to the role played by third parties such as the ECB during the Eurozone Debt Crisis.[4] When third parties have the authority to bail out multiple borrowers, their handling of one debt crisis is a signal to investors about the actions they would take should another borrower encounter a debt crisis. A special feature of sovereign debt markets is the limited ability to enforce contracts with sovereigns. This means willingness, rather than ability to pay, plays a central role in determining default. Ultimately this makes sovereigns especially sensitive to their borrowing costs and hence prone to self-fulfilling defaults when borrowing suddenly becomes more expensive (Lorenzoni and Werning, 2013).

Research into the mechanisms through which contagion operates have primarily focused on financial crises. Kaminsky, Reinhart and Vegh (2003) describes and discusses empirical evidence of four types of financial contagion. The first type is through real wealth effects. When investors are made poorer, they simply have fewer resources to lend out to other parties. Additionally, losses in net worth can cause capital constraints to bind and force a financial institution to sell off other assets.

The second type is portfolio rebalancing. Rebalancing arises when an investor's optimal portfolio decision rules force them to sell off risky assets after other assets become riskier or fall in value. A common way of generating this channel in models is through imposing decreasing average risk aversion (DARA) preferences on investors (e.g., Lizarazo, 2009).

A third form is sometimes referred to as the "wake-up hypothesis". The general idea in the context of sovereign debt is that an asset price movement in one country signals something relevant to another's country's determinants of solvency. Most often research focuses

---

[4]This is different from the type of contagion in which banks were involved during the recent Eurozone Debt Crisis. In this modern crisis, banks with exposure to each other and Southern European economies' debt cut lending after realizing asset losses through these exposures. For excellent analyses of the role of counterparty risk and the transmission of sovereign stress to bank balance sheets, see Elliott, Golub and Jackson (2014) and Bocola (2015), respectively.

on when this signal is related to imperfectly observed fundamentals of the other country. This paper considers a form of the "wake-up hypothesis" where default signals the failure of banks to act to prevent default rather than something about the real fundamentals of another economy.

The last form of contagion is through real economic linkages (i.e., trade). When one country experiences a sovereign debt crisis, it may lower real output in their major trading partners as demand for their exports and supply of their imports decrease. However, Kaminsky and Reinhart (2000) shows that a common lender better predicts asset price contagion than trade linkages in modern data. This suggests the first three forms of contagion are relatively more important.

Researchers have primarily investigated the contagion of sovereign debt crises through analyses of dynamic stochastic general equilibrium models.[5] These papers give evidence showing that particular channels are consistent with observed events. On the reduced-form empirical side, Abreu, Pinho de Mello and Sodré (2007) analyze two specific defaults – Greece in 1893 and Brazil in 1898 – and find that bonds in non-defaulting economies that shared the defaulting bond's underwriter experienced a decrease in price of about 3-4%.[6] The authors' detailed analysis of these two episodes suggests sharing a defaulting bond's bank could be an important channel for spreading sovereign stress but it does not quantify the extent to which the severity of one country's crisis is passed onto others. This paper builds on these findings in two ways. First, I examine 100 different default episodes across four continents. Second, I quantify the pass-through of asset price changes during defaults. This improves our understanding of contagion by relating the severity of the debt crisis (which is reflected in the defaulting bond's price) to the shock transmitted to non-defaulting bonds with the bad luck of sharing the defaulting bond's bank.

The next section describes Britain's international capital markets during 1869-1914 and the incentives faced by sovereign debt underwriters. Section 3 presents the model. Then, section 4 describes the newly-digitized dataset. Section 5.2 presents the empirical strategy and the main results. Section 6 empirically tests additional predictions of the model. Section 7 concludes.

2 Pre-1914 Sovereign Debt Markets

This paper focuses on 1869-1914, an era when London was central hub of international finance. Displacing Amsterdam from this role in the early 19th century where a foreign exchange market had begun to flourish, international sovereign lending grew rapidly in popularity in London during the 1820s (Chabot and Kurz, 2010; Chapman, 2013).[7]

---

[5]In addition to the papers already mentioned, see also Arellano and Bai (2014) and Cole, Neuhann and Ordonez (2015) for novel takes on possible channels of contagion of sovereign financial distress.

[6]During Brazil's default the authors examine bonds from Chile, Hungary, and Russia. In Greece's default, the authors use data on Italian, Swedish, and Norwegian Bonds.

[7]In 1820 only one non-British sovereign bond traded in London, but by 1826 there were 23 different non-British government bonds (Flandreau and Flores, 2009).

Soon after, debt crises in Latin America and Southern Europe in the late 1820s temporarily took the wind out of investors' sails. Following the failure of a number of sovereign debt underwriters, from 1826-1829 every state in Latin America and Southern Europe, that borrowed in London, defaulted (except Brazil and Naples). In 1853, foreign and colonial securities constituted 6% of all securities traded on the London Stock Exchange. Interest in this market eventually returned and by 1873 the share of foreign securities rose to 21%. This level persisted until the beginning of World War I (Tomz and Wright, 2013). From 1873-1913, foreign investment as a percentage of British GDP averaged 5%, peaking at 10% on the eve of World War I (Fishlow, 1985).

Gathering accurate and timely information relevant to the performance of sovereign bonds was a challenge for investors throughout the 19th and early 20th century. Governments postponed releasing public accounts and other economic information for years when they feared the news would discourage investors (e.g., Mexico; Weller, 2015). There was also the threat that governments would not use funds for their stated productive purpose.[8] Governments sometimes also misled investors. For example, in their 1858 and 1862 loans, Turkey pledged the same customs revenue as collateral for these separate loans. This move was not detected by investors until years after the fact (Abreu, Pinho de Mello and Sodré, 2007).

Another risk faced by investors was a dishonest underwriter. In the most notorious case, Scottish fraudster Gregor MacGregor raised funds for the non-existent country of "Poyais", which he fabricated in the early 1820s (Flandreau and Flores, 2009; Oosterlinck, 2013). Fraud also manifested itself in the form of foreign officials raising funds in London for which they did not secure the approval of their respective governments (Flandreau and Flores, 2009). In addition to these failures of due diligence in creating these fraudulent bonds, underwriters also behaved opportunistically on occasion. In 1875, the British government concluded an investigation into the practices of underwriters and found substantial evidence of market rigging and exorbitant commission fees. However, no regulatory or monitoring agency was created in response (Fishlow, 1985).

2.1 Sovereign Debt Underwriters

Faced with these sources of uncertainty, the banks underwriting and managing payments of sovereign bonds became central actors in this market. The performance of a bond signaled the effort exerted by the underwriter in drafting a quality security and their willingness to forgo opportunistic behavior. Banks issuing these bonds were also known to use their own capital for short-term financing to prevent liquidity problems from turning into a debt crisis or even to temporarily buy back bonds to keep prices from falling far.

That banks played a pivotal role in the success of their bond issues was a fact not neglected by investors. A bank with a history of well-performing bonds could establish a reputation for taking the unobserved actions that improve a bond's performance. A reputation

---

[8]For example, the Greek government confiscated two thirds of the Piraeus-Larissa Railway loan (Abreu, Pinho de Mello and Sodré, 2007).

was an asset to the banks that helped secure greater returns for their role and a sizable market share (Flandreau and Flores, 2009).

Two types of financial institutions acted as intermediaries between investors and sovereign borrowers.[9] Early in the 19th century merchant banks dominated this market. Merchant banks were large, private investment institutions that specialized in foreign bonds and railway issues in particular (both government and commercial). These institutions were typically set up by a wealthy individual or group of wealthy individuals. Rothschild's went on to dominate the market during the 19th century after being the only underwriter to have no bonds default during the debt crisis of the late 1820s, replacing the incumbent, Baring's.[10] In the latter half of the century, joint stock banks also became major underwriters of sovereign debt. Joint stock banks officially resided overseas and typically focused on financing trade between Britain and specific regions. These banks were most common in Asia and colonial states (e.g., The Hongkong and Shanghai Banking Corporation). Throughout the paper, references to "merchant banks" or simply "banks" refer to both types of financial institutions.

Joint stock banks channeled funds to different states within particular regions (e.g., southeast Asia) while merchant banks loaned to states around the world. Another important feature of sovereign debt markets was that they were characterized by monopolistic competition (Fishlow, 1985; Flandreau and Flores, 2009, 2012). Typically 200-300 sovereign bonds, underwritten by several dozens of banks traded on the London Stock Exchange during 1869-1914. While small issuers did exist, underwriters with considerable market share were most common (Flandreau and Flores, 2009). This matters because a sizable market share makes the costs of losing one's reputation higher.

How did a sovereign bond come into existence? A country would typically inform a number of underwriters that it was interested in raising funds (though occasionally banks approached sovereigns with whom they had a previous lending relationship). A handful of underwriters competed for the contract based on its characteristics such as amount raised, maturity, coupon, and the actions to be taken in the event the entire amount can not be placed upon the IPO.[11] The next step was distribution, i.e., finding investors for the IPO. Sometimes underwriters would hire another bank to act as a window for distribution. This stage required facilities and clerks in London. The next role was that of the paying agent who carried out the delivery of coupon and principal payments to investors. Most often, the underwriter would take on all of these roles. The actors to which investors paid the most attention were the underwriters and the paying agents. Both had opportunities to influence the success of a bond as described further on in this section.[12]

Who bought the bonds? Primarily bonds were bought by wealthy European individuals. Other financial institutions not involved in the marketing of bond also traded the bonds.

---

[9]The details presented here are drawn from Fishlow (1985); Flandreau and Flores (2009); Chapman (2013)

[10]Baring's remained a prolific lender until Argentina's default in the early 1890s forced them into bankruptcy.

[11]Occasionally underwriters formed a syndicate in this stage to offer a more competitive contract.

[12]The details of this process are drawn from (Flandreau and Flores, 2009).

Most often the merchant banks acted solely as an intermediary. They usually only held the bonds on their own balance sheet after repurchasing them to stabilize prices with the intent of ultimately returning them to the market.

Influencing a Bond's Success   Banks had a variety of ways to influence the performance of the bonds they issued. Importantly, many of these actions were imperfectly observable to the investors trading the bonds. In a series of papers, Marc Flandreau and Juan Flores provide many of the following details on the actions available to banks discussed below.

In the underwriting process, banks could exert costly effort to learn more about the sovereign's ability to repay. In this stage, diligent underwriters researched the borrowers' economic situation. Banks typically maintained offices abroad, this gave them a significant informational advantage compared to investors. With representatives on the ground abroad, it was easier to *verify* the research one could do from London. Bank employees often also established long-term relationships with foreign officials and major commercial enterprises to gather additional information.

Even after gathering information, underwriters had the chance to be opportunistic and could overprice their bonds relative to its expected return. Merchant banks could compensate investors fearful of this behavior through a higher IPO discount (the difference between the IPO and first quoted price). Reputable banks could offer a smaller IPO discount because a history of quality bond issues reassured investors that the bank did not find the short-term gains to opportunism greater than the long-run benefits of smaller IPO discounts. Empirically, prestigious underwriters in the 19th century did in fact have lower IPO discounts on average (Flandreau and Flores, 2009).[13] But if investors learned that the bank downplayed the risks after a default, the reputation of the bank would suffer.

Underwriters and paying agents often provided consulting services. Specifically, banks advised sovereigns on macroeconomic policy and offered debt management counseling. This allowed the bank to promote economic stability and influence the sovereign to prioritize repayment. This extensive information gathering and advising role was costly to the bank, but well-worth the effort if it helped its securities perform better and instill confidence in investors.

Another important role for banks was to prevent relatively small repayment problems from turning into debt crises and default. Even minor threats to repayment could potentially result in crises if investors suspected the sovereign was unwilling (not simply unable) to service its debt. The limited commitment problem in sovereign borrowing makes it especially prone to self-fulfilling debt crises. Banks used their own capital to support their bonds during tough economic times. Typically this occurred through short-term lending to prevent debt from falling into arrears or conditionality lending in particular (Fishlow, 1985).[14] When

---

[13]The authors measure the prestige of underwriters based on the size of their capital, the number and size of their bond issues, and narrative evidence from contemporaneous investor publications.

[14]Conditionality lending attaches policy stipulations to the financing agreement.

serving as a paying agent, a bank was the first to know when potential threats to repayment emerged. Occasionally, banks successfully prevented information about a threat to repayment from reaching the market by providing short-term finance to allow for continued debt service (Flandreau and Flores, 2012). Investors would prefer this to be kept secret if short-term financing could sufficiently remedy the sovereign's financial problems and prevent a self-fulfilling crisis from emerging.

Investors did not perfectly observe if banks were gathering information, advising, occasionally providing short-term finance, or if the bank was sufficiently incentivized to avoid opportunistic pricing. Well-performing securities were evidence of a bank willing and able to take these actions and meant banks could build a reputation over time for writing quality bonds and supporting them when threats to repayment arose. Faced with incomplete and imperfect information, investors were willing to pay a premium for a sound bond. In their research, Marc Flandreau and Juan Flores argue that banks were well aware of the importance of reputation and exerted effort in order to capture higher rents in Britain's monopolistically competitive debt issuance market.

2.2 The Corporation of Foreign Bondholders

Another important actor in early sovereign debt markets was the Corporation of Foreign Bondholders (CFB). The CFB was founded in 1868 and incorporated in 1873 (CFB Reports) to collectively bargain with sovereigns on the behalf of investors during defaults. Prior to their founding, individual investors had little power to negotiate with a defaulting state. Occasionally ad hoc committees were formed to negotiate, but much greater success was achieved by the permanent CFB (Mauro and Yafeh, 2003; Esteves, 2013).

CFB members were individual investors, representatives of financial institutions investing in sovereign debt, and representatives of the banks underwriting and managing the payments of these bonds (Eichengreen, 1995). Upon a default, members would form a committee that traveled to the defaulting country. The committee met the country's head of state or relevant ministers to negotiate a debt restructuring (Mauro and Yafeh, 2003). After returning to London with a proposed deal, a majority vote was required in a general meeting to approve the deal (CFB reports).

The greatest advantage of a large and permanent bondholders' organization was that it had the credible threat to embargo capital flows to defaulting states. With many influential members, not only was the CFB able to forcibly de-list a nation's securities in London, they could often coordinate to de-list them in other major exchanges (Mauro and Yafeh, 2003). London was the most prestigious exchange at this time and de-listing sent a strong, negative signal to potential future investors (Fishlow, 1985). The threat wielded by the CFB was a powerful one.

3 A Model of Financial Intermediary Reputation

This section presents a simple dynamic game between a bank and investors with incomplete and imperfect information. The model predicts asset price contagion arises in the presence of reputation, a prediction supported by the empirical results in section 5.2. The game is presented below, then comparative statics on reputation formation are discussed. Lastly, I connect reputation to asset prices.

The key informational frictions affecting the interaction between this era's banks and sovereign lenders were imperfect and incomplete information. Information was imperfect in that investors did not perfectly observe if the bank took the actions at its disposal to improve the expected payoff of its bonds. Debt crises were possible following random events such as political regime change, commodity price declines, and wars. When investors observe a default, it is not obvious if it would have been preventable had the bank exerted effort. This creates a potential moral hazard problem when these actions are costly for the bank to take.

Information was also incomplete in that investors were unsure of how strongly incentivized banks were to strive for a reputation of issuing well-performing bonds. Investors were concerned that a bank may be opportunistic. This could arise from a bank facing higher costs of information gathering or using its capital stock for short-term finance, but then attempts to convince investors that these costs are low and thus they're willing to pay them. Additionally, a bank may be present-biased and feign otherwise in order to amass short-term gains before its reputation is tarnished.

Setting Consider the problem of a single bank who encounters a sequence of potential investors each period t. Every period the bank brings to market a new sovereign bond issue and connects with a potential investor. There is a risk that each bond's sovereign will experience an economic crisis with probability $\delta \in (0,1)$. After issuing a bond, the bank privately observes the state of the sovereign's economy, which is summarized by $\kappa_t \in \{\kappa_C, \kappa_{NC}\}$ (crisis and no crisis, respectively).[15] Conditional on this information, the bank chooses to either fight ($a_t = F$) or allow the crisis to proceed ($a_t = A$).[16] A crisis is certain to turn into default if the bank does not fight it, but if the bank makes the costly choice to intervene it prevents the crisis from turning into default with probability $\alpha \in (0,1)$. The bank receives a payment $\lambda Q > 0$, where $\lambda \in (0,1)$, each time an investor purchases a bond and incurs a cost $\phi \geq 0$ for each fight. The goal of the bank is to maximize the expected net present value of stage payoffs (with discount factor $\beta \in (0,1)$).

Let $s_t \in \{D, H\}$ denote whether or not the sovereign defaults or honors its debt (respectively) in period t. Investors observe the entire history of defaults and can infer that a crisis occurred in t if $s_t = D$. But when $s_t = H$, it could be either that the bank prevented a default

---

[15]The analysis is similar if we instead model the bank as exerting effort in general to lower the probability of default.

[16]The bank takes no action in when $\kappa_t = \kappa_{NC}$.

or simply that there was no crisis. The public outcome s_t does not reveal the action $a \in \{F, A\}$ chosen by the bank. Let $s^t = \{s_t, s^{t-1}\}$ denote the public history.

Investors are unable to lend directly to the sovereign and can purchase bonds from the bank at price Q. If an investor does not purchase a bond, her payoff is 0. When the sovereign honors its debt the investor receives $R - Q > 0$, when the bond defaults her payoff is $-Q < 0$. Investors are "short-run" players, meaning that each is only concerned with maximizing her expected payoff from a one-shot encounter with the bank. Suppose that

$$(1 - \delta + \delta\alpha)R - Q > 0 \tag{1}$$
$$(1 - \delta)R - Q < 0 \tag{2}$$

so that, for price Q and repayment R, the investor strictly prefers (not) to invest when the bank will (not) fight. This is an important strategic feature of this problem. The bank is able to intervene to prevent a crisis in a way that an investor cannot. The services of the bank are only valuable to the investor if the bank uses this ability. Let $\mu(s^{t-1})$ denote the common belief among investors that the bank will fight, given history s^{t-1}. Investment will cease if

$$\mu < \frac{Q/R - (1 - \delta)}{\alpha\delta} \equiv \mu^*,$$

that is, if investors are sufficiently skeptical that the bank will fight.[17] The stage game is shown below in figure 1.

In any sequential equilibrium, in order for investor beliefs to be consistent they must obey Bayes' rule on path. This means that beliefs are updated in the following manner upon observing either a default or repayment:

$$\mu_{t+1}(D, \mu_t) = \frac{(1 - \alpha)\mu_t}{(1 - \alpha)\mu_t + (1 - \mu_t)}$$
$$\mu_{t+1}(H, \mu_t) = \frac{(1 - \delta + \delta\alpha)\mu_t}{1 - \delta + \alpha\delta\mu_t}$$

Notice that $\mu_{t+1}(H, \mu_t) > \mu_t > \mu_{t+1}(D, \mu_t)$, meaning that avoiding default improves the bank's reputation. Absent uncertainty about the bank's payoffs, theres still exists a reputational motive due to the imperfect observations of the bank's actions. The bank has an incentive to keep $\mu_t > \mu^*$ in order to avoid the risk of permanently losing the trust of investors.

Now suppose that investors believe the bank may be one of two types. The bank may be either a "good" or "opportunistic" type. A good bank always chooses to fight while an opportunistic bank always allows the crisis to proceed.[18] Since the ultimate interest of this

---

[17]Note that (1) and (2) imply $\mu^* \in (0, 1)$.

[18]Note this game admits sequential equilibria with mixed strategies. We could instead assume good banks play F with a probability on average greater than μ^* and opportunistic banks play it on average with a probability less than μ^*. What is relevant for this analysis is that there is adverse selection - investors stop investing once confident enough that the bank is opportunistic.
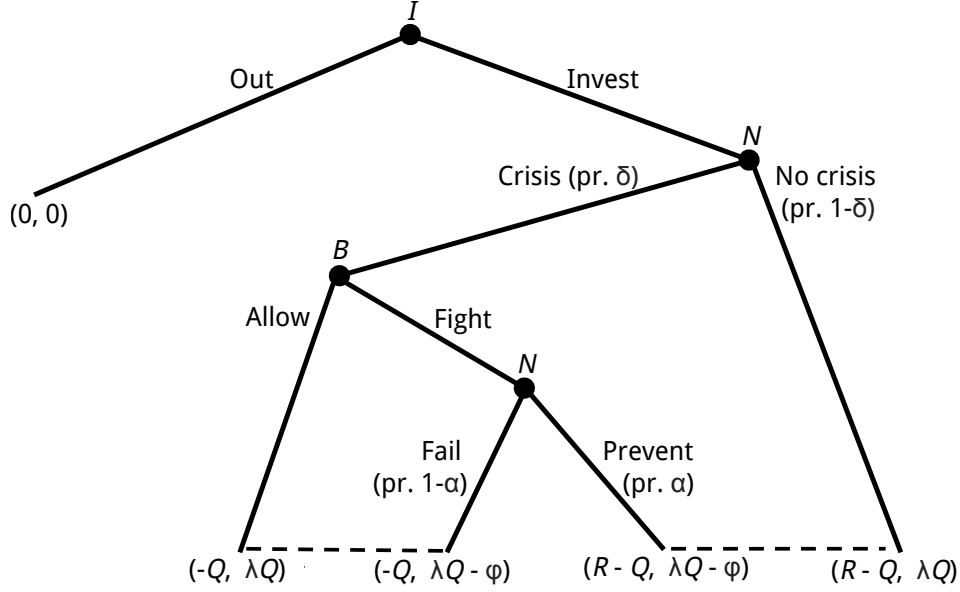
Figure 1: Stage Game

Note: Above, *I*, *N*, and *B* identify actions taken by the investor, nature, and the banker (respectively). The dashed lines indicate the investor's information sets. Nothing is learned if the investor chooses not to participate.

paper is the behavior of secondary market bond prices, I focus on how investors update their beliefs in response to default. To simplify doing so I abstract away from making explicit assumptions about the structure of the bank's payoffs and refrain from deriving their best responses for any particular structure.[19]

Using the consistency property of any sequential equilibrium with these beliefs, we can derive several comparative statics to see how the structure of the game influences reputation formation. First, note that $\mu_{t+1}(D, \mu_t) = \frac{(1-\alpha)\mu_t}{(1-\alpha)\mu_t + (1-\mu_t)}$ does not depend on δ. Default has the same effect on reputation regardless of the likelihood of a crisis. This may seem surprising, but this follows from assuming that the likelihood of a crisis is unrelated to the bank's type. Conditional on witnessing default, only the investor's prior beliefs and the effectiveness of fighting in preventing default (α) are useful for updating beliefs.

Taking derivatives of $\mu_{t+1}(D, \mu_t)$ we can also see

$$\frac{\partial \mu_{t+1}(D, \mu_t)}{\partial \mu_t} = \frac{1-\alpha}{(1-\alpha \mu_t)^2} > 0$$

$$\frac{\partial \mu_{t+1}(D, \mu_t)}{\partial \alpha} = \frac{-(1-\mu_t)\mu_t}{(1-\alpha \mu_t)^2} < 0.$$

---

[19]Note that characterizing a sequential equilibrium in these types of dynamic games featuring reputation is in general an unresolved problem in a discrete-time setting. This is however feasible in continuous-time environments as shown in Faingold and Sannikov (2011). For ease of exposition, I consider a sequential equilibrium that is analogous to what one could derive in a continuous time game as my main focus is on describing a channel of contagion between bonds.

Reputation is less harmed by default when investors already have a strong prior that the bank was the good type. Once a bank has secured a good reputation, default is does less damage to reputation. Default also harms reputation less when α is lower. Intuitively, when it is harder to prevent a crisis, a bank is punished less when a default occurs.

Next, consider $\mu_{t+1}(H, \mu_t) = \frac{(1-\delta+\delta\alpha)\mu_t}{1-\delta+\alpha\delta\mu_t}$. In contrast, the likelihood of a crisis, δ, is relevant here. Intuitively this is because the ability of the bank to prevent a crisis, α, and thus the probabilistic benefit of investing with the good type is proportional to δ. Derivatives of the posterior are given below:

$$\frac{\partial \mu_{t+1}(H, \mu_t)}{\partial \mu_t} = \frac{(1-\delta)[1-\delta(1-\alpha)]}{[1-\mu_t(1-\alpha\delta)]^2} > 0$$

$$\frac{\partial \mu_{t+1}(H, \mu_t)}{\partial \alpha} = \frac{\mu_t\delta(1-\delta)(1-\mu_t)}{[1-\delta(1-\alpha\mu_t)]^2} > 0$$

$$\frac{\partial \mu_{t+1}(H, \mu_t)}{\partial \delta} = \frac{\alpha(1-\mu_t)\mu_t}{[1-\delta(1-\alpha\mu_t)]^2} > 0$$

As before, a higher initial reputation μ_t leads to a higher updated reputation. In contrast, now an improved ability to thwart default (higher α) leads to greater reputational benefits when debt is honored, which may appear counterintuitive. The reason for this relationship is that when α is low, the investor finds it less likely that default was avoided due to a bank choosing to fight. Knowing we avoided default is a less powerful signal when it more rarely means that a good bank prevented a crisis. Thus, a lower α corresponds to a smaller reputational gain. Another important difference is that the probability of a debt crisis does affect the reputational gain to avoiding default. When a crisis is more likely (higher δ), the bank gains more in terms of reputation when default is avoided.

Asset Price Implications   The data analyzed in this paper (discussed in detail in the following section) are secondary market prices for bonds. The price Q in the previous model corresponds to a primary market or IPO price and λQ is a proportional finders fee garnered by the bank for intermediating the transaction. We can extrapolate from the above results on belief formation to consider how prices in a secondary market for bonds are affected by another bond's default.

For ease of exposition, consider a perpetuity (infinite maturity) bond $i \in I(b)$ where $b \in B$ is a bank and $I(b)$ is the set of bonds issued by bank b. Denote the price at time t as $p_{i,t}$ and coupon payments as $c_{i,t}$. Modifying our earlier notation, let $\mu_t(b)$ denote the investors' belief that bank b would attempt to prevent default should a crisis arise. When the bond defaults, the sovereign fails to make a coupon payment ($c_{i,t} = 0$), otherwise $c_{i,t} = c_i$. With no arbitrage

we can write the secondary market price of the bond as below

$$p_{i,t}[\mu_t(b)] = \mathbb{E}_{\mu_{t(b)}}[c_{i,t} + \beta p_{i,t+1}]$$

$$= \mathbb{E}_{\mu_t(b)}\left[\frac{c_{i,t}}{1-\beta}\right]$$

$$= \frac{c_i[(1-\delta) + \delta\alpha\mu_t(b)]}{1-\beta}.$$

The second equality follows from a no-bubble condition $\lim_{j\to\infty} \mathbb{E}_{\mu_t(b)}\beta^j p_{t+j} = 0$ and the law of iterated expectations.

Let $\Delta \ln p_{i,t} = p_{i,t+1}[\mu_{t+1}(b)] - p_{i,t}[\mu_t(b)]$. Next, we can see how a *change* in beliefs about the likelihood of the bank fighting a crisis affects the bond's price:

$$\Delta \ln p_{i,t} = \ln\left[\frac{(1-\delta) + \delta\alpha\mu_{t+1}(b)}{(1-\delta) + \delta\alpha\mu_t(b)}\right]$$

$$\approx \frac{\delta\alpha[\mu_{t+1}(b) - \mu_t(b)]}{1 - \delta + \delta\alpha\mu_t(b)}$$

where the last inequality comes from $\ln(1 + x) \approx x$ for x small. This approximation should be extremely precise for many possible values of the variables. The above expression motivates the log-log specification of the regression analysis. We can also see how heterogeneity in the chances of crises, the bank's ability to prevent a crisis from turning into default, and can affect pass-through.

A given change in beliefs $(\mu_{t+1}(b) - \mu_t(b))$ has a smaller effect on prices when $\mu_t(b)$ is larger. When investors are more optimistic that the bank is not opportunistic, the price does not fall as much after a downward revision of beliefs. Additionally, when the ability of the bank to thwart default, α, is greater, reputation changes have a stronger effect on bond prices. Lastly, a greater risk of a crisis δ increases the impact of reputation.

Contagion between bonds $i, j \in I(b)$ occurs when i defaults and investors become more skeptical about the willingness of bank b to prevent default. Because the determinants of b's incentives to prevent the default of i are the same as those to prevent the default of j, the default of i is informative about the likelihood of j defaulting too. Therefore, the asset price drop of i is passed on to bond j as well.

Allowing δ to rise for the defaulting bond after default occurs would give rise to partial pass-through. This is because the fall in the defaulting bond's price would be due not only to the damage to its bank's reputation, but also due to the higher risk of a future crisis. Additionally, if countries simply faced different likelihoods of experiencing a crisis, we could also have incomplete pass-through. The main analysis of section 5.2 quantifies the degree to which defaulting bond price changes are transmitted to non-defaulting bonds.

14

4 Data

One contribution of this paper is building a new dataset describing sovereign default events at the bond level constructed from CFB publications. I match this manually-entered information on sovereign defaults to bond price data digitized by the Yale School of Management's International Center for Finance. Below I describe in detail the variables of interest, their exact sources, and how the panel data used in the main empirical analysis is assembled.

4.1 Default Data

In addition to bargaining with sovereigns on the behalf of investors, the CFB also kept meticulous annual records of sovereign defaults, renegotiations, sovereign financial accounts, exchange rates, and trade data.[20] Each year since their incorporation in 1873, the CFB published an *Annual Report of the Council of the Corporation of Foreign Bondholders*.[21] The appendix of each report contains descriptions of default and describes the individual bonds involved in a default.

From the CFB reports, I first built a bond-level dataset that includes the underwriter(s) of each bond. It is worth noting that thorough records of underwriters are difficult to come by in other historical investor publications. To the best of my knowledge, this dataset contains the most complete record of sovereign bond underwriters for the pre-1914 era. These data also contain the bond's interest rate, principal size, issue year, and issue date.[22] Importantly, the data also record the timing and nature of many defaults over the course of these bonds' existence.

From each bond's default history, I construct an event-level dataset. In total these data contain 241 defaults for 26 countries in Africa, Asia, Europe, and Latin America. Ultimately, there is sufficient data across all sources to include 100 distinct default events in the main analysis. I define events at the level of the sovereign (therefore two countries defaulting simultaneously are treated as separate events). It is not uncommon for a sovereign to default on multiple bonds simultaneously; 190 bonds are associated with the 100 events in the subset used for the regression analysis.

Below, figure 2 displays the number of bonds that *enter* default each year. One reason for the surge of defaults in the 1870s is the Panic of 1873. Economic instability in North America and Europe emerged in the years following the American Civil War (1861-1865) and the Franco-Prussian War (1870-71) (Fishlow, 1985). Years of inflation, bank runs, and dwindling capital flows culminated in economic depressions from 1873 to 1879 across both continents.

Many of the defaults in the 1890s are from Argentine bonds. A new government came

---

[20]The CFB maintained a library for their members where they could access this information in addition to relevant news articles from around the world, economic commentary, and political analyses.

[21]Publication continued through 1988.

[22]Ideally one would compute yield-to-maturity for each bond, however information on the maturity of bonds is too limited to do this for many bonds.
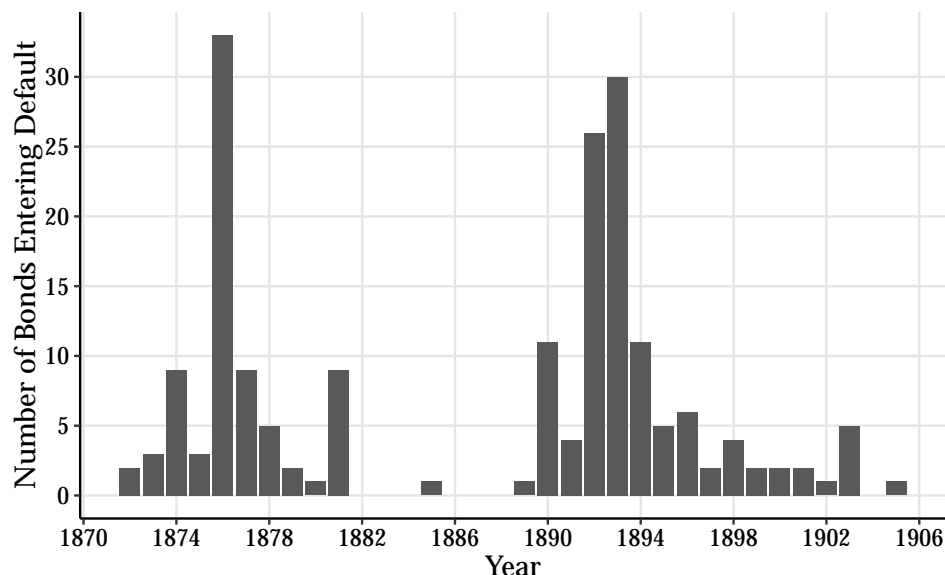
Figure 2: Bonds Entering Default

Note: The data here include the events for which there is sufficient data to use in the regression analysis.

to power in a fraudulent election and significantly increased Argentina's public borrowing. Argentina was in a precarious position both economically and politically. In 1890, a coup in Buenos Aires ultimately forced Argentina's President to resign in August. In the same year, decreases in the prices of Argentina's main agricultural exports led to a shortage of foreign currency to service the large debt accrued over the past decade (Ford, 1956).[23] Argentina entered a severe recession, with real GDP falling by 11% from 1889 to 1890. In November, Argentina defaulted on its sovereign debt; with this default Argentine bonds comprised 60% of the world's defaulted debt at that time (Mitchener and Weidenmier, 2008).

The infamous Baring Crisis ensued as exposure to Argentine securities, bought in attempts to stabilize bond prices, ultimately rendered the second largest British sovereign debt underwriter of the time, Baring's, insolvent.[24] The Bank of England prevented the crisis from bankrupting other merchant banks by guaranteeing Baring's liabilities.[25] While a potential financial crisis was curtailed in England, foreign capital flows receded. Other developing countries now found it increasingly difficult to secure new bond issues that they could afford and to rollover existing debt. Other nations defaulted in the years following the Baring Crisis. Contagion was worse for borrowers who previously issued through Barings. These

---

[23]Debt service requirements (on the external debt alone) totaled 50% of export earnings that year (Fishlow, 1985).

[24]The Bank of England oversaw the restructuring of Baring's into a joint stock banking company. The restructured Baring's reentered the sovereign debt market as an underwriter within years (Abreu, Pinho de Mello and Sodré, 2007).

[25]Baring's did not underwrite the Argentine bonds, they only acted as a paying agent – a point which they emphasized to investors (Flandreau and Flores, 2012).

borrowers sharing Argentina's banker experienced comparatively larger decreases in their bond prices following the Baring crisis (Abreu, Pinho de Mello and Sodré, 2007).

The default episodes considered in this paper focus on a wide variety of *de jure* defaults. The CFB reports do not discuss *de facto* forms of defaults; therefore these events are excluded in the analysis. But since the bonds considered here are almost exclusively denoted in British pounds, the most common form of *de facto* default (inflation) is not relevant.

This paper adopts a broader definition of *de jure* default than is standard in the sovereign debt literature (Oosterlinck, 2013). At a minimum, most academics define default episodes by the cessation or incompleteness of interest or principal payments. I broaden this definition to include events with two characteristics. First, these events must be unfavorable modifications or failures to honor the legal terms of a debt contract that adversely impact the bond's expected net present value. Second, they are also events that an underwriter or paying agent could conceivably influence so that the reputation mechanism would be operative.
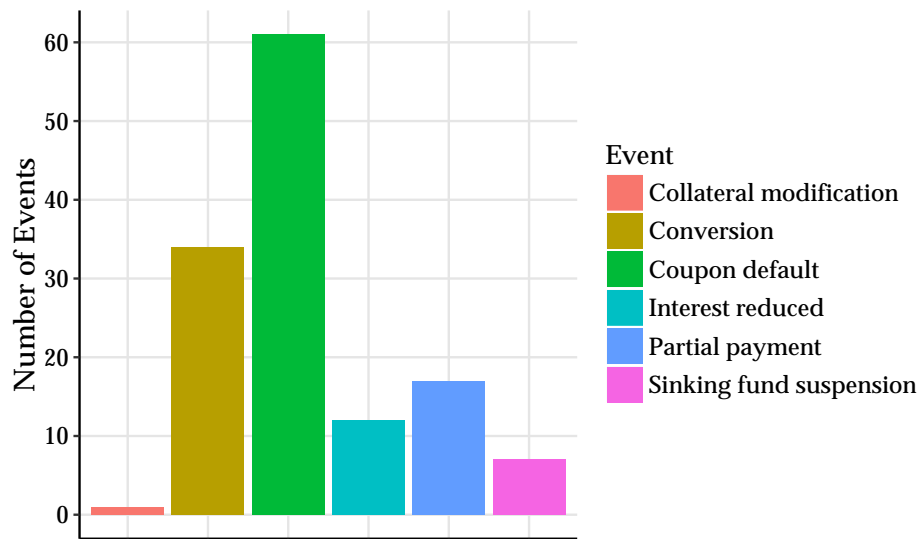
Figure 3: Types of Default

Note: There are an additional 90+ events which I classify as simply "defaults" which are omitted from this graph but still included in the main empirical analysis. These general "defaults" include events where multiple forms of default occurred (e.g., a sinking fund suspension and coupon reduction) or more idiosyncratic modifications of the initial debt contract (e.g., taxing and previously untaxed bond or modifying the currency in which payments are made). About 10-15 of these events were simply referred to as "defaults" in the CFB reports and provided no further information. The data are at the bond-level, therefore multiple bonds are present for a number of individual events. The events depicted here are those used in the regression analysis.

The frequency of the main forms of default examined in this paper is displayed in figure 3. Most common are coupon defaults, which are the failure to pay the (often quarterly or semi-annual) interest payments on a bond. Next most common are conversions which are used to lower interest rates and often reduce the principal of the outstanding debt. Partial payments refer to incomplete coupon payments. Interest reductions are modifications to

originally agreed upon interest rate. Sinking fund suspensions are the partial or complete suspension of payments to a bond's sinking fund.[26] Lastly, I include collateral modifications. In pre-1914 sovereign debt markets, it was common practice for sovereigns to pledge collateral, such as import duties, that would be turned over to investors in the event of default. On occasion sovereigns *ex post* reduced the size of the underlying collateral or bondholders seniority claim.[27] Most often, sinking fund suspensions and collateral modifications are ignored in the sovereign default literature.

Underwriters and paying agents had a significant influence on these events. First, since underwriters ultimately wrote the legal terms of each bond contract, any unfavorable modifications or failures to meet these terms would suggest the underwriters exerted insufficient effort to write a bond that whose terms would be sustainable. Additionally, underwriters offered economic policy advice to borrowers and did in fact try to protect the relevant sources of collateral and prevent taxation of coupon payments (Flandreau, 2003; Flandreau and Flores, 2012). Paying agents were responsible for ensuring payments were made on time and in their entirety. Since these defaults fundamentally stem from current or anticipated unwillingness to honor a debt contract, tools like short-term lending and conditionality lending provided by banks would be useful for reducing the likelihood of default.

4.2 Bond Data

I obtain monthly bond price data from the *Investor's Monthly Manual* (IMM), published by *The Economist*. The data span 1869 to 1929, though this paper makes use of data only until 1914 due to the outbreak of World War I.[28] Throughout, the prices this paper uses from the IMM data are the prices of the bonds upon closing on the last day of trading each month.[29] Another variable used throughout is the paying agent reported by the IMM. Lastly, issue prices, principal size, outstanding debt and a number of other bond characteristics is available.

After merging the data and dropping observations for which price or banker data is unavailable, the main sample contains price data for many countries and bonds for a variety of defaults. This subsample of the default data contains bonds from countries in Latin America and Europe primarily, though Asian and and African bonds are also present. There are 190 different bonds that are part of 105 distinct defaults from 19 countries (see table 9). There are 234 bonds that have an underwriter or paying agent in common with the defaulting bond(s)

---

[26]Sinking fund clauses required borrowers to regularly set aside a specified fraction of the bond's principal in order to ensure that sufficient cash will be available upon maturity to repay the original issue. In the miscellaneous category I include modifications to bond's sinking fund terms such as the repurchase rate (which is effectively a principal reduction).

[27]Sinking funds and collateral are rarely features of modern sovereign bond contracts. However, they are still common features of corporate debt.

[28]Not only did World War I significantly disrupt international capital markets, but the economic devastation of the war led the US to supersede Britain as the chief global lender.

[29]The IMM reports the monthly high, low, initial, and latest prices. Coverage is more complete for the latest price compared to the price at the beginning of the month so I opt to measure the change in the price as the difference between the end of month prices.

during a default.[30] The subsample that shares a defaulter's bank in at least one default comes from 37 different countries in Africa, Asia, Europe, North America, South America, and Oceania. (see table 10). In total 649 non-defaulting bonds from 68 different countries are in the main sample.[31]

Below are summary statistics for the bonds used in the main analysis. In table 1, unsurprisingly we can see a large difference between the behavior of defaulting bond prices (third row) and non-defaulting bonds without a shared bank. On average defaulting bonds fall in price by 5.4% during their default compared to an average decline of 0.26% for bonds unconnected to the defaulting bond. Similarly, the median change for all other bonds is 0 during a default while defaulting bonds typically decline in price by 3.29%.

Table 1: Bond Price Changes During Default Episodes

Var.	Mean	25th %	50th %	75th %	Std. Dev.	Obs.	Def.	Share bank
$\Delta \ln P_{i,e}$	-0.26	-1.02	0.000	0.95	8.90	21,536	N	N
$\Delta \ln P_{i,e}$	-1.85	-2.90	0.000	0.91	16.52	852	N	Y
$\Delta \ln P_{i,e}$	-5.40	-13.55	-3.29	2.37	13.44	190	Y	NA
$\Delta \ln P_{i,e}$	-0.94	-0.91	0.000	0.91	7.52	2,105	N	Unknown

Note: This table reports summary statistics for the changes in log bond prices over the month surrounding a default for different subsamples of the main sample. The first row is for non-defaulting bonds *i* that do not share a banker with the defaulting bond of event *e*. The second row are non-defaulting bonds with a banker in common with the defaulting bond. The third row gives the price changes for the defaulting bonds during their respective defaults. The fourth row is for non-defaulting bonds with unknown bankers.

More interestingly, bonds sharing the banker of the defaulting bond on average fall much more than those with unrelated bankers (rows 2 versus 1). On average, a bond connected to the defaulting bond by a common intermediary declines -1.85% in price. This is significantly larger than the -0.26% decrease of unrelated bonds. At the 25th percentile, we can also see that the decrease is about three times as large.

The last row contains statistics for bonds for which it was unclear whether or not a bank was connected to the defaulting bond. It is encouraging to see that these bonds appear to behave somewhere in between those with a shared bank and those without. This is consistent with these observations' bank information being close to missing at random.

Table 2 reports the same summary statistics but for the change in the bond prices over the month *preceeding* the default of event *e*. The ability to statistically identify contagion would be questionable if the prices of bonds connected to the soon-to-default bond (the treatment

---

[30]Many underwriters also served as the paying agent for their bonds, so these banks are one and the same for the most part. Both underwriters and paying agents are in a position to take similar costly actions to ensure the success of bond issues. Therefore it is reasonable that the effects of a default on a shared intermediary's reputation – whether its the underwriter or paying agent – would be similar.

[31]This is out of 1009 bonds for which some information is published in the IMM in the months of the defaults.

group) behaved differently than the unconnected bonds (the control group). Two worrying patterns would be if it appeared that the treatment group tended to fall in price more on average or comoved more closely with the defaulting bonds regardless of the default status of the soon-to-default bond. Fortunately, we do not see such patterns in the table below.

Table 2: Bond Price Changes Before Default Episodes

Var.	Mean	25th %	50th %	75th %	Std. Dev.	Obs.	Def.	Share bank
$\Delta \ln L(P_{i,e})$	-0.10	-0.95	0.000	0.95	8.99	21,276	N	N
$\Delta \ln L(P_{i,e})$	0.40	-1.08	0.000	1.16	7.20	837	N	Y
$\Delta \ln L(P_{i,e})$	0.30	-5.13	0.000	6.45	11.43	189	Y	NA
$\Delta \ln L(P_{i,e})$	1.48	-0.69	0.000	0.89	32.94	1,981	N	Unknown

Note: This table reports summary statistics for the changes in log bond prices over the month *preceding* a default for different subsamples of the main sample. Above, $L(\cdot)$ denotes the monthly lag operator. The first row is for non-defaulting bonds i that do not share a banker with the defaulting bond of event e. The second row are non-defaulting bonds with a banker in common with the defaulting bond. The third row gives the price changes for the defaulting bonds prior to their respective defaults. The fourth row is for non-defaulting bonds with unknown bankers.

At the various quantiles, the treatment group (row 2) most closely resembles the control group (row 1). Additionally, the variance of these two groups is now very similar whereas during defaults the standard deviation for the treatment group is double that of the control group. Overall the means for rows 1-3 are very similar. The mean differs for row 4, but this is due to a few relatively observations. At the quantiles, the group in row 4 is very close to rows 1 and 2. We also see that prior to the default events, the soon-to-default bonds had greater variance and, at the 25th percentile even fell significantly. This is not surprising as the build up to default often took months or years in this era.

If we look over a wider a window before and after defaults, we can see from another perspective that bond prices tend to behave similarly before a default but diverge significantly in price after a default. Figure 4 plots the average bond price at various leads and lags of the date at which default occurs. The plot displays the average for both banks that share and do not share the defaulting bond's bank. In the month of the default (time $t = 0$) we see a negative divergence between the average prices of the two groups. The divergence between the two groups is persistent; the gulf continues to widen even five months after the default.

4.3 Controls

Correlates of War Data One of the less common, but still important, causes of default during 1869-1914 was war. This is especially true for North and South America during this time. A war could potentially call into question the solvency of all nations involved. Therefore a regression of one warring nation's bond prices on those of another involved in the conflict could lead spurious correlation and makes causal inference incredible. To avoid this, I use the
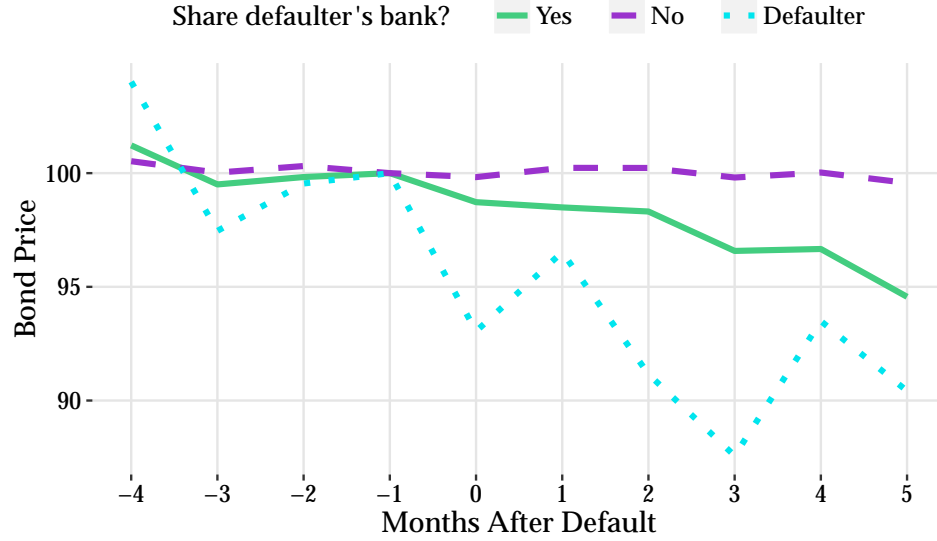
Figure 4: Average Bond Prices Near Defaults

Note: This graph plots the average price of all bonds trading in the months before and after a default. The solid green line is the average price of bonds that do share the defaulter's bank. The dashed purple line is the average for bonds that do not share the bank of the bond that defaults at time 0 above. The dotted turquoise line is the average price of defaulting bonds. The averages for both groups are normalized to 100 at time $t = -1$. The prices are those at the end of the month on the last day of trading; i.e., at $t = 0$ it is the average end of month price in the month during which default occurs.

Correlates of War 1816-2007 database (Sarkees and Wayman, 2010) to exclude observations where the defaulting state is at war with the sovereign of the other bonds trading during the default.[32]

5   Empirical Analysis: Contagion and Underwriter Reputation

5.1   Empirical Strategy

To understand the role of shared banks in transmitting sovereign financial distress, I investigate if sharing an underwriter leads to greater price comovement between defaulting bonds and non-defaulting bonds. To do so, I merge the monthly bond price data and default event data into a panel indexed by bond i and event e. The key to identification is that within countries, even during the same defaults, there is variation across a country's bonds in whether or not they share the bank of the defaulting bond. Identification comes from exploiting this variation across bonds and time within countries.

The outcome of interest is $\Delta \ln P_{i,e}$, the log change in the price of a non-defaulting bond i

---

[32]It ends up being not necessary to drop any additional observations from the subsample with complete information. Only once in this sample is a defaulting country (Turkey/The Ottoman Empire) at war with another country (Serbia) in the non-defaulting bonds sample. However, there were no Serbian bonds trading during the Serbian-Turkish war of 1876).

over the month surrounding event e. To quantify contagion, I regress this asset price change on the logged, monthly change in the price of the defaulting bond ($\Delta \ln P_e^D$) of event e.[33] I estimate the effect of bank reputation on contagion by including a binary indicator Bank$_{i,e}$ that equals one when bond i has the same paying agent as the defaulting bond of event e (and zero otherwise).[34] Interacting this indicator variable with the asset price change of the defaulting bond makes it possible to estimate how sharing an underwriter affects the transmission of asset price changes. The baseline specification is

$$\Delta \ln P_{i,e} = \beta_1 \Delta \ln P_e^D + \beta_2 1[\text{Bank}]_{i,e} + \beta_3 (\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}) \tag{3}$$
$$+ \gamma L(\Delta \ln P_{i,e}) + \text{Country}_i \times \text{Year}_e + \varepsilon_{i,e}$$

where $L(\Delta \ln P_{i,e})$ is the previous month's price change (a control) and Country$_i$ is a fixed effect for the non-defaulting bond's country.

Identification. The central challenge for identifying the causal effect of sharing a defaulter's bank on bond prices is that unobserved factors may simultaneously impact both the defaulting and non-defaulting bonds. For example, a fall in the price of silver could trigger both a default in Mexico and comovement between Mexican bonds and the bonds of other silver exporters in this era, such as Australia. In general, contagion is challenging to quantify because variation in unobserved country-level factors could drive comovement between bonds. Here, the risk is that the regression would conflate the impact of a country's exposure to a defaulter's bank with the impact of these latent shocks.

This paper addresses this challenge by using *within* country variation in exposure to a defaulter's bank. In this era, many countries had outstanding bonds written by different underwriters. By including a country-specific time trend, the regression above implicitly compares bonds within the same country and time period, subject to the same country-level shocks, but differing in their exposure to a defaulter's underwriter. In effect, the change in bond price comovement is estimated from the spread that opens up among bonds from the same country, due to their different underwriter exposures. This approach to identification disentangles the effect changes in country-level factors from sharing an defaulter's underwriter (Khwaja and Mian, 2008).

A lingering identification concerns centers on the interpretation of the effect of sharing a defaulter's underwriter. Namely, does the estimated effect impact non-defaulting bonds through changes in the underwriter's reputation or another channel? This interpretation follows under the assumption of an exclusion restriction: that sharing a defaulter's bank im-

---

[33]When multiple bonds are part of the same default, $\Delta \ln P_e^D$ is the weighted averaged of the different bonds' price changes (weighted by principal). I.e., $\Delta \ln P_e^D = \sum_{d \in \mathcal{D}(e)} \frac{P_d(\Delta \ln P_{d,e})}{\sum_{d \in \mathcal{D}(e)} P_d}$ where $\mathcal{D}(e)$ is the set of defaulting bonds in event e and P_d is the principal of bond $d \in \mathcal{D}$.

[34]Since the underwriter is almost always a paying agent, there is little loss from only using the IMM data's paying agents to match. Since underwriter data is most complete for the defaulting bonds, I match non-defaulting bonds based on their paying agents to underwriters or paying agents of the defaulting bond(s).

22

pacts non-defaulter's bond prices *only* through damage to the underwriter's reputation. This would be violated if, for example, default triggered wealth losses that resulted in disproportionate sales of the *non-defaulting bonds* issued through the *defaulter's underwriter*.

The remainder of this section presents the main empirical results. The subsequent section provides additional evidence supporting the interpretation that reputation is the mechanism underlying the results presented here.

5.2 Results: The Impact of Sharing of Defaulter's Underwriter

I find that sharing a defaulting bond's underwriter leads to significant contagion. Table 3 reports the estimation results. The most rigorous specification (column 5) includes country-year fixed effects, defaulting country fixed effects, and bank fixed effects. According to this specification, a one percentage point decrease in the defaulting bond's price is associated with a 0.05 percentage point fall in a non-defaulting bond's price when it does not share a common underwriter. This corresponds to 5% pass-through. Some positive comovement on average is not surprising, as bonds may on average share other common factors.

The coefficient on the shared bank indicator implies that, in the average default, bond prices fall by 1.63 percentage points. In the average default, the *defaulting* bond falls in price by 5.40 percentage points. The point estimate therefore implies that pass-through rises to 30% when sharing a defaulting bond's bank. The interaction term implies that 20% (5% + 15%) of any further price decreases are on average passed on to non-defaulter bonds with a shared bank. These findings illustrate that significant contagion can arise through a shared intermediary that is charged with monitoring and intervening to prevent default. An intermediary's reputation can be a powerful source of contagion outside of borrower fundamentals.

Including bank fixed effects helps address endogeneity concerns related to the issuer. Namely, it helps account for bank-specific characteristics of bonds that may also influence their average comovement during times of distress. For example, underwriters may request similar collateral across different bonds. Because a bond's underwriter is determined prior to issuance, in many cases this choice long proceeds the month of default.The similarity in the estimates after adding the bank fixed effect suggests that the within-country variation used for identification is not correlated with bank-specific factors.

Table 3: Contagion Estimation Results

	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.02**	0.04***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$1[\text{Bank}]_{i,e}$	-2.23***	-2.15***	-2.00***	-1.64***	-1.63***
	(0.59)	(0.54)	(0.50)	(0.36)	(0.35)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.18***	0.19***	0.21***	0.15**	0.15**
	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)
$L(\Delta \ln P_{i,e})$	-0.09	-0.10	-0.10	-0.13*	-0.13*
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)
Country FE	✓	✓	✓	✓	✓
Year FE		✓	✓	✓	✓
Def. Country FE			✓	✓	✓
Country x Year FE				✓	✓
Bank FE					✓
# Time Clusters	76	76	76	76	76
Observations	21,542	21,542	21,542	21,542	21,542
R^2	0.03	0.05	0.06	0.23	0.23

Note: The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

6 Interpretation: The Role of Underwriter Reputation

This section assesses the plausibility that reputation, rather than alternative channels related to a common underwriter, can account for the contagion documented above. The model of Section 3 yields several testable predictions, which I investigate empirically. Ultimately I find evidence consistent with reputation and at odds with alternative explanations.

6.1 Contagion and the Size of Default

While the evidence considered so far is consistent with the reputation mechanism presented in section 3, it could also be explained by an alternative story with segmented markets and wealth effects. If investors tend to purchase bonds from the same bank(s), the default of one bond may cause the price of other non-defaulting bonds underwritten by the same bank to fall as investors sell those bonds in response to their decreased wealth. This story requires no role for reputation but could generate the same patterns observed in the main analysis.

To distinguish between these mechanisms, I augment the baseline specification test a pre-

diction for which reputation and wealth effects have different implications. If wealth effects are driving the results, a default affecting a larger amount of investors' wealth should be associated with *more* contagion. However, if reputation is the central force driving contagion, a larger default may signal that the underlying crisis that caused the default was more serious and thus harder to prevent or less anticipated. In this case, the bank effectively receives less blame for the default and its reputation is less damaged. With a more limited effect on reputation, a larger default should be associated with *less* contagion.

To test this, I compute the percentage of a bank's bonds (in terms of principal) involved in default, Share$_e$, for each event e. I then add to the baseline specification this covariate and its interaction with the dummy indicating a shared bank (Bank$_{i,e}$). The results, in table 4, do not suggest that wealth effects are playing an important role. The positive coefficient on the interaction term implies a lower magnitude of the negative effect of sharing a defaulting bond's bank. A weaker effect of sharing a defaulting bond's bank when the default is more "severe" is consistent with reputation declining less.

6.2 Selective Default

In this era, selective default was not uncommon. For 36% of observations in the sample, sovereigns defaulted on a subset of their bonds as opposed to all of their outstanding bonds. When underwriters can build reputation for avoiding default, *selective default* can send a more informative signal to investors about the underwriter's willingness/ability to avoid default. If the difficulty in averting default varies across crises (and is imperfectly observed by investors), when one underwriter avoids default investors infer default was less difficult to prevent. Conditional on this additional information, default sends more a negative signal about the underwriter.

To test for the presence of this mechanism, I examine how the effect of sharing a defaulter's underwriter differs in selective defaults. Table 5 reports regression results after adding an interaction term between the shared bank indicator and an indicator for event e being a selective default. The estimates indicates that in non-selective defaults, sharing a defaulting bond's bank leads to a 0.77 percentage point decrease in bond prices. This corresponds to 14% pass-through of the defaulting bond's price decrease in an average default. Consistent with scenario described above, the impact is even larger in a selective default, where bonds on average fall an additional 1.67 percentage, decreasing 2.44% percentage points in total. This larger decline corresponds to 45% pass-through of the fall in the defaulting bond's price.

Next, I examine the effect of sharing an underwriter with a bond that did *not* enter default. In addition to selective default sending a more negative signal about the defaulting bond's underwriter, it can also send a positive (or less negative) signal about an underwriter that avoided default.

To explore this, I focus on the subset of selective defaults. Instead of using only a binary indicator for sharing a defaulter's bank, I add an interaction with the defaulting bond's price

Table 4: Interaction with the Defaulting Share of Bonds

	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.02**	0.04***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$1[\text{Bank}]_{i,e}$	-1.49***	-1.31***	-1.37***	-1.02**	-1.03**
	(0.52)	(0.49)	(0.51)	(0.42)	(0.42)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.19***	0.20***	0.22***	0.16**	0.16**
	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)
$\text{Share}_e \times 1[\text{Bank}]_{i,e}$	1.35**	1.39**	1.19*	1.20*	1.17
	(0.66)	(0.67)	(0.65)	(0.71)	(0.72)
Share_e	0.03	0.26	-0.003	-0.02	-0.02
	(0.17)	(0.21)	(0.23)	(0.24)	(0.24)
$L(\Delta \ln P_{i,e})$	-0.09	-0.10	-0.10	-0.13*	-0.13*
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)
Country FE	✓	✓	✓	✓	✓
Year FE		✓	✓	✓	✓
Def. Country FE			✓	✓	✓
Country x Year FE				✓	✓
Bank FE					✓
# Time Clusters	76	76	76	76	76
Observations	21,542	21,542	21,542	21,542	21,542
R^2	0.03	0.05	0.06	0.23	0.24

Note: The covariate Share_e is the percentage of the face value of bonds in default during event e among all the active bonds underwritten by the bank(s) associated with the defaulting bond. I.e., $\text{Share}_e = 100 \times \sum_{b \in \mathcal{B}(e)} \left(\frac{D_{be} X_b}{\sum_{b \in \mathcal{B}(e)} X_b} \right)$ where b denotes a bond, $\mathcal{B}(e)$ the set of active bonds issued by the bank(s) associated with event e, $D_{be} = 1$ if b is in default in event e, and X_b is the principal of bond b. The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

change and an indicator for having a "good bank" during a default. Specifically, a good bank is one with outstanding bonds in the country that defaulted in event e that did *not* enter default. Table 6 displays the regression results. On average, bonds issued by a good bank exhibit higher returns than bonds unconnected to the default (the omitted category), but the difference is not statistically significant.

Both bonds issued by good banks and the defaulting bond's underwriter comove more strongly with the defaulting bond (compared to unconnected bonds). But comovement is

Table 5: Interaction with Selective Default Indicator

	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.03**	0.04***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$1[\text{Bank}]_{i,e}$	-1.00*	-0.94*	-0.69*	-0.77**	-0.77**
	(0.60)	(0.50)	(0.41)	(0.36)	(0.35)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.18***	0.19***	0.22***	0.16**	0.16**
	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)
$1[\text{Selective}]_e \times 1[\text{Bank}]_{i,e}$	-2.66***	-2.62***	-2.90***	-1.67**	-1.65**
	(0.85)	(0.80)	(0.87)	(0.66)	(0.67)
$1[\text{Selective}]_e$	-0.49	0.50	-0.89*	-0.84	-0.84
	(0.34)	(0.57)	(0.52)	(0.53)	(0.54)
$L(\Delta \ln P_{i,e})$	-0.09	-0.10	-0.10	-0.13*	-0.13*
	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)
Country FE	✓	✓	✓	✓	✓
Year FE		✓	✓	✓	✓
Def. Country FE			✓	✓	✓
Country x Year FE				✓	✓
Bank FE					✓
# Time Clusters	76	76	76	76	76
Observations	21,542	21,542	21,542	21,542	21,542
R^2	0.03	0.05	0.06	0.23	0.24

Note: The indicator $1[\text{Selective}]_e$ equals one when the default in event e was a selective default. The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

nearly twice as strong for bonds from underwriters that experienced a default (34% pass-through versus 20%). This result is consistent with default sending a negative signal about both kinds of underwriters, perhaps suggesting shortcomings in the due diligence phase of underwriting. However, consistent with a weaker impact on reputation due to avoiding default, pass-through is weaker for bonds underwritten by the good bank. Conditional on knowing the sovereign faced pressure to default, a lack of default can send a positive signal that an underwriter is better able/willing to prevent default.

Table 6: Interaction with "Good Bank" Indicator

	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.05***	0.05***	0.06***	0.06***	0.06***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
$1[\text{Bank}]_{i,e}$	-3.79***	-3.72***	-3.63***	-3.00***	-2.94***
	(1.08)	(1.06)	(1.03)	(1.07)	(1.09)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.34*	0.34**	0.39**	0.34*	0.34*
	(0.17)	(0.17)	(0.16)	(0.18)	(0.18)
$\Delta \ln P_e^D \times 1[\text{GoodBank}]_{i,e}$	0.20***	0.20***	0.20***	0.20***	0.20***
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
$1[\text{GoodBank}]_{i,e}$	0.12	0.40	0.03	0.75	0.70
	(0.83)	(0.87)	(0.88)	(1.09)	(1.05)
$L(\Delta \ln P_{i,e})$	-0.13**	-0.14**	-0.13**	-0.17*	-0.17*
	(0.06)	(0.06)	(0.06)	(0.09)	(0.09)
Country FE	✓	✓	✓	✓	✓
Year FE		✓	✓	✓	✓
Def. Country FE			✓	✓	✓
Country x Year FE				✓	✓
Bank FE					✓
# Time Clusters	76	76	76	76	76
Observations	8,682	8,682	8,682	8,682	8,682
R^2	0.07	0.08	0.08	0.32	0.32

Note: The indicator $1[\text{GoodBank}]_{i,e}$ equals one when the non-defaulting bond has an underwriter with outstanding bonds issued for the defaulting *country* that did *not* enter default. The sample used here is the subset of observations from selective defaults. The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

6.3 Default with a Strong Reputation

How does contagion differ when the underwriter initially had a better reputation? In general, there is a non-monotonic relationship between the price change triggered by default and reputation in the model from Section 3. In the model, reputation is measured the belief μ that the underwriter will fight to try to prevent a crisis from turning into a default. At extremely high or low levels of reputation, investors already have strong beliefs. One new default will have a relatively small effect on their posterior belief. In intermediate ranges of reputation, the model implies a larger price change in prices following a default.

To empirically explore the relationship between reputation and contagion, I add an interaction term with a measure of reputation. I proxy for an underwriter's reputation using the number of defaults over the past year that included a bond from the underwriter. Table 7 reports the regression results. The coefficient on the shared bank indicator implies that in the average default, for a bank with no default in the past year, sharing the defaulting bond's bank led to a 1.62 percentage point bond price decrease. Having one recent default lowers this effect to 0.49 percentage points. The interaction term implies that more recent defaults are on average associated with milder contagion.

Table 7: Interaction with Bank's # Recent Defaults

	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.02	0.04***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
$1[\text{Bank}]_{i,e}$	-2.36***	-2.23***	-2.08***	-1.63***	-1.62***
	(0.57)	(0.52)	(0.48)	(0.38)	(0.37)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.16***	0.17***	0.20***	0.14**	0.14**
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)
$\text{NDef}_e \times 1[\text{Bank}]_{i,e}$	1.44***	1.43***	1.40***	1.13***	1.13***
	(0.44)	(0.33)	(0.35)	(0.36)	(0.36)
NDef_e	0.34*	0.12	0.48	0.46	0.46
	(0.17)	(0.24)	(0.32)	(0.33)	(0.33)
$L(\Delta \ln P_{i,e})$	-0.08	-0.09	-0.09	-0.11	-0.11
	(0.08)	(0.08)	(0.07)	(0.08)	(0.08)
Country FE	✓	✓	✓	✓	✓
Year FE		✓	✓	✓	✓
Def. Country FE			✓	✓	✓
Country x Year FE				✓	✓
Bank FE					✓
# Time Clusters	76	76	76	76	76
Observations	21,228	21,228	21,228	21,228	21,228
R^2	0.04	0.06	0.07	0.25	0.25

Note: The covariate NDef_e measures the number of defaults over the past year that included a bond from the underwriter of the defaulting bond of event e. The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

These results are consistent with banks on average being in the lower reputation region.

Here, default is less surprising for banks that have already established a bad reputation. Default among bonds issued by reputable underwriters is more surprising and leads to more contagion (a larger decrease in price in the average default).

7 Conclusion

This paper finds evidence that financial intermediaries can be an important source of non-fundamental contagion. In pre-1914 sovereign debt markets, British sovereign bond issuers were in unique position to influence the performance of their bonds. By learning about and advising the sovereign, standing ready to provide short-term capital should a liquidity shortage occur, and ignoring short-term opportunistic gains in favor of building a reputation, banks were able reduce the likelihood that sovereigns would default.

Aware of this, news of default on one bond signaled to investors that the bank was less willing and able to perform these tasks. Others bonds issued by the same bank appeared riskier to investors and their prices fell in response. Even absent real economic linkages between the defaulting bond and the non-defaulting bonds of the same issuer, sovereign distress was able to spread to different countries.

New data from the CFB Reports paired with monthly bond price data from the IMM suggest that this channel existed in pre-1914 sovereign bond markets. Identification is achieved by exploiting variation in association with the defaulting bond's bank within countries. The effect of having a bank in common with a defaulting bond leads to significantly more bond price comovement. Without a shared bank, a 5% drop in the price of a defaulting bond only leads to a 0.26% decline in bond prices. Only 5% of the fall is transmitted to other bonds. But when bonds share the bank of the defaulting bond, the same 5% drop now leads to 1.77% fall in non-defaulting bonds' prices. This is a 36% pass-through of the asset price loss.

This era gives use a chance to examine how powerful reputation and non-fundamental contagion can be in transmitting sovereign financial stress. In a modern setting, many policymaking agencies are in a position where their actions can reveal information about their willingness to prevent economic crises. When this willingness in one context is related to the agency's willingness to do so in other contexts, actions can be a powerful signal to investors. The significant ability of Britain's merchant banks to transmit financial weakness in pre-1914 sovereign debt markets suggests it is worthwhile for future research to investigate when a similar reputation channel could exist and to quantify its importance. A better understanding of these channels could help policymakers and investment banks in assessing the risks of contagion associated with the information revealed by their actions.

References

Abreu, Marcelo P., João Manoel Pinho de Mello, and Antonio Sodré, "Informational Spillovers in the Pre-1914 London Sovereign Debt Market," *Journal of Money, Credit and Banking (revision requested)*, 2007.

Arellano, Cristina and Yan Bai, "Renegotiation Policies in Sovereign Defaults," *American Economic Review Papers and Proceedings*, 2014, *104* (5), 94–100.

Bocola, Luigi, "The Pass-Through of Sovereign Risk," *Journal of Political Economy (forthcoming)*, 2015.

Chabot, Benjamin R. and Christopher J. Kurz, "That's Where The Money Was: Foreign Bias and English Investment Abroad, 1866-1907*," *The Economic Journal*, 2010, *120* (547), 1056–1079.

Chapman, Stanley, *The Rise of Merchant Banking*, Routledge, 2013.

Cole, Harold L., Daniel Neuhann, and Guillermo Ordonez, "Debt Crises: For Whom the Bell Tolls," 2015.

Council of the Corporation of Foreign Bondholders, *Annual Reports*, 1869-1914.

Eichengreen, Barry, "Back to the Future: The Return of Bond and Equity Finance," *Harvard International Review*, 1995, *18* (1), 8–11.

Elliott, Matthew, Benjamin Golub, and Matthew O. Jackson, "Financial Networks and Contagion," *American Economic Review*, 2014, *104* (10), 3115–53.

Esteves, Rui Pedro, "The Bondholder, The Sovereign, and the Banker: Sovereign Debt and Bondholders' Protection before 1914," *European Review of Economic History*, 2013, *17*, 389–407.

Faingold, Eduardo and Yuliy Sannikov, "Reputation in Continuous-Time Games," *Econometrica*, 2011, *79* (3), 773–876.

Farhi, Emmanuel and Jean Tirole, "Deadly Embrace: Sovereign and Financial Balance Sheets Doom Loops," *NBER Working Paper Series* No. 21843, 2016.

Fishlow, Albert, "Lessons from the Past: Capital Markets During the 19th Century and the Interwar Period," *International Organization*, 1985, *39* (3), 383–439.

Flandreau, Marc, "Crises and Punishment: Moral Hazard and the pre-1914 International Financial Architecture," *CEPR Discussion Paper*, 2003.

— **and Juan Huitzilihuitl Flores**, "Bonds and Brands: Foundations of Sovereign Debt Markets, 1820-1830," *The Journal of Economic History*, 2009, *69* (3), 646–684.

— **and** — , "Bondholders versus Bond-Sellers? Investment Banks and Conditionality Lending in the London Market for Government Debt, 1815-1913," *European Review of Economic History*, 2012, *16* (4), 356–383.

Ford, A. G., "Argentina and the Baring Crisis of 1890," *Oxford Economic Papers, New Series*, 1956, *8* (2), 127–150.

Gaure, Simen, "Linear Group Fixed Effects. R package version 2.4-1788," 2015.

Hlavac, Marek, "Well-Formatted Regression and Summary Statistics Tables. R package version 5.2," 2015.

Investor's Monthly Manual, Published by *The Economist*, 1869-1914, London: Thomas Harper Meredith.

Kaminsky, Graciela and Carmen Reinhart, "On Crises, Contagion, and Confusion," *Journal of International Economics*, 2000, *51* (1), 145–168.

— **,** — **, and Carlos Vegh**, "The Unholy Trinity of Financial Contagion," *Journal of Economic Perspectives*, 2003, *17* (4), 51–74.

Khwaja, Asim Ijaz and Atif Mian, "Tracing the impact of bank liquidity shocks: Evidence from an emerging market," *American Economic Review*, 2008, *98* (4), 1413–42.

Lizarazo, Sandra, "Contagion of Financial Crises in Sovereign Debt Markets," 2009.

Lorenzoni, Guido and Iván Werning, "Slow Moving Debt Crises," *NBER Working Paper Series* No. 19228, 2013.

Mauro, Paolo and Yishay Yafeh, "The Corporation of Foreign Bondholders," *International Monetary Fund,* Working Paper No. 03/107, 2003.

Meyer, Josefin, Carmen M. Reinhart, and Christoph Trebesch, "Sovereign Bonds Since Waterloo," 2019.

Mitchener, Kris James and Marc D. Weidenmier, "The Baring Crisis and the Great Latin American Meltdown of the 1890s," *Journal of Economic History*, 2008, *68* (02), 462–500.

Oosterlinck, Kim, "Sovereign Debt Defaults: Insights from History," *Oxford Review of Economic Policy*, 2013, *29* (4), 697–714.

Park, JungJae, "Contagion of Sovereign Default Risk: The Role of Two Financial Frictions," 2014.

Sarkees, Meredith Reid and Frank Wayman, "Resort to War: 1816-2007," *Washington DC; CQ Press*, 2010.

Tomz, Michael and Mark L. J. Wright, "Empirical Research on Sovereign Debt and Default," *NBER Working Paper Series* No. 18855, 2013.

Weller, Leonardo, "Government versus Bankers: Sovereign Debt Negotiations in Porfirian Mexico, 1888-1910," *The Journal of Economic History*, 2015, *75* (04), 1030–1057.

Appendix

A   Additional Tables

Table 8: Comparing Contagion Within Events

	(1)	(2)	(3)
$1[\text{Bank}]_{i,e}$	-2.06***	-1.72***	-1.71***
	(0.48)	(0.37)	(0.36)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.22***	0.16**	0.16**
	(0.07)	(0.07)	(0.07)
$L(\Delta \ln P_{i,e})$	-0.11*	-0.14*	-0.14*
	(0.06)	(0.07)	(0.07)
Country FE	✓	✓	✓
Event FE	✓	✓	✓
Country x Year FE		✓	✓
Bank FE			✓
# Time Clusters	76	76	76
Observations	21,542	21,542	21,542
R^2	0.09	0.26	0.26

Note: The outcome variable is the change in a non-defaulting bond's price ($\Delta \ln P_{i,e}$). The explanatory variables are: the change in the defaulting bond's price ($\Delta \ln P_e^D$), an indicator for sharing the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$), and the interaction of these two variables. Price changes are measured as the difference in log prices between the current month and the previous month. The coefficient on the shared underwriter indicator is scaled by 100 so that its units correspond to log points. The defaulting bond's price change is demeaned prior to regression. The lagged price change for the non-defaulting bond is included as a control variable. Standard errors are clustered by time (monthly). Statistical significance: 0.1*, 0.05**, 0.01***.

B   Geography of Bonds

Table 9: Defaulting Bonds by Country

Country	Bonds	Country	Bonds	Country	Bonds	Country	Bonds
Argentina	57	Venezuela	14	Bolivia	4	Nicaragua	2
Turkey	27	Ecuador	11	Colombia	4	Peru	2
Costa Rica	15	Guatemala	5	Paraguay	4	Mexico	1
Egypt	14	Spain	5	Portugal	3	San Domingo	1
Greece	14	Uruguay	5	Honduras	2		

Note: This table breaks down the number of defaulting bonds in the main sample by sovereign. Each time a default occurs for a bond, it contributes to the total number of observed defaults counted here. San Domingo refers to the current capital of the Dominican Republic (Santo Domingo).

Table 10: Number of Bonds Connected by Banker to a Defaulting Bond

Country	Bonds	Country	Bonds	Country	Bonds	Country	Bonds
Argentina	37	India	6	Chile	3	Spain	2
Canada	27	Sweden	6	Honduras	3	China	1
Russia	21	Venezuela	6	Belgium	2	Cuba	1
Turkey	18	Italy	5	Bulgaria	2	Japan	1
Egypt	13	Costa Rica	4	Denmark	2	Morocco	1
Britain	11	Hungary	4	Ecuador	2	Portugal	1
Brazil	8	Norway	4	Germany	2	South Africa	1
Greece	8	Paraguay	4	Mexico	2		
Australia	7	Romania	4	New Zealand	2		
US	7	Uruguay	4	Peru	2		

Note: This table breaks down by country the number of bonds associated via a shared bank with a defaulting bond. These data are from the sample used in the regression analysis. Each time a bond defaults, it contributes to the total number of observed defaults counted here. Throughout the sample I label bonds issued for Australian states as having the same country as Australia became a country in 1901.

Table 11: Number of Bonds Trading During Defaults

Country	Bonds	Country	Bonds	Country	Bonds	Country	Bonds
Australia	88	France	10	Paraguay	4	Barbados	1
Canada	62	Mauritius	10	Peru	4	Bolivia	1
Argentina	46	US	10	Romania	4	Fiji	1
Turkey	38	Sweden	9	Trinidad	4	Ghana	1
Russia	33	Italy	8	Belgium	3	Grenada	1
Britain	32	Spain	8	British Guiana	3	Hawaii	1
Brazil	22	Ceylon	7	Bulgaria	3	Liberia	1
South Africa	20	Hungary	7	Colombia	3	Morocco	1
Egypt	19	Venezuela	7	Honduras	3	Nicaragua	1
New Zealand	17	Jamaica	6	Cuba	2	Nigeria	1
Chile	16	Norway	6	Ecuador	2	North Germany	1
China	15	Portugal	6	Germany	2	Orange Free State	1
Mexico	13	Uruguay	6	Hong Kong	2	San Domingo	1
Natal	13	Costa Rica	5	Ireland	2	Serbia	1
Greece	11	Denmark	5	Sierra Leone	2	Siam	1
India	11	Guatemala	5	St. Lucia	2	Straits Settlements	1
Japan	11	New Granada	4	Antigua	1	Switzerland	1

Note: This table breaks down the number of bonds associated via a shared bank with a defaulting bond. Each time a bond defaults, it contributes to the total number of observed defaults counted here. British Guiana, Ceylon, and the Straits Settlements are now primarily Guyana, Sri Lanka, and Singapore (respectively). Natal and Orange Free State are presently part of South Africa. New Granada is the predecessor state to Colombia and Panama and also included parts of Ecuador and Venezuela.

C Bond Characteristics

Table 12: Bond Principal Size (Millions of Contemporaneous £)

Variable	Mean	25th %	50th %	75th %	Std. Dev.	Obs.	Default	Shared banker
Principal$_{i,e}$	£10.91	£0.78	£2.28	£6.44	£58.64	19,686	N	N
Principal$_{i,e}$	£10.48	£1.50	£3.82	£8.00	£47.60	781	N	Y
Principal$_{i,e}$	£6.56	£1.19	£2.40	£5.40	£12.83	189	Y	NA
Principal$_{i,e}$	£155.44	£0.80	£6.52	£84.50	£523.13	922	N	Unknown

Note: This table reports summary statistics for the principal ("original issue" in the IMM data) of the bonds in the panel for different subsamples of the main sample. The first row is for non-defaulting bonds i that do not share a banker with the defaulting bond of event e. The second row are non-defaulting bonds with a banker in common with the defaulting bond. The third row gives the principal size for the defaulting bonds prior to their respective defaults. The fourth row is for non-defaulting bonds with unknown bankers. Most of the large bonds with unknown bankers are American bonds.

D   Bank Affiliations of Bonds

Table 13: Number of Bonds by Underwriter/Paying Agent (1 of 4)

Bank	No. of Non-Defaulting	No. of Defaulting	$\frac{100 \times \text{Def. Bonds}}{\text{Non-Def. Bonds}}$
Crown Agents	3,068	0	0.00%
Barings	2,948	24	0.81%
Rothschilds	2,019	4	0.20%
Bank of England	1,856	2	0.11%
London & Westminster	1,209	0	0.00%
Hambros	971	14	1.44%
Glyn, Mills, Currie & Co.	847	4	0.47%
Imperial Ottoman	813	20	2.46%
Bank of Montreal	729	0	0.00%
National Bank of Australia	669	0	0.00%
London Joint Stock Bank	644	0	0.00%
London & County	395	6	1.52%
Murrieta	392	14	3.57%
Bank of New South Wales	381	0	0.00%
Raphael	367	2	0.54%
Schroders	341	2	0.59%
Imperial Treasury Paris	337	0	0.00%
Thomson & Bonar	327	3	0.92%
Oriental Bank of New South Wales	315	0	0.00%
Stern	312	6	1.92%
J. S. Morgan	306	4	1.31%
Fruhling & Goschen	293	5	1.71%

Note: This table breaks down the number of bonds associated with the various underwriters and paying agents in the sample. For each bank, the second column gives the number of bonds in the sample of those that were trading during a default but not counted as defaulting. The third gives the number of bonds for each bank that default in the sample considered in the main analysis. The third column reports the ratio of default bonds to non-defaulting bonds.

Bank	No. of Non-Defaulting	No. of Defaulting	$\frac{100 \times \text{Def. Bonds}}{\text{Non-Def. Bonds}}$
River Plate Trust Loan & Agency	293	12	4.10%
Union Bank of Australia	272	0	0.00%
Consolidated Bank	260	0	0.00%
Dent & Palmer	249	6	2.41%
Bank of Ireland	242	0	0.00%
Morton, Rose & Co.	240	13	5.42%
Robarts & Lubbock	218	15	6.88%
HSBC	205	0	0.00%
Bischoffsheim & Goldschmidt	155	6	3.87%
Gibbs	138	0	0.00%
Deutsche Bank	135	3	2.22%
Robinson Fleming	127	2	1.57%
Portuguese Financial Agency	120	3	2.50%
City Bank	108	2	1.85%
Cohen	98	3	3.06%
Devaux	95	0	0.00%
Spanish Financial Agency	94	0	0.00%
Coutts	92	0	0.00%
Comptoir d'Escompte	83	3	3.61%
McCalmonts	70	0	0.00%
Bank of British Columbia	60	0	0.00%
Lawson & Co.	60	1	1.67%
London Buenos Ayres & River Plate Bank	60	0	0.00%
Yokohama Specie Bank	57	0	0.00%
Imperial Bank of Canada	55	0	0.00%
Credit Lyonnais	54	0	0.00%
Anglo Italian Bank	53	0	0.00%

Note: This table breaks down the number of bonds associated with the various underwriters and paying agents in the sample. For each bank, the second column gives the number of bonds in the sample of those that were trading during a default but not counted as defaulting. The third gives the number of bonds for each bank that default in the sample considered in the main analysis. The third column reports the ratio of default bonds to non-defaulting bonds.

Table 15: Number of Bonds by Underwriter/Paying Agent (3 of 4)

Bank	No. of Non-Defaulting	No. of Defaulting	$\frac{100 \times \text{Def. Bonds}}{\text{Non-Def. Bonds}}$
Clydesdale	53	0	0.00%
Anglo Egyptian Bank	51	3	5.88%
Corporation of Foreign Bondholders	51	4	7.84%
Queensland National Bank	51	0	0.00%
General Credit and Finance	50	2	4.00%
Knowles & Foster	50	5	10.00%
Lumb Wanklyn	50	4	8.00%
Matheson & Co.	49	0	0.00%
National Provincial Bank	48	0	0.00%
Seligman	46	0	0.00%
Parr's	40	0	0.00%
Martin & Co.	38	0	0.00%
Hme & Col As	33	0	0.00%
Standard Bank of South Africa	33	0	0.00%
National Bank of Scotland	32	0	0.00%
Brit. Lin. Co. Bank	31	0	0.00%
Lloyds	28	0	0.00%
Newgass	26	0	0.00%
Bank of South Australia	25	0	0.00%
Russian Bank	25	0	0.00%
Bank of Adelaide	22	0	0.00%
Chartered Bank	22	0	0.00%
Gordon Barton	22	0	0.00%
Bank of Japan	16	0	0.00%
Ionian Bank	5	0	0.00%
Speyer	4	0	0.00%
Bank of Spain	2	0	0.00%

Note: This table breaks down the number of bonds associated with the various underwriters and paying agents in the sample. For each bank, the second column gives the number of bonds in the sample of those that were trading during a default but not counted as defaulting. The third gives the number of bonds for each bank that default in the sample considered in the main analysis. The third column reports the ratio of default bonds to non-defaulting bonds.

Table 16: Number of Bonds by Underwriter/Paying Agent (4 of 4)

Bank	No. of Non-Defaulting	No. of Defaulting	$\frac{100\times\text{Def. Bonds}}{\text{Non-Def. Bonds}}$
Canadian Bank of Commerce	2	0	0.00%
Huth	2	0	0.00%
London & Brazilian Bank	2	0	0.00%
Midland Bank	2	0	0.00%
Natal Bank	2	0	0.00%
Victoria Cham	2	0	0.00%
Capital & Counties	1	0	0.00%
Erlanger	1	0	0.00%
Franco-Egyptian Bank	1	0	0.00%
Isaac & Samuel	1	0	0.00%
Total	24,151	197	

Note: This table breaks down the number of bonds associated with the various underwriters and paying agents in the sample. For each bank, the second column gives the number of bonds in the sample of those that were trading during a default but not counted as defaulting. The third gives the number of bonds for each bank that default in the sample considered in the main analysis. The third column reports the ratio of default bonds to non-defaulting bonds.