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

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Abstract

This paper uses new bond-level data on sovereign borrowing and defaults during 1869-1914 to quantify a channel of contagion via banks' reputation for *monitoring* borrowers. Concerns over reputation incentivized Britain's merchant banks (who underwrote sovereign bonds) to monitor and exert influence over sovereigns. Default signaled to investors that a bank was less 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 where underwriters build a reputation for monitoring, I find further evidence supporting reputation as the mechanism – as opposed to alternative explanations such as wealth effects. 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.

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1 Introduction

Financial crises are often international 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, and exerting influence to encourage meeting 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. Prior work emphasizes the role of wealth losses among common lenders in facilitating contagion (Kaminsky, Reinhart and Vegh, 2003). However, there is little prior evidence on the ability of financial intermediaries' reputation for monitoring 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% for bonds with a different underwriter). Guided by a model of underwriter reputation formation,

[1] In this paper "contagion" specifically refers to asset price comovement.

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 manually 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 of changes in country-level factors from sharing a 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.

[2]The IMM data were digitized by William Goetzmann and K. Geert Rouwenhoorst. 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, for example, modifications to sinking funds and the rehypothecation of collateral. This broader definition helps capture small defaults that are often omitted from other historical records.

A distinct identification concern centers on the interpretation of the effect of sharing a defaulting bond's underwriter. The empirical strategy identifies the causal effect of sharing an underwriter during a default. But does this estimated effect impact bond prices *only* through underwriter reputation, or is there another underwriter-specific channel at play? For example, do defaults cause financial losses to the underwriter that impact their ability to monitor and intervene? The estimated effect can be attributed to underwriter reputation 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.

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 investors (short-term players), and a sovereign (a passive player). Each period, a new investor chooses 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 the history of defaults but do not directly observe if a crisis occurred nor if the underwriter fought the crisis.

The model captures the moral hazard and adverse selection problems 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 prior over the likelihood that the underwriter is the low-cost type. Investors 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 it sends a negative signal about the underwriter. After a default, investors revise downwards their belief that the underwriter 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 varies with the size of the default, measured as 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 purchase bonds through only one underwriter). 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. Additionally, local projections estimates reveal that sharing a defaulter's underwriter has a persistent impact on bond prices, at odds with temporary selling pressure.

Second, the model predicts that additional signals about the occurrence of a crisis or the cost of preventing default lead to a stronger revision of investor 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 other bonds) is on average associated with higher bond prices.

Third, I explore how initial reputation affects contagion. In the model, 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 beliefs, and default leads to a smaller price decrease. In intermediate ranges, default has a more negative impact on bonds sharing the defaulter's underwriter. This result suggests the possibility of a paradox: maintaining a good reputation by avoiding default can reduce contagion, but a sound reputation can make contagion more severe when default occurs because it is more surprising.

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 defaulter's underwriter is larger when banks have *more* recent defaults. This suggests that in the sample period, on average banks were in the higher reputation region, where better reputation reduces contagion following defaults.

Related Literature. This paper contributes to several strands of literature. First, it contributes a new focus on contagion to a body of work linking reputation to financial intermediary behavior and market outcomes. In modern underwriting, reputable underwriters with a track record of successful IPOs are rewarded with larger fees, market share, and higher-valued offerings (Beatty and Ritter, 1986; Nanda and Yun, 1997; Dunbar, 2000; Fang, 2005). And both underwriters and lead lenders in syndicates are willing to take costly actions to support their issues when it can improve their reputation (Lewellen, 2006; Ivashina, 2009). When market share increases the returns to reputation for honest ratings, credit rating agencies are less likely to give overly-optimistic credit ratings (Becker and Milbourn, 2011; Baghai and Becker, 2020). In these modern settings, isolating contagion can be challenging. For example, there is generally little variation within securities in rating agency exposure outside of the unique episodes studied in Becker and Milbourn (2011) and Baghai and Becker (2020).

Second, this paper sheds new light on the functioning of early sovereign debt markets and examines a channel of contagion that has received little prior attention. Using quantitative evidence and contemporaneous writings, Flandreau and Flores (2009, 2012) argue that underwriters' reputation for monitoring was critical factor in early sovereign debt markets. Investors appear to value reputable underwriters whose bonds avoided default, as evidenced by higher issuance prices and market shares (Flandreau and Flores, 2009). Indeed, contemporaneous accounts highlight the importance of the underwriter's identity in evaluating the risk of a sovereign bond.[4] This paper builds on this work by documenting the ability for underwriter reputation to spread contagion. In an analysis of two defaults by Greece in 1893 and Brazil in 1898, Abreu, Pinho de Mello and Sodré (2007) find that on average bonds sharing the underwriter of the defaulter fell in price. Building on the study of these cases, I combine data on over 100 defaults with an empirical strategy designed to isolate the effect of a shared underwriter. Understanding the origins of international contagion in this era is valuable, as the costs of crises were large even in the early years of large-scale international capital markets. Bank losses were an important vector of contagion, spreading economic crises and reshaping economic activity in the long-term (Olmstead-Rumsey, 2019; Xu, 2020). Additionally, the new bond-level data created for this paper would be useful for future work examining sovereign borrowing and default in the pre-1914 era.

Third, this paper adds to the literature on financial contagion by adding a new historical perspective and by investigating a channel that has received little prior attention. Kaminsky, Reinhart and Vegh (2003) provides a useful summary of historical patterns of financial contagion, highlighting several channels of contagion. One works through real wealth effects. As investors are made poorer by one default, their ability to lend to others can become constrained. Another related channel is portfolio rebalancing. When the riskiness of one asset grows, optimal portfolio allocation may dictate selling off other assets, depressing the price and lowering the returns of other assets (Lizarazo, 2009). Real economic linkages through trade may also spread economic distress. But empirically, a common lender is a stronger predictor of asset price comovement than trade linkages in modern data (Kaminsky, Reinhart and Vegh, 2003). This paper contributes to our understanding of the role of financial intermediaries in facilitating contagion. In particular, reputation for *monitoring* can be a powerful source of a contagion outside of wealth effects and borrower fundamentals.

The next section describes Britain's international capital markets during 1869-1914 and the in-

[4] For example: "And thus it is that the credit of a foreigner, namely that of the House of Rothschild, not that of the Kingdom of Naples, was responsible for the rise of Neapolitan securities. Hence, the value of public securities does not reflect the prosperity of a country...Naples itself had very little to do in all that beyond punctually paying coupons." – Source: Austrian Ambassador Ficquelmont in February 1822 (quoted in Gille, 1965). "It was especially regrettable that Barings had lent its name to the proceedings. Although all the firm's partners had repeatedly stated that they had no formal connection with the Mexican government and had agreed to pay out dividends as they would [for?] any other commercial agency, the general public had received a different impression. Many bondholders would never had retained their position in the loan but for the character which Messrs. Barings gave it by undertaking the agency." – Source: The Times (Sep. 18, 1827, quoted in Dawson, 1990).

centives faced by sovereign debt underwriters. Section 3 presents the model. The newly-digitized dataset is described in Section 4. Section 5 presents the empirical strategy and the main results, and 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 19$^{\text{th}}$ 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).[5]

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 borrowing 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 19$^{\text{th}}$ and early 20$^{\text{th}}$ 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.[6] 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

[5] 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).

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

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. 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 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.[7] Early in the 19$^{\text{th}}$ 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 19$^{\text{th}}$ century after being the only underwriter to have no bonds default during the debt crisis of the late 1820s, replacing the incumbent, Baring's.[8] 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.

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

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

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.[9] 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.[10]

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. 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.

[9] Occasionally underwriters formed a syndicate in this stage to offer a more competitive contract.
[10] The details of this process are drawn from (Flandreau and Flores, 2009).

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 19$^{\text{th}}$ century did in fact have lower IPO discounts on average (Flandreau and Flores, 2009).[11] 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. When serving as a paying agent, a bank was the first to know when potential threats to repayment emerged (Flandreau and Flores, 2012).

Investors did not perfectly observe if banks were gathering information, advising, and exerting influence – nor if the bank was sufficiently incentivized to avoid opportunistic pricing. Well-

[11] 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.

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. 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 costs of information gathering or exerting influence. 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).[12] Conditional on this information, the bank chooses to either fight ($a_t = F$) or allow the crisis to proceed ($a_t = A$).[13] 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

[12]The analysis is similar if we instead model the bank as exerting effort in general to lower the probability of default.
[13]The bank takes no action in when $\kappa_t = \kappa_{NC}$.

t if $s_t = D$. But when $s_t = H$, it could be either that the bank prevented a default 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

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

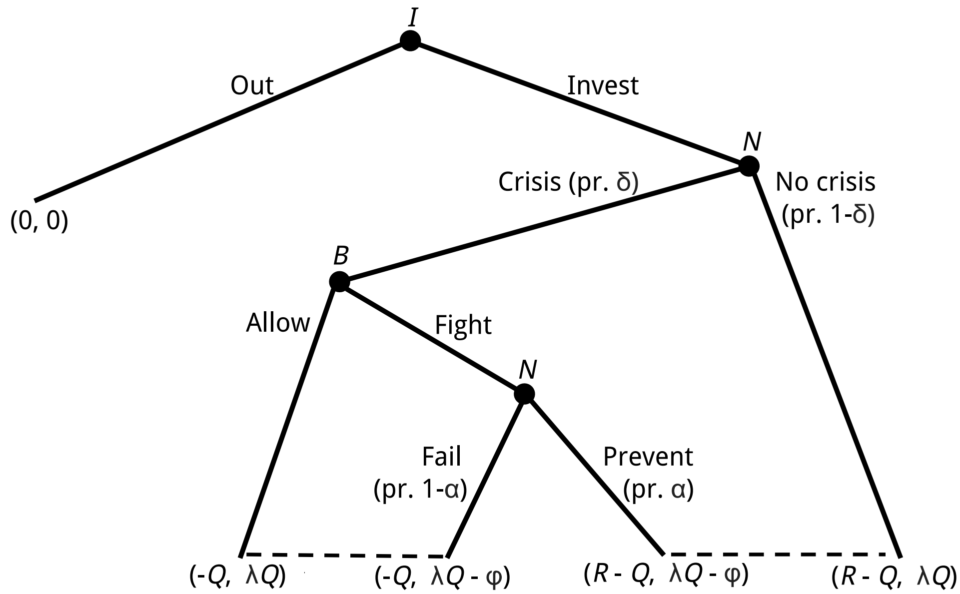
that is, if investors are sufficiently skeptical that the bank will fight.[14] The stage game is shown below in figure 1.

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:

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

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

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.

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.[15] Since the ultimate interest of this 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.[16]

Using the consistency property of any sequential equilibrium with these beliefs, we can derive

[15]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.

[16]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.

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

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

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:

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

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

$$\begin{aligned}
p_{i,t}[\mu_t(b)] &= \mathbb{E}_{\mu_{t(b)}}[c_{i,t} + \beta p_{i,t+1}] \\
&= \mathbb{E}_{\mu_t(b)}\left[\frac{c_{i,t}}{1-\beta}\right] \\
&= \frac{c_i[(1-\delta) + \delta\alpha\mu_t(b)]}{1-\beta}.
\end{aligned}$$

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:

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

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 quantifies the degree to which defaulting bond price changes are transmitted to non-defaulting bonds.

4 Data

One contribution of this paper is building a new bond-level dataset. The main novelties of this dataset are the recording of bond-level default histories, bond characteristics (including underwriter identity), and linking this information to monthly bond price data. I manually record bond default histories and characteristics from the text of CFB publications. I then manually match these bonds to digitized monthly price data.[17] 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.

[17] The price data were digitized by William Goetzmann and K. Geert Rouwenhoorst and are hosted by the Yale School of Management's International Center for Finance.

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.[18] Each year since their incorporation in 1873, the CFB published an *Annual Report of the Council of the Corporation of Foreign Bondholders*.[19] 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.[20] 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.

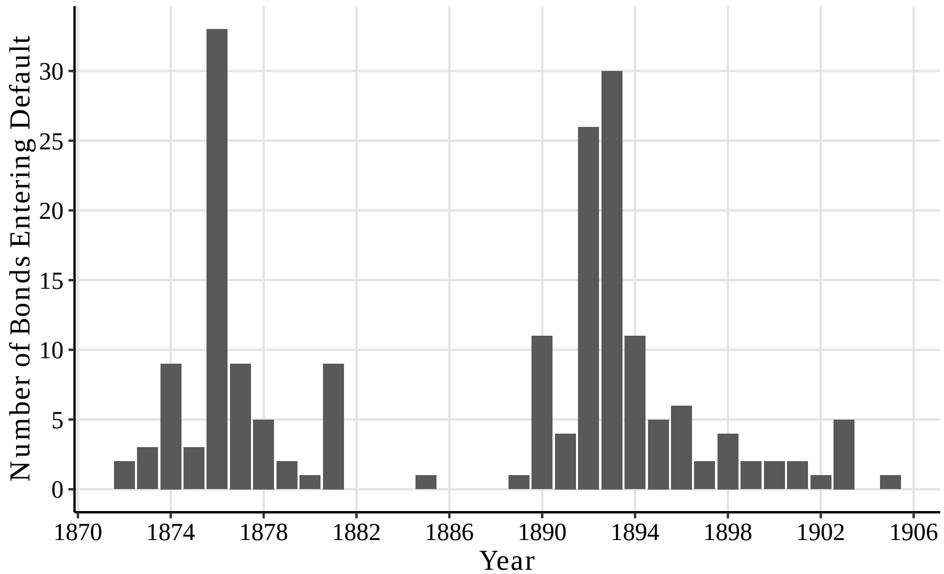
Many of the defaults in the 1890s are from Argentine bonds. A new government came to power in a contested election and significantly increased Argentina's public borrowing. Argentina

[18] 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.

[19] Publication continued through 1988.

[20] 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.

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).[21] 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.[22] The Bank of England prevented the crisis from bankrupting other merchant banks by guaranteeing Baring's liabilities.[23] 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.

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

[22]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).

[23]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).

Other nations defaulted in the years following the Baring Crisis. Contagion was worse for borrowers who previously issued through Barings. These 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.

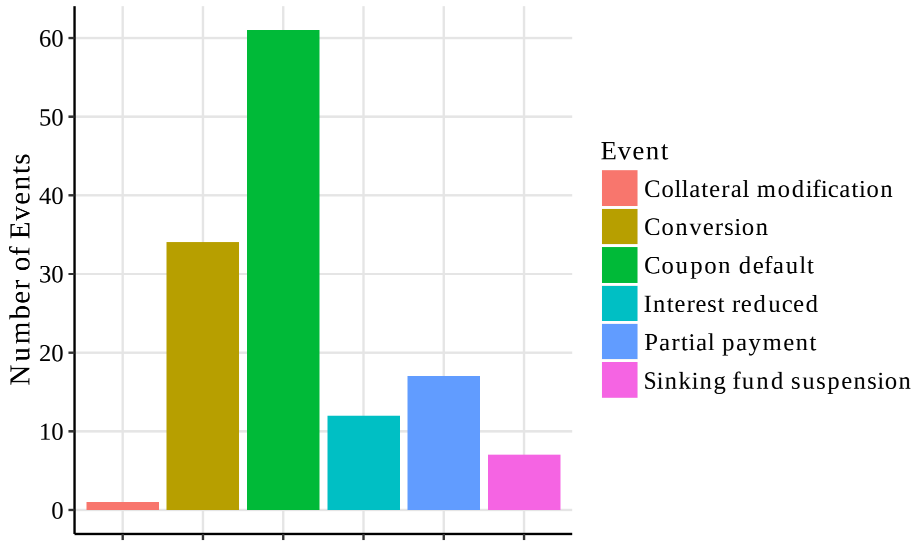
This paper adopts a broader definition of *de jure* default than is standard in the sovereign debt literature (Oosterlinck, 2013). At a minimum, most academics define default episodes by the cessation or incompleteness of interest or principal payments. I broaden this definition to include events with 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.

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.[24] 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.[25] Most often, sinking fund suspensions and collateral modifications are ignored in the sovereign default literature.

[24] 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).

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

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.

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.

4.2 Bond Data

I obtain monthly bond price data from the *Investor's Monthly Manual* (IMM), published by *The Economist*.[26] The data span 1869 to 1929, though this paper makes use of data only until 1914 due

[26]The price data were digitized by William Goetzmann and K. Geert Rouwenhoorst and are hosted by the Yale School of Management's International Center for Finance.

to the outbreak of World War I.[27] 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.[28] 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 underwriter identity 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 B.2). There are 234 bonds that have an underwriter or paying agent in common with the defaulting bond(s) during a default.[29] 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 B.3). In total 649 non-defaulting bonds from 68 different countries are in the main sample.[30]

Table 1 reports summary statistics describing the characteristics of bonds across the various default episodes in the sample used for analysis. Panel A reports characteristics for the non-defaulting bonds during each episode. Panel B reports the same characteristics for the defaulting bonds.

Typically non-defaulting bonds have a higher issue price, consistent with investors anticipating greater default risk among the bonds that end up defaulting. Defaulting bonds also tend to have a smaller amount of principal, consistent with investors being less willing to lend to higher-risk countries. Further compensating investors for greater risks, defaulting bonds also tend to have higher coupon rates. Defaulting bonds are less likely to have a sinking fund, but conditional on having a sinking fund the bonds that end up in default initially offer a higher sinking fund rate. The higher rate means these bonds have a shorter maturity, which investors may also prefer

[27] 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.

[28] 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.

[29] 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.

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

if they are correctly anticipating these countries as having greater default risk.

Table 1: Bond Summary Statistics

	Mean	SD	P25	Median	P50	N
Panel A: Non-Defaulting						
Issue Price	89.00	14.03	81.25	91.38	91.38	15910
Orig. Issue (mil. £)	37.57	214.37	0.92	2.70	2.70	25122
Coupon	4.89	1.44	4.00	5.00	5.00	26352
1[Has SF]	80.76	39.42	100.00	100.00	100.00	26600
SF Rate	1.55	2.13	1.00	1.00	1.00	12213
Panel B: Defaulting						
Issue Price	77.45	16.01	69.25	80.00	80.00	83
Orig. Issue (mil. £)	9.45	16.56	1.21	3.78	3.78	126
Coupon	5.38	1.74	4.94	6.00	6.00	128
1[Has SF]	62.60	48.57	0.00	100.00	100.00	131
SF Rate	1.65	1.21	1.00	1.00	1.00	77

Note: This table reports summary statistics calculated for the set of non-defaulting bonds (Panel A) and defaulting bonds (Panel B) across all events. Note that a bond can appear multiple times if it trading and non-defaulting during multiple defaults. The issue price is the percent relative to par value. The original issue is the initial principal on the bond in millions of British pounds. The annual coupon rate is given in percentage points. Throughout "SF" denotes a sinking fund. This tables reports the fraction of bonds with a sinking fund and the annual sinking fund rate (i.e., the fraction of principal paid to the sinking fund each year).

Table 2 reports monthly bond price changes during defaults (Panel A) and in the month before the default occurs (Panel B). Within the rows, the table reports price behavior separately for (1) non-defaulting bonds that do not share the defaulter's bank; (2) non-defaulting bonds that *do* share the defaulter's bank; and (3) the defaulting bond(s).

On average, prices decrease for all bonds during a default. This is consistent with defaults tending to occur in worse economic climates or triggering investor pessimism about sovereign bonds in general. Prices fall 0.21 log points on average among non-defaulting bonds not connected to the defaulter via a common underwriter. Non-defaulting bonds that do share the defaulter's underwriter instead fall on average 1.72 log points. The defaulting bond on average falls in price by 4.90 log points. The median changes are zero for non-defaulting bonds and -2.82 log points for defaulting bonds. In the month prior to default, the average bond price changes are closer to zero (-0.10 to 0.51 log points), with median changes of zero across all bonds.

Table 2: Bond Prices During and Before Default

	Mean	SD	P25	Median	P50	N	In Default?	Share Bank?
Panel A: During Default								
$\Delta \ln P$	-0.21	7.94	-1.00	0.00	0.00	23304	No	No
$\Delta \ln P$	-1.72	16.02	-2.70	0.00	0.00	908	No	Yes
$\Delta \ln P$	-4.90	13.19	-11.87	-2.82	-2.82	203	Yes	N/A
Panel B: Month Before								
$\Delta \ln P$	-0.10	8.47	-0.96	0.00	0.00	23035	No	No
$\Delta \ln P$	0.44	7.10	-1.08	0.00	0.00	893	No	Yes
$\Delta \ln P$	0.51	12.75	-5.11	0.00	0.00	203	Yes	N/A

Note: This table reports summary statistics for bond prices during the month of default (Panel A) and in the month prior to default (Panel B). The measure of prices is the monthly change in log bond prices (scaled by 100). The summary statistics are calculated separately for defaulting and non-defaulting bonds during each event. The samples are also split based on whether bonds share the defaulter's bank.

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 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.[31]

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

[31] 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).

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 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.[32] I estimate the effect of bank reputation on contagion by including a binary indicator $\text{Bank}_{i,e}$ that equals one when bond i has the same paying agent as the defaulting bond of event e (and zero otherwise).[33] 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

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

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 de-

[32] 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 $d \in \mathcal{D}$.

[33] 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).

faulter'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 a 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 impacts 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.

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***.

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 co-movement 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.

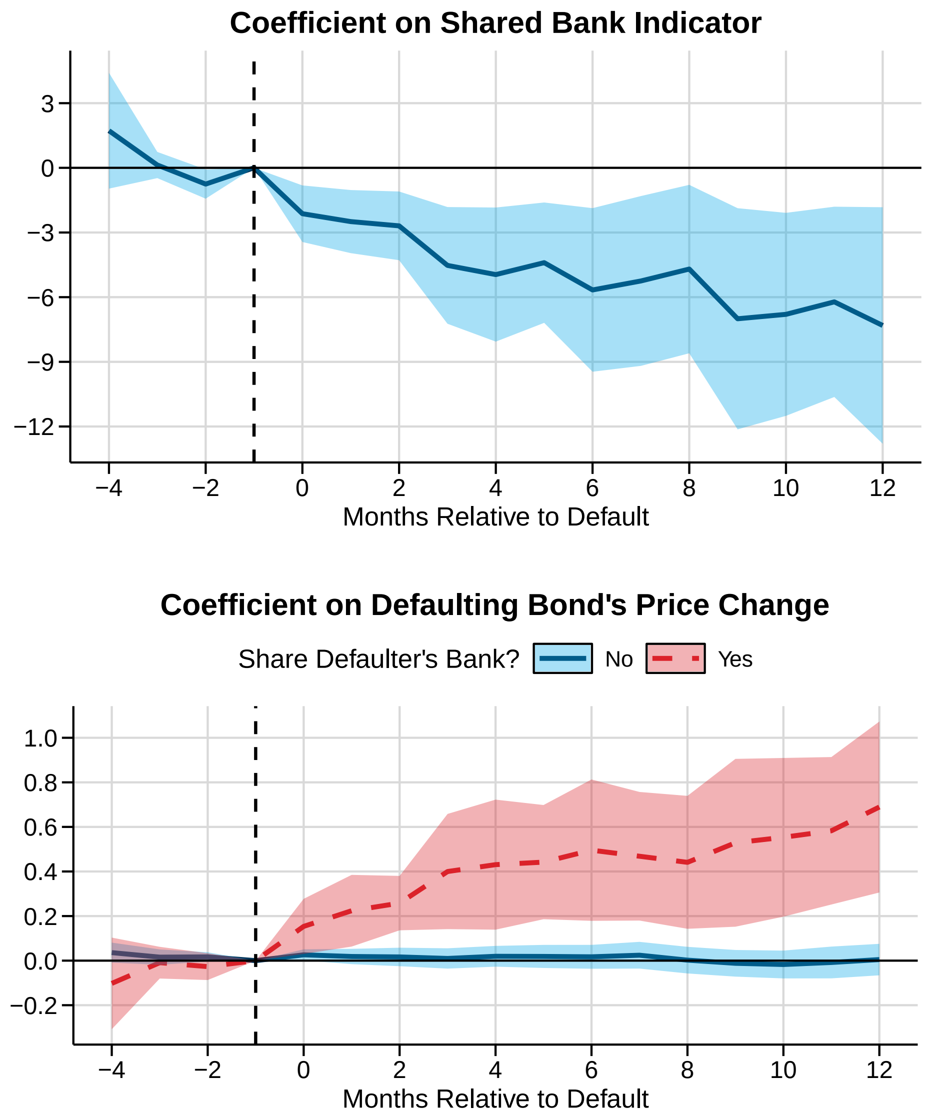
Persistence. I estimate the impact of sharing a defaulter's bank at longer horizons using local projections (Jordà, 2005). Figure 4 plots estimation results. Prior to default, the defaulting bond's price decrease has no effect on either bonds connected or unconnected to the defaulter via a shared bank. After default, there is a small and temporary decrease in unconnected bonds' prices for a given decrease in the defaulting bond's price. In contrast, bonds sharing the defaulter's bank respond much more strongly and persistently. The impact of the defaulting bond's initial price decrease more than doubles in the twelve months following default.

The persistence of these effects can shed light on the mechanism by which connection to the defaulter's bank impacts non-defaulting bonds. Temporary selling pressure from a one-time decrease in investors wealth is unlikely to result in persistent and growing price effects. On the other hand, reputation could have a more persistent effect if beliefs about the bank are persistently revised downward. And a response that grows over time may suggest that investors gradually learn and incorporate new information into beliefs following default.

Examining the pre-default period is also informative about a potential risk to identification. The risk is that banks that tend to be associated with defaulters also systematically write bonds whose characteristics differ. For example, these bonds could tend to have a shorter maturity, higher coupons, or customs duties pledged as collateral. Differences in these characteristics could cause a disparities in price responses between two bonds, belonging to the same country, in response to the same shocks. However, if such systematic differences existed, we would expect these bonds to comove differently outside of default as well (in response to other events). Counter to this concern, the local projections estimates indicate that there are no such differences in the four months prior to default. That is, before default, there is no difference in returns, nor difference in comovement with the bond that will default.

Balance Tests. To further investigate the possibility of systematic differences between bonds that tend to be associated with defaulters' banks, I estimate balance tests. I examine whether bonds sharing a defaulter's underwriter differ in observable bond characteristics. Mirroring the specification of column 5 from Table 3, I regress the shared bank indicator on these characteristics (Table 4). I find no statistically significant differences in price growth prior to default, issue price, original issue size, coupons, or sinking fund rates. And the point estimates are economically small. For

Figure 4: Local Projections Estimates of Longer-Run Effects



Note: This figure plots results from a local projections estimation (based on the main specification). The shaded regions delineates a 95% confidence interval. The upper plot displays the coefficients on the shared bank indicator. The lower plot shows the coefficients on defaulting bond's initial price decrease for both bonds sharing the defaulter's bank (solid line) and not sharing (dashed line). The sample for these estimates is a balanced panel subset of the main sample. Note that the dashed line is calculated by summing the uninteracted coefficient on the defaulting bond's price (the solid line in the same plot) and the interaction term. Standard errors for this sum are calculated using the estimate's clustered covariance matrix.

example, the first column's estimate implies that a 1 standard deviation increase the lagged price change is associated with a 0.1 percentage point increase in the likelihood of sharing a defaulter's bank. Together, these tests find no evidence of systematic differences in bond characteristics.

Table 4: Balance Tests (Outcome = 1 if Bond Share's Defaulter's Bank)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$L(\Delta \ln P_{i,e})$	0.001	0.002	0.001	0.001	0.001	0.000	0.002	0.001
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.006)	(0.005)	(0.006)
Issue Price$_i$		-0.002					-0.001	-0.004
		(0.003)					(0.005)	(0.006)
$\ln(\text{Orig. Issue}_i)$			0.003				0.005	0.005
			(0.002)				(0.004)	(0.005)
Coupon$_i$				0.000			-0.002	0.000
				(0.002)			(0.003)	(0.006)
1[Has SF$_i$]					0.005		0.004	
					(0.004)		(0.006)	
SF Rate$_i$						-0.005		-0.003
						(0.004)		(0.003)
Observations	21542	13699	20841	21360	21542	10557	13673	8413
R2	0.288	0.244	0.287	0.287	0.288	0.256	0.244	0.211
Bank FE	✓	✓	✓	✓	✓	✓	✓	✓
Country × Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Def. Country FE	✓	✓	✓	✓	✓	✓	✓	✓

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Note: The sample here is the set of non-defaulting bonds (i) for each default (e). The outcome variable is an indicator for whether the non-defaulting bond shares the defaulting bond's underwriter ($1[\text{Bank}]_{i,e}$). The explanatory variables are the monthly change in the non-defaulting bond's price prior to the default and bond characteristics. These characteristics include the issue price, the original amount issued (logged), the coupon, an indicator for the presence of a sinking fund, and the sinking fund rate. All explanatory variables are demeaned and divided by the standard deviation prior to the regressions. Standard errors are clustered by time (monthly). All specifications include, country, year, bank, defaulting country, and country-year fixed effects.

6 Interpretation: The Role of Underwriter Reputation

This section assesses the plausibility that reputation can account for the contagion documented above, rather than alternative channels related to a common underwriter. 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 prediction 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. Formally, if the probability that fighting a crisis succeeds in preventing default is lower, the model predicts a smaller price impact on bonds sharing the defaulter's bank. If having more bonds involved in the default signals that fighting would be less likely to prevent default, we should expect less contagion in these cases. Intuitively, the underwriter 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 ($\text{Bank}_{i,e}$). The results, in table 5, 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.

Table 5: 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***.

To test for the presence of this mechanism, I examine how the effect of sharing a defaulter's underwriter differs in selective defaults. Table 6 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,

Table 6: 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***.

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 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 7 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 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 7: Interaction with "Good Bank" Indicator

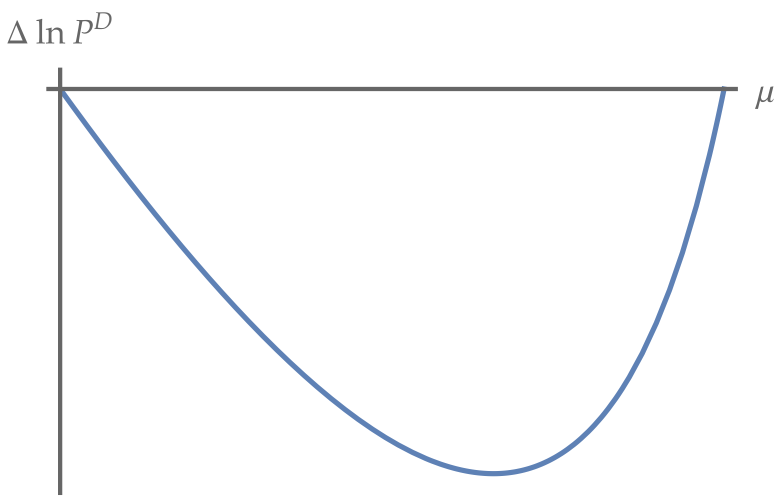
	(1)	(2)	(3)	(4)	(5)
$\Delta \ln P_e^D$	0.05***	0.05***	0.06***	0.06***	0.06***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
$1[\text{Bank}]_{i,e}$	-3.79***	-3.72***	-3.63***	-3.00***	-2.94***
	(1.08)	(1.06)	(1.03)	(1.07)	(1.09)
$\Delta \ln P_e^D \times 1[\text{Bank}]_{i,e}$	0.34*	0.34**	0.39**	0.34*	0.34*
	(0.17)	(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 Stronger 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 by 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. This result is formalized in Appendix A. An example of the relationship between the price change following default ($\Delta \ln P^D$) and initial reputation (μ) is depicted in Figure 5.

Figure 5: Effect of Initial Reputation on Price Response

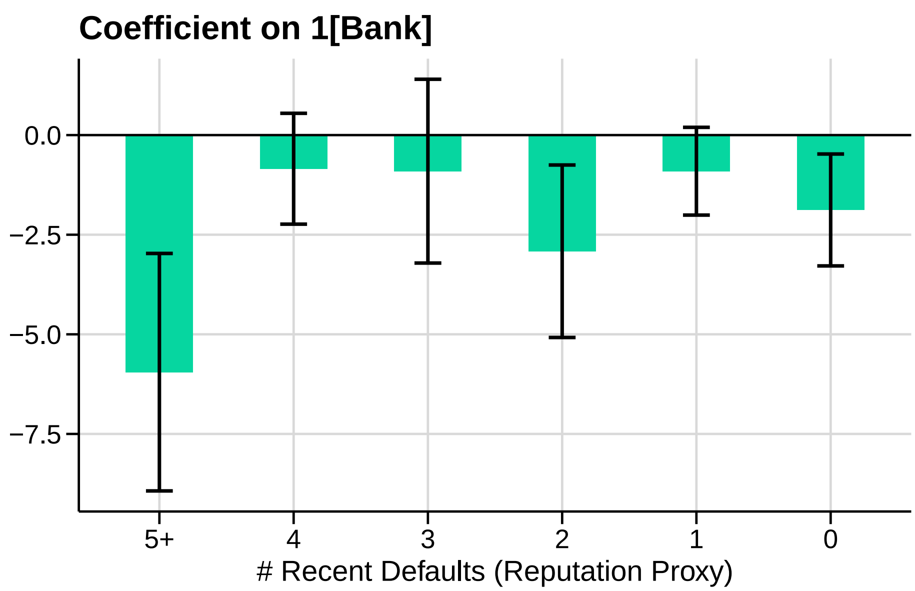


Note: The figure depicts an example of the U-shaped relationship between the price response ($\Delta \ln P^D$) and initial reputation (μ). The example is generated using $\alpha = 0.75$ and $\delta = 0.15$.

This result implies that the impact of improving monitor reputation on the severity of contagion depends on how reputable the monitor is to begin with. For a high reputation monitor (rightmost region), improvements in reputation reduce contagion to non-defaulting bonds sharing the defaulter's underwriter. In contrast, for a low reputation monitor (leftmost region), a better reputation leads to *more* contagion during default. This suggests a paradox can arise in the leftmost region: maintaining a good reputation by avoiding default can reduce contagion, but a sound reputation can make contagion more severe when default occurs because it is more surprising.

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 two years that included a bond from the underwriter.[34] To allow for a more flexible, nonlinear specification, I interact the the indicator for sharing a defaulter's bank with a categorical measure of recent default counts (rather than a continuous measure). This categorical variable indicates whether the bond's underwriters' have experienced zero, one, ..., four, or five or more defaults in the past two years.[35]

Figure 6: Impact of Sharing Defaulter's Bank by Recent Reputation



Note: This figure plots point estimates and 95% confidence intervals for estimates of the effect of sharing a defaulter's bank. Fewer recent defaults (moving to the right on the plot) corresponds to higher/better reputation. The shared bank indicator is interacted with a categorical variable describing recent default history, rather than a continuous measure. There are 6 levels to the categorical variable (zero to four recent defaults and five or more). The omitted category in the regression is zero recent defaults, to calculate the effect for all other categories I add the corresponding interaction term to the coefficient on the shared bank indicator (and calculate standard errors accordingly using the covariance matrix). The interaction terms are statistically significant for banks with five or more recent defaults. Full regression results available by request.

Figure 6 displays estimated effects of sharing a defaulter's bank by recent default history. The largest contagion effects are associated with banks that have the worst recent default history (five or more defaults). With this history, sharing a defaulter's bank leads to approximately a

[34]In the case of multiple underwriters, I take the average number of defaults in the past two years across the different underwriters.

[35]Winsorizing at five defaults avoids extremely small bins.

six percentage point bond price decrease. As bank history improves (fewer defaults), the effect generally ranges from one to 2.5 percentage points. The only statistically significant difference in interaction terms (where the omitted category is zero defaults) is the five or more category. This difference is 4.07 percentage points (with a p-value less than 1%).

The results indicate that contagion is more severe on average when the associated banks have a worse recent track record. This is consistent with strong reputation *dampening* contagion. Moreover, these patterns suggest banks in this era were generally in the higher reputation region (the rightmost region) of Figure 5. Here, default has a more limited impact on bank reputation when a bank has already established a good reputation. When confidence in monitors is strong, this trust limits contagion. In contrast, the reputation of less reputable underwriters is more fragile, and default leads to more severe contagion.

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 monitoring, advising, and exerting influence over the sovereign, 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. In the average default, sharing the defaulting bond's underwriter leads to 6 times more pass-through of the defaulting bond's price change. This difference is quantitatively significant. The average monthly price change of a defaulting bond (upon entering default) is a 5% decrease in price. On average 30% of this price decrease is passed on to non-defaulting bonds sharing the defaulter's underwriter. In contrast, only 5% of the defaulting bond's price decrease is pass on to non-defaulting bonds with a different underwriter. This suggests that underwriter reputation for monitoring can be an important source of contagion outside of borrower fundamentals.

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.

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Sasha Indarte

A Proofs

This section presents proofs for the theoretical results discussed in the paper. The following results are proved for the model of Section 3 (or extensions of this model, presented here).

A.1 Effect of Fighting Ability α on Price Response

Proposition 1 (Fighting Ability Comparative Static)**.** *Denote the price change following default by*

$$\Delta \ln P^D \equiv \ln \left[\frac{(1-\delta) + \delta\alpha\mu'}{(1-\delta) + \delta\alpha\mu} \right]$$

where $\mu' = \frac{(1-\alpha)\mu}{(1-\alpha)\mu + (1-\mu)}$. *If* $\alpha, \delta \in (0,1)$ *and* $\mu \in [0,1]$, *then*

$$\frac{\partial \Delta \ln P^D}{\partial \alpha} < 0.$$

Proof. The derivative is

$$\frac{\partial \Delta \ln P^D}{\partial \alpha} = -\frac{\alpha\delta\mu(1-\mu)[2(1-\alpha\mu)(1-\delta) + \alpha\mu]}{(1-\delta)[(1-\delta)(1-\alpha\mu) + \delta\alpha(1-\alpha)\mu]}$$

Given $\alpha, \delta \in (0,1)$ and $\mu \in [0,1]$ the denominator is positive as

$$(1-\delta)(1-\alpha\mu) > 0\delta\alpha(1-\alpha)\mu > 0.$$

Note also $2(1-\alpha\mu)(1-\delta)$ is positive, as are the additional terms in the fraction. $\square$

A.2 Effect of Initial Reputation μ on Price Response

The proposition below characterizes the effect of initial reputation (μ) on the price change induced by default. The relationship is generally U-shaped. At low levels of reputation, a better reputation means a bigger price decrease following default. The effect size bottoms out at some $\mu^\star \in (0,1)$; for higher levels of reputation, the price change begins to shrink as reputation improves (μ rises).

Proposition 2 (Initial Reputation Comparative Static)**.** *Denote the price change following default by*

$$\Delta \ln P^D \equiv \ln \left[\frac{(1-\delta) + \delta\alpha\mu'}{(1-\delta) + \delta\alpha\mu} \right]$$

where $\mu' = \frac{(1-\alpha)\mu}{(1-\alpha)\mu + (1-\mu)}$. *If* $\alpha, \delta \in (0,1)$, *then there exists a unique* $\mu^\star \in (0,1)$ *such that*

$$\begin{aligned}
\frac{\partial \Delta \ln P^D}{\partial \mu} &< 0 \quad \textit{for all } \mu \in [0, \mu^\star) \\
\frac{\partial \Delta \ln P^D}{\partial \mu} &= 0 \quad \textit{for } \mu = \mu^\star \\
\frac{\partial \Delta \ln P^D}{\partial \mu} &> 0 \quad \textit{for all } \mu \in (\mu^\star, 1].
\end{aligned}$$

The proof below proceeds in multiple steps in order to consider several cases.

Proof. First, note that the derivative of the price change with respect to initial reputation μ is:

$$\frac{\partial \Delta \ln P^D}{\partial \mu} = \alpha \left[\frac{1}{1-\alpha\mu} - \frac{\delta}{1-\delta+\alpha\delta\mu} - \frac{1-(2-\alpha)\delta}{(1-\delta)(1-\alpha\mu) + \delta\alpha(1-\alpha)\mu} \right].$$

For $\alpha, \delta \in (0,1)$ and $\mu \in [0,1]$, all three denominator terms above are strictly positive. Therefore the derivative $\frac{\partial \Delta \ln P^D}{\partial \mu}$ defined everywhere on these intervals. Because the $\Delta \ln P^D$ is differentiable everywhere on $\mu \in [0,1]$ it is continuous in μ on that interval.

At the beginning of the interval ($\mu = 0$) the derivative is decreasing in μ while at the end of the interval ($\mu = 1$) it is increasing in μ. That is,

$$\begin{aligned}
\left. \frac{\partial \Delta \ln P^D}{\partial \mu} \right|_{\mu=0} &= -\frac{\alpha^2\delta}{1-\delta} < 0 \\
\left. \frac{\partial \Delta \ln P^D}{\partial \mu} \right|_{\mu=1} &= \frac{\alpha^2\delta}{(1-\alpha)[1-(1-\alpha)\delta]} > 0.
\end{aligned}$$

Given the above and the continuity of $\Delta \ln P^D$, if there is a unique μ that solves $\frac{\partial \Delta \ln P^D}{\partial \mu} = 0$ then the derivative $\frac{\partial \Delta \ln P^D}{\partial \mu}$ is strictly decreasing for $\mu \in [0, \mu^\star)$ and strictly increasing for $\mu \in (\mu^\star, 1]$. To see that there is such a unique $\mu^\star$, we must consider the two cases below.

Case 1: $\alpha \neq 2 - 1/\delta$**.** In this case, there are two solutions to $\frac{\partial \Delta \ln P^D}{\partial \mu} = 0$:

$$\mu^- \equiv \frac{1 - \delta - \sqrt{(1-\alpha)(1-\delta)(1-\delta+\alpha\delta)}}{\alpha[1-\delta(2-\alpha)]}$$
$$\mu^+ \equiv \frac{1 - \delta + \sqrt{(1-\alpha)(1-\delta)(1-\delta+\alpha\delta)}}{\alpha[1-\delta(2-\alpha)]}$$

However, for $\alpha, \delta \in (0,1)$, only μ^- lies on the interval $[0,1]$ while μ^+ lies strictly outside of this interval. Thus in this case there is a unique $\mu^\star \in [0,1]$ such that $\frac{\partial \Delta \ln P^D}{\partial \mu} = 0$ for $\mu = \mu^\star$.

Case 2: $\alpha = 2 - 1/\delta$**.** In this case, the derivative is:

$$\frac{\partial \Delta \ln P^D}{\partial \mu} = -\frac{(1-2\delta)^2(1-2\mu)}{(1-\delta-\mu+2\delta\mu)(\delta+\mu-2\delta\mu)}. \tag{4}$$

Both denominator terms are nonzero. To see that the first is, assume for the sake of contradiction that $1 - \delta - \mu + 2\delta\mu = 0$, which rearranges to yield $\delta = \frac{1-\mu}{1-2\mu}$. But since $\mu \in [0,1]$, this would imply $\delta \geq 1$, contradicting $\delta < 1$. The second term, $\delta + \mu - 2\delta\mu$ is nonzero for $\delta \in (0,1)$ and $\mu \in [0,1]$.

For $\delta \neq \frac{1}{2}$, the unique solution to Equation (4) is $\mu = \frac{1}{2}$. We do not need to consider the case $\delta = \frac{1}{2}$ because this case is ruled out by the assumption $\alpha = 2 - 1/\delta$. To see this, note that $\alpha < 1$ and $\alpha = 2 - 1/\delta$ imply $\frac{1}{2} > \delta$. Therefore in Case 2 there is a unique $\mu^\star = \frac{1}{2}$ such that $\frac{\partial \Delta \ln P^D}{\partial \mu} = 0$. $\square$

B Additional Tables

Table B.1: 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***.

Table B.2: 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 B.3: 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 B.4: 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.

Table B.5: Bond Principal Size (Millions of Contemporaneous £)

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

Table B.6: 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.

Table B.7: Number of Bonds by Underwriter/Paying Agent (2 of 4)

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 B.8: 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 B.9: 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.