Quis custodiet quem? Sovereign Debt and Bondholders' Protection Before 1914

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Abstract

The half-century before World War I has been characterized as the first age of financial globalization. This paper focuses on the role and significance of the bondholders' organizations for the governance of this market. I argue that the outcome of the these institutions depended on two dimensions: the institutional variation that characterized these organizations and their strategic interaction. These aspects are addressed using a model of sovereign debt with constant renegotiation. An original data set with information on the settlement of defaulted debts in the period 1870-1913 is used to test the implications of the model. Empirical results support the premise that the quality of bondholders' representation matters for the terms of settlement and the costs of renegotiation. Renegotiation-friendly but not debtor-friendly organizations yielded the best *ex post* results for their members. The representation of bondholders' interests by the issue banks, on the other hand, produced inferior outcomes.

1 Introduction

The half-century before World War I has been characterized as the first age of financial globalization (Feis 1930, Woodruff 1966). The sheer size of international capital flows in this period implied the development of an institutional basis for aligning the incentives of borrowers and lenders and for the governance of international debt contracts.[1] Market incentives were all the more significant in a period when sovereign immunity blocked normal legal procedures for the enforcement of contracts, and when the apportionment of responsibilities between the sovereign defaulters, underwriting banks, and bondholders themselves was not clear.

Pre-1914 international financial architecture has also recently attracted considerable attention in the literature for its resonance with the current debate on the problems of emerging markets.[2] Particularly relevant is the problem of "common agency", that is, the several market failures deriving from having multiple lenders (agents) for the same borrower. The current dealings between Argentinean bondholders, the banks that sold them the bonds, and the defaulting government remind us of just this. In the recent Argentine case, several committees competed to represent the bondholders, and some of these organizations were criticized for being dominated by large investors affiliated with the issuing banks (Portes 2004, Bedford *et al.* 2005). In 1891, as in 2001, the question of who should watch whom (*quis custodiet quem*) was not clearly decided and it made it harder to converge to a solution of the problem.

This paper concentrates on the role of bondholders' protective organizations for the governance of the market. A considerable amount has been written on the epitome of these organizations, the British Corporation of Foreign Bondholders (e.g. Mauro and Yafeh 2003). However, two important dimensions have been neglected, namely, the degree of institutional variation that characterized these entities, and the strategic interaction among them. European bondholders tended to organize along national lines, which meant that defaulting sovereigns often had to deal with several bondholders' organizations. Moreover, the degree of participation of each organization in monitoring the sovereign and in the negotiations after a default was in direct proportion to the value of bonds held in each country. Because these two activities costed money and any deals reached with the borrowers could only be binding if supported by a considerable share of bondholders, protective committees were typically not created if the amount of defaulted debt held in the country was not deemed sufficiently important. One of objectives of this paper is thus to integrate the Continental European bondholders' organizations (especially in France and Germany) into the evaluation of this institutional arrangement.[3]

The hypothesis of this paper is that the different institutional solutions adopted by bondholders

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[1]For measures of the size and integration of the pre-1914 capital markets see Obstfeld and Taylor 2004).

[2]On this see the recent panel on "New Approaches to Resolving Emerging Market Financial Crises" at the 2003 Meeting of the American Economic Association, and Eichengreen (2003). Many of the problems and policies there discussed do have the distinct flavor of similar 19th century predicaments. Portes (2000) explicitly draws from the historical experience before 1914, while Rogoff and Zettelmeyer (2002) provide a review of the recent proposals for improving sovereign debt workout procedures.

[3]In this period, it does not make much violence to reality to reduce the creditor nations to the three leading capital exporting countries, viz., Britain, France and Germany. Indeed, by the eve of World War I, these three countries concentrated about three fourths of the world total foreign investment (Bairoch 1976, Maddison 2001).

significantly affected the terms of settlement of sovereign defaults in the decentralized pre World War I capital market. The main contribution of bondholders' organizations was their ability to gather information on sovereigns and to aggregate the bondholders affected by a default. These institutions helped to align the sovereign's incentives through a reputational mechanism, making it harder for a defaulting government to refinance itself in the international capital market before it had settled its old debt with its creditors. This is in contrast with the recent literature advancing the view that reputational sanctions cannot sustain a working market for sovereign debt. Instead, this literature has focused on two other major types of *direct* sanctions of sovereign defaults: trade sanctions (Rose and Spiegel 2002) and political interventions (Mitchener and Weidenmier 2004, 2005).

In order to test these hypotheses, I construct a data set on the renegotiation of sovereign defaults between 1870 and 1913. The data gathered include information on the terms of the settlements reached (duration of default and rate of return), and on the determinants of those outcomes. After controlling for the two classes of *direct* sanctions, my empirical results underscore the importance of institutional design at the level of creditors' representation, and therefore, of reputational factors. The results show that the sharing of the post default surplus, as well as the costs of renegotiation, were significantly affected by the form of these organizations.

I also provide evidence on the *ex ante* probabilities of default. These were driven by three main factors: political disturbances, economic fundamentals, and the market's memory about the sovereign's default record. This is another way of confirming the relevance of reputational factors in the market for sovereign debt.

The text is organized as follows. Section 2 reviews theoretical questions raised by sovereign debt contracts and describes the institutional setting of the market before 1914. Section 3 develops these topics using a formal model. The testable implications of the analysis are then confronted with empirical evidence in section 4. Two types of evidence are offered in this section: on the probability of default and on the characteristics of default settlements. Section 5 concludes and suggests extensions of the analysis. A documental Annex is also provided, listing the main data sources.

2 The Sovereign Debt Market in the *Belle Epoque*

The literature on sovereign debt and default before World War I includes broad comparative studies, such as Feis (1930), Borchard (1951), and Wynne (1951), national histories written from the perspective of capital exporting countries, and a myriad of national or regional studies on borrowing countries. My survey focuses on three topics that have been largely neglected in the literature: the market's industrial organization, the diversity of institutional solutions, and the problems of intra- and inter-coordination between bondholders' protective organizations.

2.1 The Industrial Organization of the Market

The market for sovereign debt involves three main agents: the sovereign governments, financial intermediaries (issue banks), and the bondholders, either isolated, or represented through collective

organizations. Central here is the agency relation that connected the issue banks to the bondholders and their organizations for the governance of the market, especially in event of default.

Despite some differences in national practice, the process of emission of a sovereign bond was similar in the three main European capital markets before 1914.[4] A borrower had the choice of selling its bonds directly to the public or of hiring a financial intermediary to sell them in its name. For foreign governments however, this choice was more theoretical than real, since the intermediation of financial institutions was seen as a necessary "seal of approval" of the bonds tendered.[5] Banks provided a menu of services. They could act as mere intermediaries, receiving subscriptions from the public, publicizing the issue, and making sure that all legal requirements for floating the loan were met. In exchange, the banks charged a commission to the government.[6] They did not, however, share any of the risk of the emission. Alternatively, the bank or syndicate of banks could underwrite all or a fraction of the loan, buying the bonds in advance from the government, and accept the risk of having to take the bonds unsold to the public. In this case, the banks bargained with the government for the price they would pay for the bonds with a view to the issue price at which they expected to sell them.[7]

Flandreau (2003) describes a market fraught with information asymmetries to which banks tried to adapt through forms of "relationship banking." In practice, this meant that banks abstained from competing for clients among sovereign debtors because reliable information on the financial solvency of governments was a strategic asset that was costly to acquire. Hence:

> Rather then having all bankers competing on all issues, and thus tending to under-invest in information gathering, relationship banking provides extra incentives for each banker to take a close look at his client (Flandreau 2003: 36).[8]

Contemporaries did not always see things this way. With respect to France, Eugène Letailleur, writing under the alias of "Lysis", interpreted the absence of competition as evidence of market power:

> As foreign loans are extremely coveted by banks owing to their high returns, competition, and rivalry would threaten at each instant to destroy the consortium between our great

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[4]For details see Finnie (1934) on London, Tchernoff (1930) and Yovovitch (1918) on Paris, and Marx (1913) and Schaefer (1993) on Berlin.

[5]There were but a few cases of governments who could successfully issue bonds in foreign markets without intermediation. For example, in the German market, between 1883 and 1913, I could only find one case, of the Dutch state railways that directly placed a 4% loan in 1883. In fact, even national governments resorted to intermediation in their own markets. Such was the case of the Prussian government that placed its debt in Germany almost exclusively through the services of a banking syndicate, the *Preußen-Konsortium*, formed in 1859.

[6]This system was called "*vente à commission*" in Paris, and "*kommissionsweise Emission*" in Germany.

[7]Another "service" often provided by underwriting syndicates was to intervene in the market, in the early stages of issue, to raise the price of the bond artificially and realize a higher profit. The multitude of expressions to describe this practice should perhaps attest to its vulgarity: *Budapester System*, *market rigging*, *wash sales*, *premium Dodge*, *faire la hausse*.

[8]It will be noticed the complementarity of this analysis to that of Wright (2002) - relationship banking provides an extra incentive for banks not to defect from punishing defaulters. Moreover, as shown by Flores (2005) for the Argentinean default in 1890, increased competition from new entrants could erode the incentives for proper monitoring of the debtor, and lead to an overlending externality.

banks, unless they set up a *modus vivendi* between them. Each bank then has its own clientele of foreign states; it has its influence zones. We call it its "hunting preserve" (Lysis 1908: 105).

Regardless of which interpretation better approximates reality, the stable long-term relationship between banks and their foreign clients gave the former an important advantage over other market participants. One such category of participants were the bondholders who acquired the sovereign debt underwritten and placed in the European markets by the banks. The increasing importance of underwriting for big European banks imposed restrictions on the banks' intermediation between their two classes of clients, i.e., the sovereign governments and the private bondholders. In particular, since there was value in keeping a good reputation in the markets, it seems natural that banks would have interest in selling bonds of governments they knew to be on a sustainable financial path while shunning the securities of insolvent sovereigns.

This might be so, but as in any agency relation, the asymmetry of information could have led to problems of moral hazard. That is, the financial interest of issue banks, who drew considerable returns from the placement of sovereign bonds, conflicted with the incentives to keep a sound reputation. This was all the more so for banks that lacked an established reputation, namely new entrants, who were prepared to issue riskier bonds in order to penetrate the market.[9] The frequency of defaults coupled with very high premia charged on the bonds of risky borrowers seem to support this alternative interpretation. Indeed, credit rationing is a standard result in a moral hazard setting. As bonds were usually issued below par, a higher spread was equivalent to a lower *effective* amount subscribed by the bondholders.[10] Again Letailleur goes further in accusing the big banks of misleading the French public into investing its savings in overpriced foreign government securities, on which no reliable information actually ever transpired to the market (before the predictable default, that is).[11] Rudimentary rules for information disclosure on new emissions of securities and the lack of independence of the majority of the financial press from the main banks and issue houses, also contributed to indulging the credulity of individual investors.[12]

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[9] This is actually how Cairncross (1953) describes the hierarchy of the London merchant bankers, who only competed for the issue of securities of new borrowers, and where the old houses usually avoided dealing with impecunious and risky governments. See also Jenks (1927: 288).

[10] For an analysis of the evolution of risk spreads see Mauro, Sussman and Yafeh (2002).

[11] The pessimistic judgment of Letailleur was taken at face value by authors seeking an explanation for the apparent incapacity of the French capital market to anticipate and take adequate protective measures against the widespread postwar default on Central European government debts (Cairncross 1953, White 1933). This is obviously an unfair criticism of French investment, which could hardly have anticipated the coming and consequences of such a perturbation as World War I.

[12] For an abstract of official requirements on the contents of the prospectuses for the emission of new securities, on the several European exchanges, see Yovovitch (1918). As for the control of the press, Lysis (1908: 34-35) has abundant references to the French case. See also Colinet (1913: 134).

2.2 Bondholders' Organizations

Bondholders organized to address these hazards. One may distinguish three broad categories of bondholders' protective organizations. The first was the *ad hoc* committees that were created to deal with each individual default and dissolved thereafter. The second was the indirect representation of bondholders' interests by the banks who had issued the securities of the defaulting sovereign, the standard German practice. Finally, there was the model of permanent and independent bondholders' organizations that could potentially represent all bondholders owning a minimum stake of any foreign securities. I refer to these as *ad hoc*, indirect, and corporation of foreign bondholders' types of representation, respectively.

Ad hoc committees were the prevalent solution before the creation of permanent organizations. However, the temporary and improvised nature of these organizations reduced their effectiveness. They faced high administrative costs in gathering bondholders to finance the committees; they had trouble in dealing credibly with defaulting governments, since they could guarantee that the agreements they negotiated would be binding on individual bondholders; they often lacked financial resources and information on debtor countries; and they were subject to manipulation by the same banking firms and brokerage houses that had originally issued the bonds.[13]

These problems were addressed with the creation of permanent organizations of bondholders, set up with an appropriate endowment of funds and information. The first of such organizations was the British Corporation of Foreign Bondholders, created in 1868 and incorporated in 1873. It was closely tracked by the equivalent Dutch organization, the *Vereeniging voor den Effecthandel*, incorporated in 1876. Other countries took longer to adopt this innovation but ultimately followed. Comparable organizations where thus established in France and Belgium in 1898, Switzerland in 1912, Germany in 1927, and the United States in 1933.

Two indicators suggesting that the creation of bondholders' organizations had a positive effect on the governance of the market are the number of countries in default and the total amounts in default, which fell significantly from the late 1870s; and the average duration of default, which fell from about 14 years (1821-70) to 6.3 (1871-1925) according to Suter (1992: 91). The same author provides information on losses of the pre-default interest and principal as well as on the capitalization of arrears. His evidence seems to point to a more debtor-friendly settlement of defaults after the 1870s.

These improvements notwithstanding, contemporaries frequently complained about the imperfect sanctioning of sovereign defaults. Alfred Neymarck, the influential turn-of-the-century statistician and financier, pleaded for a more ambitious solution to the problem: "*These disasters imperiously call for a reformation of international credit and, to obtain it, we need that all governments come to an agreement among them to take the initiative*".[14] By this he meant a combination of financial regulations (the deposit of bonds by the borrowing governments to be forfeited in case of default) and the creation and international enforcement of a code of "public financial law."[15] Although less

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[13]Cf. the report presented by Eugène Lacombe, vice-president of the French bondholders' association to the *Congrès international des Valeurs mobilières* of 1900, reprinted in ANPFVE (1900).

[14] Neymarck (1905: 138).

[15]This is another example of the reemergence of similar solutions to persistent problems: cf. the proposal for a new

ambitious than Neymarck, the officials of the bondholders' organizations acknowledged the need for improvements. Hyde Clarke, secretary of the Council of Foreign Bondholders, complained in 1878 about the abandonment by the Foreign Office of the protection of the interests of British citizens, which could have been achieved at no great cost:

> The blockade of a port, the occupation of a custom house until the receipts provided an indemnity, or the arrest of a Government vessel, would, in many cases, put a stop to the proceedings of some of the offenders, and be an example to the others...The mercantile interests of this country are never in favour of war, but they feel sensibly the great disadvantages they are placed under in most parts of the world in contrast with the care shown for the mercantile protection of other countries.[16]

More pragmatically, Eugène Lacombe, vice-president of the French bondholders' association noted that as hardly any foreign bonds were floated outside of four major European countries - Britain, France, Germany, and Belgium -, *"It would therefore be enough for these four nations to form an agreement such that all borrowing countries would be obliged to accept the conditions demanded from them"*.[17] Although different national bondholders' committees sometimes cooperated, this measure of agreement was never reached.

Two other problems afflicted the workings of foreign bondholders committees even when sustained as permanent organizations: the differing interests of bondholders, brokers, and underwriters, and potential conflicts with other national committees. Given the conflict of interests of the issue houses mentioned before, it is surprising that the agents (the banks and brokers) sometimes enjoyed a majority or, at least, blocking position in the organizations set up to protect the interests of the principals (the bondholders) during the settlement of defaulted bonds.[18] This conflict arose in the first organization of the British Corporation of Foreign Bondholders, in 1868. The intention to constitute a self-standing organization of bondholders met with the objections that it might be perceived as thwarting the action of the great financial houses and that foreign governments might react adversely, again damaging the position of the issue houses. As a result, the latter had to be co-opted into the Council (Ronald 1935). According to Jenks (1927), the majority of the council that run the Corporation was composed by bankers or members of brokerage houses.[19]

In what seems to be a direct consequence of the 1868 power distribution, the British Corporation of Foreign Bondholders was repeatedly accused in its first two decades of existence of yielding excessively to pressure from the issue houses:

Sovereign Debt Restructuring Mechanism by Krueger (2002).

[16]Clarke (1878: 334). Despite his influential position, Hyde Clarke's ideas were not representative of all the membership of the Corporation of Foreign Bondholders. The topic of the relationship that the Corporation should keep with the political authorities had been debated in its original meeting, with the majority concluding that bondholders' private interests should not be let to interfere with the general diplomatic relations between countries (Jenks 1927, Ronald 1935).

[17]ANPFVE (1900: 39).

[18]This point was appreciated by contemporary writers such as Manchez (1900: 24), Wuarin (1907: 252-53), and Colinet (1913: 309).

[19]For accounts of the founding process of the Corporation of Foreign Bondholders see Borchard (1951) or Ronald (1935).

a powerful influence is exercised upon bondholders by the issuing houses, who find it practically impossible to do fresh business with the borrowers while the default lasts, and who are, therefore, naturally anxious that some sort of settlement be arrived at, more especially as settlements of the kind yield substantial pickings in the way of commissions, are frequently followed by new loans (*Economist*, no. 55 1897: 1624)

In 1898 the Corporation was reorganized by an act of Parliament that took heed of these problems by ruling for a minority of representatives of issue houses in the governing body of the Corporation (Ronald 1935).[20]

The same hazards and conflicts of interests found different solutions in the organization of other national organizations. As I will show below, such differences were so marked as to significantly affect the outcome of the governance of sovereign debt, and through it, *ex ante* incentive alignment between prospective borrowers and alternative lenders.

Dutch protective committees emerged as an outgrowth of other organizations, *Kantoren*, originally brokerage associations for the placement of foreign bonds (namely to take care of paperwork). In case of default, the brokers (usually but not necessarily members of the original *Kantoor*) or the Amsterdam Stock Exchange Association took it upon themselves to gather a critical mass of certified bondholders in a committee which could credibly negotiate a settlement with the debtor.[21] Similar preoccupations to those vented about the British Corporation led to the creation of the *Vereeniging voor den Effecthandel* in 1876, which accepted as members individual bankers, stockbrokers and their staffs (with businesses in Amsterdam).

The French *Association Nationale des Porteurs Français de Valeurs Etrangères* was similarly under the control of the big French banks and stockbrokers at the Parisian *Parquet*. Despite some agitation for the creation of an organization similar to the Corporation of Foreign Bondholders, individual investors were usually content to pressure the Paris *Bourse* to intervene on their behalf.[22] The *Association* was only established in 1898 by the Paris stockbrokers chamber under commission of the finance minister. Like its British counterpart, the French Association drew criticism for pressuring bondholders to accept too generous settlements, and also (unlike the British organization) for its subservience to the political objectives of the French government. Contrary to the Corporation of Foreign Bondholders, the *Association* made no effort to conceal its privileged relations with the French government:

The relations that it entertains with the public powers don't make it at all an official institution; it keeps the full and complete independence of its acts...But the Association receives from the Government a precious support, an exclusive support. It has been declared

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[20] Corporation of Foreign Bondholders Act, 61 & 62 Vict. ch. cxlix (1898). The statutes of the US Foreign Bondholders Protective Committee would go even further by excluding from its board of directors anyone "*who within the five years preceding has had any interest, direct or indirect, in any corporation, company, partnership, bank or association which has sold, or offered for sale any foreign securities*" (cit. in Winkler 1933: 174).

[21] According to Veenendaal (1996: 82-83) the Dutch investors were the first to widely use these organizations, and the financial reputation they acquired led other countries, namely Britain, to copy their model.

[22] About this agitation cf. Lewandowski (1896).

that the French interests in arrears abroad will only be considered if they employ the Association as intermediary. (ANPFVE 1900: 4)

A conspicuous case of discontent with the *Association* was the journalistic agitation against the terms of the 1900 conversion of Spanish foreign debt. The *Association* was blamed for lack of determination in its dealings with the Spanish government and the other national bondholders committees and for sacrificing the interests of the bondholders to political pressure from the French finance minister (Manchez 1900).

A still more extreme example of banking control is pre-war Germany, where issuing banks took it as their responsibility to protect the interests of their clients and acted in isolation or organized in special committees. Pressure in the press for the creation of a organization similar to the British or French associations foundered on the opposition and rivalry of the big issue houses. The only big German bank that consistently promoted the creation of an independent organization was the Deutsche Bank, under the influence of its director Georg Siemens. On at least three occasions between 1875 and 1891, Siemens attempted to interest the German financial system in the project, to no avail.[23] According to Barth (1995: 102), opposition came from the Disconto Gesellschaft and the banking house S. Bleichröder, who feared having their interests represented by an organization led by their main rival. Despite the lack of support, in 1890 Siemens and the banker Jacob S. H. Stern of Frankfurt formed the *Deutsch-Amerikanische Treuhand-Gesellschaft* with the purpose of representing the interests of German owners of North American securities.[24] Later, the object of the society was enlarged, with a corresponding change in name to *Deutsche Treuhand-Gesellschaft*. In 1898, while explaining to the general assembly of the bank the difficulties in coming to a settlement with the Argentinean provinces, Siemens emphasized the inferior institutional solution then in place for the protection of bondholders in Germany:

> These outcomes have reminded us again of how regrettable it is that our business world has not decided to create an institute corresponding to the English Council of Foreign Bondholders. As of today, the owner of foreign bonds or stock is merely dependent, with respect to the defense of his interests, from the tact and energy of the emission house. If the latter goes out of business, or for some reason behaves passively, so is the former easily subjected to inconsiderate treatment or even exploitation by the borrower.[25]

Despite its success in coordinating German interests the restructuring foreign securities, the society did not outlive its creator and main enthusiast, in its original purpose.[26] The protection of bondholders' interests through self-standing organizations seems to have been more of a personal project of Siemens

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[23] Cf. Helfferich (1923: II, 190 seq).

[24] The initial concentration on the American market was attributable to the substantial financial interests of the Deutschen Bank in American railways, namely the Northern Pacific Railroad Co. See Helfferich (1923: II, 247-50).

[25] Deutsche Bank - Geschäftsbericht of 1898.

[26] By the early 1900s, the *Deutsche Treuhand* had effectively been converted into an auditing firm. Among the successful interventions of the *Deutschen Treuhand* were American railways, Argentinean provincial debts, Spanish bonds, an Italian bank, and a Guatemalan electricity company.

rather than one which resonated in the wider circles of German banking, or even within the Deutschen Bank itself. Arthur Gwinner, Siemens's successor as head of the Deutschen Bank, seemed to be less prepared to sacrifice the financial interest of the bank to the protection of individual bondholders. A particularly telling example is the negotiation for the unification of the Turkish debt in 1903. The project, supported by the Deutschen Bank and the Banque Imperiale Ottomane, met with opposition from the Council of Foreign Bondholders and the administration council of the *Dette Publique Ottomane*.[27] To forestall opposition to the project, Gwinner used the financial network of the Deutschen Bank to prevent the convening of a German assembly of bondholders of Turkish debt and even to have his interests represented in the general assembly of the British bondholders. In exchange for a share in the placement or the service of the new debt, he contacted several German, French, Dutch, and Italian banks to put pressure on their national bondholders and also to gather a sufficient quantity of bonds with which to endow one or more straw men, who would be present at the general assembly to vote in favor of the project.[28]

Finally, Belgium had, from 1898, two bondholders' associations – one in Antwerp and that largely followed the organization of the British and French equivalents, and another in Brussels that followed the "German" model of only gathering banks for the protection of the interests of their clients.[29]

2.3 Collective Action and International coordination

One of the major impediment in reaching an orderly settlement of defaulted debt lies on the side of the bondholders, i.e., on the possibility that blocking minorities hold out an agreement that a majority of bondholders would be willing to accept. A straightforward solution to this problem is the inclusion *ex ante*, i.e. in the original debt contract, of collective or majority action clauses (CACs). The purpose of such clauses is to define a qualified majority required to make any change in the original contract binding for all bondholders. According to Billyou (1948), the first instance of a majority action clause in English law dates from a trust deed prepared in 1879 by a barrister, Francis Palmer, who popularized its usage through the several editions of his *Company Precedents*.[30] Subsequently, the practice became standard for corporate debt issued in London, but not under the laws of different countries (namely the US). But CACs were not commonly included in sovereign debt contracts, even under English law. The possibility of hold outs was therefore real, but less so when bondholders were represented by permanent independent organizations. The regulations and by-laws of these organizations typically established a majority rule for decisions to be carried in general assemblies of bondholders.[31] This meant that,

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[27] At stake was the perception that the income saved from the unification would be released to guarantee the investments of the Deutschen Bank in the Baghdad railroad. The British bondholders therefore required an increase in the interest to be served on the new debt as compensation.

[28] All the process is kept in the historical archive of the Deutschen Bank, files HADB - OR 1301 and HADB - OR 1302. Not surprisingly, there was a complete inversion of positions, with Bleichröder pressing for the convocation of a general assembly of German bondholders. Barth (1995: 208) mentions the supra normal profits of the banking syndicate in the deal, with the banks even buying the old bonds in the market to win from the very generous exchange price.

[29] Colinet (1913: 149-50).

[30] This was a compilation of UK corporate forms and documents, edited 17 times between 1877 and 1960.

[31] For the British Corporation see §§ 4. and 5. of the rules for general meetings reprinted in SEC (1937: 767). The French bondholders' association established a similar disposition in article 26 of its original statutes, preserved at the

even though an individual bondholder always had the right to refuse an agreement negotiated by the bondholders' organization, it would be hard for him to extract a better deal once a significant majority adhered to the settlement. Sovereign immunity prevented him from extracting legal compensation, and he usually had no power to bar the sovereign from obtaining new finance in the market once the majority opinion was that the matter had been equitably settled with the representatives of the bondholders.[32]

Institutional diversity in bondholder representation also influenced the strategic interaction of different national committees. The literature again appears to overlook this point. Mauro and Yafeh (2003) assert that cooperation between national committees usually prevailed during the punishment and renegotiation stages, effectively blocking the access to international refinancing to defaulting governments. However, this opinion is hard to square with the evidence about the conflicts of interests among creditors of different nationalities, especially in the case of Latin American countries. These countries often resorted to selective default (usually on all or some of the bonds held by European creditors) without affecting their ability to get new funds, especially in the United States. That such schemes were successful is an indication, for the authors, that the "willingness to pay" of these countries was more important than their "ability to pay".[33] In other words, trade links and international political relations counted more than bondholders' coordination.

The bulk of this evidence comes from the statements of the bondholders' committees themselves (specifically from those of the British Corporation of Foreign Bondholders). Beyond the obvious problem of the selectivity of information that the Corporation of Foreign Bondholders chose to make public in its reports, there is the fact that the materials from the other national bondholders organizations have not been systematically consulted. In fact, evidence on the impact of conflicts of interests between different committees for the settlement of sovereign defaults features prominently in the works of such classic authors as Feis (1930) and Wynne (1951), but also in more recent research, e.g., Aggarwal (1996), Barth (1995), and Schaefer (1993) and in numerous monographs on national cases. Only a study of individual default settlements, based on direct archival evidence will allow to grasp the underlying interactions between national committees. This will further our understanding of the importance of communication between committees and, especially, how this affected the efficiency of debt settlements either by delaying the final agreement or by precipitating settlements under the threat of separate deals.[34]

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historical archive of the ANPFVM. In countries, like Germany, where no such organizations existed, voting rules were sometimes included in the charters of the committees staffed by issue banks. For instance, the articles of the Protective Committee of the holders of bonds from the Brazilian *Companhia de estradas de ferro do Oeste de Minas* determined that any agreement with the debtor could only be carried by a 3/4 majority, in a general meeting that gathered at least 2/3 of the bonds deposited (*Frankfurter Zeitung und Handelsblatt*, nr. 178, erstes Morgenblatt 29.06.1899, p. 4).

[32]There were also exceptions. The family of the counts of Reillac moved a legal and press campaign for 25 years against the Portuguese government because of the so-called "D. Miguel loan". This loan, issued in 1832 had been repudiated by the government in 1834. Despite that, successive governments reached agreements with foreign bondholders and were able to float debt abroad. Only in 1890 did the government reach a settlement with the owners of the "D. Miguel loan".

[33]To use Kelly's (1998) expressions.

[34]More can also be learned about the origins of such disputes, be it different portfolio composition (namely in terms of types of securities), different strategies for settlement and compensation of borrowers, or simply, different bondholders'

One would also expect to find a relationship between the nature of international conflicts in which the borrowers were involved and the nature of the agency problem. In particular, one would expect to see systematic differences in time horizons between committees dominated by issue houses and committees where the influence of the latter had been constrained, leading to different settlement patterns. This by itself would go a long way toward explaining a number of deadlocks and delays or, at least, to affecting the final settlement.

3 A Model of Debt Recontracting Under Moral Hazard

3.1 Previous Literature

As Tirole (2002) notes, the peculiarity of sovereign borrowing lies in its structure as a problem of *common agency* coupled with the sovereign immunity of the principal. The former creates a *lending externality*, which cannot be corrected by the same responses devised for corporate borrowing because of the immunity of the debtor. Tirole identifies externalities in contracting, in collective action, and from heterogeneity of claims. Because no individual lender has to internalize the impact of its lending upon other creditors of the same debtor, there is a potential for overlending (contracting). Collective action externalities are likely to occur in monitoring the debtor's behavior, as well as in organizing an ordered framework for renegotiation in case of distress. Finally, there is the potential for conflict between holders of different claims on the same debtor.[35]

Lending externalities dilute the borrower's incentives for timely repayment, thereby aggravating the potential moral hazard associated with any debt contract. But, notwithstanding these inconveniences, the sovereign debt market has not only survived but known periods of rapid expansion. This led scholars to consider the conditions under which sovereign borrowing could be sustained in equilibrium. In other words, they have sought to identify the sanctioning device used to align the interests of borrowers to those of lenders.

This line of inquiry was started by Eaton and Gersovitz (1981), who characterized debt contracts as equilibrium outcomes sustained by a reputation mechanism based on trigger strategies. Bulow and Rogoff (1989a, 1989b) noted that the mechanism required a very high level of commitment on the part of lenders and that punishment strategies were not renegotiation-proof. This led them to develop a model where pure reputational sanctions (i.e. embargoes on future loans) could not sustain an equilibrium with debt. This result flows from relaxing the assumption of perfect commitment on the part of lenders and introducing competition from other potential lenders who could, under certain conditions, recontract with the defaulting borrower. A corollary of their result was the need for exogenous third party enforcement of senior lenders' rights, such as political intervention or trade

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reserve prices.

[35]The classic example is the conflict between share and debt-holders, in the corporate context. Although, in the period I am studying, governments frequently took responsibility for the international liabilities of formally private corporations (especially railroads), this type of conflict is of less practical relevance. Nonetheless, antagonisms between holders of different loans often occurred, namely because of concurrent claims to the security provided by the same mortgaged revenues.

sanctions by the governments of the lending countries. Rose and Spiegel (2002) offered suggestive evidence that international trade was used as a mechanism for sovereign debt repayment in the postwar period. Mitchener and Weidenmeier (2004, 2005), who study the pre-1914 period, concentrate on direct political and military "supersanctions," which they consider to have been instrumental in encouraging sovereign debtors to repay. [36]

At the heart of Bulow and Rogoff's result is the observation that the capital market can provide a richer set of opportunities than just lending contracts. For example, sovereigns also have access to deposit or 'cash-in-advance' insurance contracts. The authors then prove that there are states of nature in which the sovereign will be better off by defaulting and using the amount due as debt service to make an up-front payment to another financial intermediary in exchange for a stream of contingent payments in the future (an insurance contract).[37] Hence the result that a pure reputational debt contract could not be sustained in equilibrium.

However, in order to derive this result, Bulow and Rogoff assume asymmetric commitment possibilities, i.e., whereas the original lenders cannot commit not to recontract with the defaulter, the counterparts in the insurance contracts can commit to the future stream of payments.[38] Without assuming commitment on the part of either the lenders or borrowers, Kletzer and Wright (2000) show that sovereign credit transactions are enforceable in equilibrium under pure reputational sanctions. This result is proved under "cheat the cheater" strategies. That is, in equilibrium, if one of the lenders breaks a moratorium imposed on the defaulter, the strategies of the other lenders induce the borrower to cheat the new lender.[39] Wright (2002) has a model in the same spirit, where debt repayment can be sustained in equilibrium not by the debtors' reputation but by the incentives of lenders to collude and punish countries in default. In the context of syndicated bank lending, he shows that the incentives for banks to cooperate decrease with the number of banks in the market. From this it follows that the benefits of increased competition between lenders may not be efficient, if such competition dilutes the incentives to cooperate in punishing defaulters. Wright's model, however, is tailored to sovereign bank lending, which differs in important respects from lending through bond markets. The ownership of claims tends to be more dispersed in bond markets which raises an additional problem of aggregation of claims, while the menu of contracts that individual bondholders can offer the sovereign borrower is smaller than in the case of banks.[40]

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[36] Although disagreeing with Bulow and Rogoff on the enforceability of these types of direct sanctions, Tirole (2002) also sees a solution to the problem of common agency in the creation of an external "delegated monitor" with responsibilities in monitoring countries and renegotiating defaults.

[37] Equivalently, a country can accumulate foreign reserves or foreign assets with payments indexed to the same variables of the initial debt contract.

[38] The authors consider that "*These commitments are enforced by the legal system in the investors' countries*" (Bulow and Rogoff 1989b: 45).

[39] The idea of these strategies is that the original lenders can deter any new entrants into the lending market from breaking the moratorium by undercutting any offer by the latter.

[40] With respect to Bulow and Rogoff's 'cash-in-advance' contracts, there is no historical record of widespread accumulation of foreign reserves or assets by the governments of borrowing countries before World War I. Only Russia, during Witte's tenure as finance minister (1892-1903) seems to have followed a 'self-insurance' strategy to leverage its bargaining position vis-á-vis its creditors (Flandreau 2003).

Cole, Dow and English (1995) develop a model specifically adapted to the conditions of the nineteenth century sovereign debt market. Their approach complements the reputation-based models in that they posit a signalling mechanism for debt settlements. Like Bulow and Rogoff, they find equilibrium lending sustained by trigger strategies unconvincing. However, instead of concluding that debt can only be sustained in equilibrium by the threat of direct sanctions, they interpret the settlement of old debts by defaulting governments as a means of signaling their willingness to honor future debts. That is, they incorporate a less mechanical concept of reputation, which depends on the observable actions of the sovereign *after* the default instead of being lost forever (in the simplest trigger strategy equilibrium) or for a fixed punishment period.

A related literature (e.g. Smith and Smith 2002) has focused on the best post default mechanisms for orderly renegotiation. In this context, a superior institutional design is one that is more renegotiation-friendly without being borrower-friendly. That is, the mechanism should minimize the deadweight costs of delayed agreements and eventual sanctions without aggravating the moral hazard problem. The debate here has essentially converged to two polar positions: the market-based adoption of collective action clauses (CACs) versus the intervention of multilateral organisms, like the IMF, in the coordination of crisis resolution. According to Eichengreen, Kletzer and Mody (2003) and Kletzer (2003), the adoption of CACs could be beneficial for debtor countries with good credit ratings, whereas it would be perceived as increasing moral hazard (and hence interest rate spreads) for countries with poor credit.[41] Compared to the alternative of increased IMF intervention, for instance along the lines of the Sovereign Debt Restructuring Mechanism (SDRM) proposed by Krueger (2002), CACs would offer a feasible alternative to the enforceability problems of the SDRM. Despite that advantage, the authors also acknowledge that the provision of CACs is not a complete solution for an orderly restructuring of sovereign debt, because CACs fail to solve the problem of aggregation of bondholders, especially across different classes of securities. As suggested by Eichengreen and Portes (1989), aggregation would be facilitated under the reestablishment of institutions similar to the bondholders' protective committees, which were common before 1914.

In sum, the literature divides into two fields that emphasize different sanctioning devices to maintain a market for sovereign debt. One side concludes that reputation of market agents (both sovereigns and banks) can be enough to align their incentives in equilibrium. The other believes that lending to sovereigns can only be sustained through the threat of sanctions that directly harm the defaulter.

3.2 General Description

I now derive a simple model that combines several strands of previous literature concerning the impact of different *ex post* mechanisms for renegotiating sovereign debt (Bulow and Rogoff 1989b, Kletzer and Wright 2000, and Kletzer 2003). The model has the structure of an infinitely repeated

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[41]Earlier work along this line can be found in Lindert and Morton (1989), and Aggarwal (1996). However, the models of these authors are simultaneous-move normal-form games that collapse all intertemporal implications of the players' choices into a reduced measure of future gains from trade or "goodwill" in the markets. This is obviously an inferior modeling strategy to the constant recontracting framework of Kletzer (2003).

two-stage game with complete but imperfect information. Asymmetric information leads to a typical problem of moral hazard where the principal (the bondholders or their representatives) tries to create an optimal incentive scheme for the agent, i.e., the sovereign state.

Whenever a default occurs, bondholders and the sovereign engage in a two-stage process of renegotiation. In the first stage, the sovereign makes an unilateral settlement offer. The likelihood that bondholders accept this offer depends on the probability P that they can form a qualified majority that accepts the agreement, and also on the type of organizations created by bondholders to represent them in the negotiations with the sovereign.

In case the offer of settlement is not accepted, the game enters a second "punishment" stage in which bondholders boycott the access of the sovereign to international financing until the latter returns to the fulfillment of its contractual obligations vis-à-vis international creditors.[42] The length of the punishment is endogenous. After the punishment period, the two parties return to their "cooperative" behavior, i.e., bondholders buy the sovereign's bonds and the latter repays them according to the promised schedule. Once a new default occurs, play returns to the two-stage renegotiation.

3.3 Second stage: Regime-switching Model

Assume that an agreement could not be found between the sovereign and its several bondholders for an orderly restructuring of the defaulted bonds. In that case, both parties will suffer costs from disagreement. These costs have several formulations in the literature, namely, financial embargoes (Kletzer and Wright 2000), direct sanctions (Bulow and Rogoff 1989b), or pure time costs from delay in reaching the ultimate settlement (Kletzer 2003, Eichengreen, Kletzer, and Mody 2003). In my model I will follow the latter simplified version, but endogenizing the delay t by means of a regime-switching model. In this context, t will be the optimal duration for the punishment phase derived from the equilibrium strategies of the non-cooperating sovereign and bondholders.

Environment

The sovereign country needs to borrow \$1 per period by selling an equivalent value of its bonds to foreign bondholders. For simplicity, I assume that all debt has maturity of one period and serves an amount R for interest and repayment of principal.[43]

The sovereign's per period resources are then determined by a production function $f(I, \theta_t)$. Total output depends on foreign capital investment, which can take two values $I = \$1$ or $I = \$0$, and on the stochastic realization of a parameter θ_t, which can take either a "high" (θ) or a "low" (0) value.[44] At the beginning of each period, bondholders and sovereign alike don't know the value of θ_t, but it's common knowledge that the stationary probability mass function of θ_t is simply: $\Pr(\theta_t = 0) = \gamma$. At

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[42] This is precisely the structure of the reputational equilibrium proved by Kletzer and Wright (2000), although I adopt here a simplified version.

[43] In terms of the timing of the game this implies that the bondholders commit \$1 at the beginning of each period, in the expectation of receiving R at the end of the *same* period.

[44] I assume $f_I > 0$, $f_\theta > 0$.

the end of the period, only the sovereign is informed of the value of θ_t.

If $\theta_t = 0$ the sovereign defaults on its contractual debt service R because $f(1, 0) - R$ is below a minimum surplus ℓ, required by the sovereign. This is equivalent to saying that the sovereign enjoys limited liability because of its sovereign immunity. As in Bulow and Rogoff (1989a), bondholders and the sovereign are risk neutral, but I assume $R > 1 + r$, where r is the riskless rate of return on bonds of the bondholders' country government. In other words, there is a yield præmium for foreign sovereign debt.

The sovereign may also choose to default even when θ_t has a "high" realization because bondholders cannot ascertain the value of θ_t. In order to adapt for this typical moral hazard problem, I follow Kletzer and Wright (2000) in assuming that bondholders impose a limited moratorium to new applications for credit by the defaulting sovereign. This regime-switching formulation has the advantage of allowing to derive the punishment duration that is optimal in some sense, and to isolate the basic parameters, which determine it.

Equilibrium

Given this setting, it is possible to show that there is a strategy profile which constitutes a sub-game perfect Nash equilibrium of this game. In these strategies, players alternate between "cooperation" and "punishment" phases. In the former they abide by their contractual obligations, i.e., bondholders buy an amount \$1 of the sovereign's debt per period, while the sovereign repays a total sum of R as debt service in interest and repayment of principal. These strategies are:

for the bondholders

- start in a cooperative phase with payoffs $f(1, \theta_t)$ for the sovereign, and $R - 1$ for the bondholders

- if the sovereign repays stay in the cooperative phase;

- if the sovereign defaults start a punishment phase with payoffs $f(0, \theta_t)$ for the sovereign, and r for the bondholders.

- after t periods of punishment return to a cooperation phase.

for the sovereign

- repay the interest and principal at the end of each period if $\theta_t = \theta$

- default if $\theta_t = 0$.

Figure 1 represents these strategies along with the timing of the game.

Let V_s^+, V_s^- be the present discounted value to the sovereign of paying, defaulting, respectively, starting from any time period. Likewise, define V_b^+, V_b^- as the present discounted value for the bondholders from cooperating and boycotting the sovereign, respectively. And let β stand for the discount factor.[45] By replacing the payoffs under the cooperative and punishment phases I get:

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[45]In alternative, if δ is the discount rate, $\beta = \frac{1}{1+\delta}$.

$$V_s^+ = (1-\gamma)\left[f(1,\theta) - R + \beta V_s^+\right] + \gamma\left[f(1,0) + \beta V_s^-\right] \tag{1}$$

$$V_s^- = P\left(\ell + \beta V_s^+\right) + (1-P)\left\{\frac{\beta - \beta^{t+1}}{1-\beta}\left[(1-\gamma)f(0,\theta) + \gamma f(0,0)\right] + \right.$$
$$\left. + \beta^{t+1}V_s^+\right\} \tag{2}$$

$$V_b^+ = (1-\gamma)\left(R - 1 + \beta V_b^+\right) + \gamma\left(-1 + \beta V_b^-\right) \tag{3}$$

$$V_b^- = P\left(A + \beta V_b^+\right) + (1-P)\left(\frac{\beta - \beta^{t+1}}{1-\beta}r + \beta^{t+1}V_b^+\right) \tag{4}$$

Because default may also happen in future periods, the expressions for V_s^- and V_b^- depend on the probability P that a settlement will be reached without the need for a punishment phase. In this context, A is the maximum amount of the settlement acceptable to the sovereign, which is defined by $f(1,0) - A = \ell$, where ℓ is the minimum consumption level tolerated by the sovereign. In other words, A is a measure of the sovereign's objective ability to pay in case of a bad draw from the distribution of endowments (equivalent to a deterioration of fundamentals).

For the sovereign's strategies to form an equilibrium, I still need an incentive constraint for the sovereign:

$$V_s^+ \geq (1-\gamma)\left[f(1,\theta) + \beta V_s^-\right] + \gamma\left[f(1,0) + \beta V_s^-\right] \tag{5}$$

This basically guarantees that the sovereign will not want to deviate once in a cooperation phase. After replacing (2) into (1) I get:

$$V_s^+ = \frac{\mu_1 - (1-\gamma)R + \gamma\left[P\ell\beta + (1-P)\frac{\beta^2 - \beta^{t+2}}{1-\beta}\mu_0\right]}{1 - \beta(1-\gamma) - P\gamma\beta^2 - (1-P)\gamma\beta^{t+2}} \tag{6}$$

in which μ_1 (μ_0) is the expectation of output under cooperation (punishment): $\mu_1 = (1-\gamma)f(1,\theta) + \gamma f(1,0)$, and $\mu_0 = (1-\gamma)f(0,\theta) + \gamma f(0,0)$.[46]

The bondholders want to maximize their present discounted surplus subject to (5) and a participation constraint for the sovereign. That is, they solve the problem:

$$\begin{aligned} \underset{t}{Max} \quad & V_b^+ \\ \text{s.t.} \quad & V_s^+ \geq \frac{\mu_0}{1-\beta} \\ & V_s^+ \geq (1-\gamma)\left[f(1,\theta) + \beta V_s^-\right] + \gamma\left[f(1,0) + \beta V_s^-\right] \end{aligned} \tag{7}$$

Notice that the first constraint insures that the sovereign will be better off by resorting to the international capital market then in autarky, with a payoff of μ_0 in every period. It can be shown that the bondholders' objective function V_b^+ is decreasing in t, which makes sense because the bondholders have an obvious interest in minimizing their costs of punishing the sovereign. Hence, the optimal punishment duration t^* is the smallest value of t consistent with (5).[47] As for the constraints, the first is

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[46]This implies $\mu_1 - (1-\gamma)R$ is the expected per-period surplus of the sovereign under cooperation. It is easy to show that $\mu_1 - (1-\gamma)R > 0$, i.e. that the per-period expected surplus under cooperation is positive - otherwise foreign debt would have no value to the sovereign.

[47]More precisely, V_b^+ decreases with t provided that $V_b^+ \geq \frac{r}{1-\beta}$, which however is required for the bondholders to invest their money in sovereign debt, because otherwise the present discounted value of holding the riskless asset would be greater.

actually independent from the choice of t, and can be reexpressed as an upper limit on the repayment value:

$$R \leq \frac{\mu_1 - (1 - \gamma \beta) \mu_0 + \gamma P \ell \beta}{1 - \gamma} \tag{8}$$

I will assume that (8) holds, otherwise there would not have been a debt contract in the first place. In an environment with perfect information, i.e., where the bondholders could also observe the realization of θ_t, this would be the only constraint, because there would be no scope for moral hazard. Obviously, the optimal solution of the problem would then be $t^* = 0$. With imperfect information, the solution to (7) may require a positive punishment duration, which depresses the bondholders' value V_b^+ relative to the perfect observability case.

Turning now to the incentive constraint, after replacing (6) into (5), I come to an expression which cannot directly be solved for the value of t.

$$\frac{\mu_1 - (1 - \gamma) R + \gamma \left[P \ell \beta + (1 - P) \frac{\beta^2 - \beta^{t+2}}{1 - \beta} \mu_0 \right]}{1 - \beta (1 - \gamma) - P \gamma \beta^2 - (1 - P) \gamma \beta^{t+2}} - \frac{\mu_1 + P \beta \ell + (1 - P) \frac{\beta^2 - \beta^{t+2}}{1 - \beta} \mu_0}{1 - P \beta^2 - (1 - P) \beta^{t+2}} \geq 0 \tag{9}$$

However, because for reasonable parameter values, the left-hand side is monotonically increasing in t, t^* is the value for which (9) holds with equality.[48] Given that, I can study the sensitivity of this optimal duration of punishment to the several parameters of the model using implicit differentiation. Table 1 summarizes the signs of the derivatives. The signs of the first four derivatives are intuitive. An increase in the expected per-period surplus in cooperation (i.e. an increase in μ_1 and/ or a decrease in R) increases the relative cost of the punishment phase to the sovereign, who can then be dissuaded with a smaller duration of punishment. Likewise, larger per-period expected output under punishment (i.e. an increase in μ_0 and/ or ℓ) requires a longer punishment.

The impact on t^* of an increase in P is also positive because a higher probability of settlement increases the expected per period payoff to the sovereign under punishment, what then has to be compensated with a longer duration of punishment. An increase of the probability γ of default in equilibrium has an uncertain impact because of two countervailing effects. On the one hand, it decreases μ_1, which requires a lower t^*. However, it also reduces μ_0, implying a higher t^*. The net effect will then depend on how much larger μ_1 is in relation to μ_0. Finally, the undecided sign of the derivative with respect to β has the same interpretation, because a higher β (meaning a lower discount rate δ) increases simultaneously the present discounted value of future cooperative payoffs and of present punishment values. This time, the larger μ_1 / μ_0, the higher the likelihood of t^* increasing with β.

3.4   First Stage: Majority Formation

I now move up one stage in the game tree to study the conditions for the formation of blocking minorities that, in the absence of pre-established majority and aggregation clauses, may provoke a

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[48]In fact, depending on the parameter values, the root for t^* may not be positive - apparently a case in which the cost of punishments would be so great for both parties that cooperation would be sustained without ever entering into a punishment phase. I will assume in what follows that $t^* > 0$.

breakdown in the negotiations between bondholders and the sovereign for a settlement after a default. In this section I will use the following notation: x_i is the share of the total debt in default owned by bondholder i, R is the normal debt service (as above), and A is the amount the sovereign offers as a settlement after default.

As is well described in Kletzer (2003), the formation of a minority of bondholders that can successfully refuse to agree to the settlement proposed by the sovereign, and still receive full repayment, can be modeled as a war of attrition. As the payoff of an individual bondholder to join the blocking minority is always greater than to accept the settlement offered by the sovereign, bondholders engage in a competitive process to hold out from this settlement. Bondholders are selected into the two pools depending on their willingness to pay the costs of delaying the settlement (if any).

A problem with this class of games is the multiplicity of potential equilibria. Nevertheless, I will follow Kletzer (2003) in concentrating in the (unique) symmetric equilibrium, which involves mixed strategies.[49]

To illustrate the structure of these games start with the simplest case, i.e., only 2 bondholders, who hold shares x, and $1 - x$ of the total debt in default. For each bondholder, the cost of delay is $x_i (A - x_j R)$ per period, whereas the gain from outliving his opponent is $x_i R$. Let p_i be the probability bondholder i accepts the settlement. In equilibrium he should be indifferent between holding out a further period and settling, that is:

$$p_j x_i R - (1 - p_j)(A - x_j R) = 0 \tag{10}$$

In a symmetric equilibrium, $p_i = p_j = p$, and replacing in (10), I can solve for the equilibrium probability of accepting the settlement: $p^* = \frac{A - x_j R}{A + R(1 - 2x_j)}$.

Not surprisingly, p^* is increasing with A, and is decreasing with R and the share owned by the other bondholder x_j.

Suppose now there are n identical bondholders, $n \geq 2$, and that the maximum size of a successful hold out minority is x.[50] Again concentrating only on the symmetric equilibrium, an individual bondholder will be a member of the minority with probability

$$\Pr\{\text{at least } (1 - x)n \text{ other bondholders concede}\} \tag{11}$$

Under a symmetric equilibrium, the value of p is common to all n bondholders. Hence, the random variable "number of bondholders who concede" has a binomial distribution. This implies the probability of inclusion in a successful minority is:

$$1 - \sum_{i=0}^{(1-x)n-1} \binom{n}{i} p^i (1 - p)^{n-i} \tag{12}$$

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[49]There are other asymmetric equilibria without mixed strategies which, however, are counter intuitive. The combination of strategies where any given fraction of bondholders always holds out and the remaining always concede is a perfect equilibrium of this class.

[50]By "successful" I mean a minority that can hold out an agreement and be compensated in full by the majority interested in accepting the settlement proposed by the sovereign.

Noting that for a sufficiently large n, the binomial distribution can be approximated with the normal distribution, (12) can be replaced with $1 - \Phi\left(\frac{(1-x)n - np}{\sqrt{np(1-p)}}\right)$.[51] By similar reasoning, the bondholder will be excluded from the successful minority with probability $\Phi\left(\frac{(1-x)n - np}{\sqrt{np(1-p)}}\right)$. Now, his equilibrium condition is:[52]

$$\left[1 - \Phi\left(\frac{(1-x)\,n - np}{\sqrt{np\,(1-p)}}\right)\right] R - \Phi\left(\frac{(1-x)\,n - np}{\sqrt{np\,(1-p)}}\right) \frac{A - xR}{1-x} = 0 \tag{13}$$

Although (13) can no longer be solved directly for p, I can still implicitly establish its relation with the relevant parameters, namely, R, A, x and n. Table 2 summarizes the comparative statics results.

It is easy to verify that the equilibrium level of p^* is an increasing function of A, the settlement offered by the sovereign. On the other hand, p^* varies inversely with R and x (the greatest size of the successful minority). The sign of the derivative with respect to n, the number of bondholders, depends on the minimum size of the majority, $1 - x$. If $p^* > 1 - x$ there is a "crowding out" effect of bondholders out of the conceding majority, because the individual probability of accepting the terms of settlement exceeds the required proportion $1 - x$. Because of that, a rise in the number of bondholders only aggravates this effect and therefore reduces the equilibrium probability of conceding. If, on the contrary, $p^* < 1 - x$ to start with, the adding of new bondholders has the converse "crowding in" effect and raises p^*.

In principle, these results should be generalizable to a setting with heterogeneous bondholders. In particular, a negative relation between p^* and n should translate into an equivalent relationship between the probability of reaching a settlement and the concentration of bond holdings. *Cæteris paribus*, the higher the concentration of holdings of defaulted bonds the easier it should be to reach a settlement (the higher p^*).[53]

Finally, I can now precise the value of probability P, used in the previous section. P, which is the probability that at least $(1-x)\,n$ bondholders concede is given by:[54]

$$P = 1 - \sum_{i=0}^{(1-x)n-1} \binom{n}{i} (p^*)^i (1-p^*)^{n-i} \tag{14}$$

Or, using the normal approximation:

$$P = 1 - \Phi\left(\frac{(1-x)\,n - np^*}{\sqrt{np^*\,(1-p^*)}}\right) = \frac{A - xR}{A + R\,(1-2x)} \tag{15}$$

where the last identity comes from the equilibrium condition (13).

It is now also possible to derive the consequences of the renegotiation process for the rate of return effectively served on the defaulted debt. Together with the duration of default without settlement (t^*),

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[51]A conservative rule for this approximation is that $\min\{np, n\,(1-p)\} \geq 5$.

[52]Notice that the second term is divided by $1 - x$ to normalize for the total share of bondholders who accepted the agreement, and have to divide the amount $A - xR$ between them.

[53]However, above a certain level of concentration, a settlement may be invalidated because of a small numbers problem, as follows. If the smaller bondholder owns a share larger than x there is no incentive for any of the other bondholders to compensate him - in other words there cannot be a "successful minority".

[54]In the formula I am assuming that xn is an integer.

the ratio between the *ex post* rate of return, after the settlement (or after the punishment phase), and the *ex ante* rate of return is a synthetic measure of the sacrifice imposed on bondholders by the default. The *ex ante* rate of return is simply $i_0 = R - 1$, while there are three possibilities for the *ex post* return. With probability $1 - P$, a settlement cannot be reached between the sovereign and the bondholders. According to the equilibrium strategy profiles defined in 3.3, bondholders are only repaid after t^* periods, which implies an internal rate of return of $R^{1/t^*} - 1$. With probability P, the bondholders settle for an immediate repayment of A, some of them receiving full repayment (i.e. those belonging to the minority fraction x), while the others share the remaining. According to the equilibrium mixed strategies, each bondholder accepts the settlement with probability p^*. The *ex post* rate of return can then be expressed as:

$$i_1 = (1 - P)\left(R^{1/t^*} - 1\right) + P\left[(1 - p^*)(R - 1) + p^*\left(\frac{A - xR}{1 - x} - 1\right)\right] \tag{16}$$

Define the ratio of internal rates of return $\rho = i_1/i_0$. Table 3 provides the comparative statics of this ratio with respect to the underlying parameters of the model.

Before commenting on the results, it should be mentioned that because the model is specified to derive the optimal punishment length t^*, the implications for the bondholders' rate of return are not independent from the determination of t^*. In particular, because the settlement amount A is exogenous, instead of the outcome of bargaining between the parties, there is a direct *negative* relation between i_1 and t^*. In other words, this rules out the possibility of the bondholders extracting a better deal (in terms of A) through a longer punishment of the defaulter.

Bearing this in mind, the three fist derivatives are fairly intuitive: the higher the aggregate probability of settlement P, or the individual probability of accepting the settlement p^*, the lower will be the *ex post* return, because there is a greater chance that bondholders will settle for a lower repayment than the originally agreed. Likewise, the longer the required duration of punishment in equilibrium (t^*) the lower the *ex post* return i_1.[55]

On the contrary, the return ratio may increase or decrease with the pre- and post-settlement repayments (R, and A, respectively), and with the size of the largest successful minority x. This is so because these parameters have contradictory effects on the elements that determine i_1. For instance, the size of the largest minority x decreases the aggregate and individual probabilities of settlement, P and p^*, and also the optimal duration of punishment t^*. These bode well for the return prospects of the individual bondholder. However, a larger x also decreases the net repayment for the members of the majority in case of settlement. I will return to this point in the next subsection.

3.5 First Stage: Bondholders' Organizations

I now turn to the last element in this game - the definition of the maximum size of a hold out minority without impairing the immediate acceptance of the settlement proposed by the sovereign.

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[55]Incidentally, this implies (through the chain rule) that ρ decreases with μ_0 and ℓ, increases with μ_1, and has ambiguous derivatives with respect to β and γ.

The organizational structure of the bondholders is now relevant for the result. For sake of simplicity, I will reduce the institutional variation observed in bondholders' organizations to the three ideal types identified in 2.2: *ad hoc* representation, indirect representation, and corporations of bondholders.

Moreover, I will also distinguish these three types of organizations in a very stylized fashion. The first two do not provide for any aggregation or collective action clauses, so that the maximum size of a successful minority x will depend entirely on the opportunity costs from delay, which depend on the optimal t^* derived in the second section. These costs, however, vary with the relevant discount rate of the bondholders. Because issue banks faced a conflict of interests in the representation of bondholders, I will posit that they had a higher discount rate (equivalently: a lower discount factor: $\beta_b < \beta$) than bondholders who formed *ad hoc* committees. Bondholders' corporations are distinguished by the fact that they specified the minimum majority of bondholders required to make any settlement binding to *all* holders of the defaulted securities under negotiation.[56]

In what follows I will abbreviate the three types by: AR (*ad hoc* representation), IR (indirect representation), and CFB (corporation of bondholders). I will also consider three cases:

- AR or IR with all bondholders sharing the same rate of time preference;

- aggregation of bondholders with different types of organization (AR and IR);

- aggregation of bondholders with and without CFB.

Case I: AR or IR With Same Time Preference

In the absence of collective action clauses, the possibility of reaching an immediate settlement is dependent on the trade-off between the costs to the bondholders of delaying the solution to the default and of paying-off in full to a minority of owners of bonds who refuse the renegotiation terms. The settlement will then be reached with no delay when two conditions are met:[57]

$$A - xR \quad > \quad \beta^{t^*}(1-x)R \tag{17}$$

$$\beta^{t^*} xR \quad > \quad A - (1-x)R \tag{18}$$

where (17) states that the majority $(1-x)$ of bondholders prefers to compensate the minority to having to wait, whereas (18) guarantees the interest of the minority in holding out. These two inequalities have solutions $x < \bar{x}$, and $x < 1 - \bar{x}$, respectively. Whenever $\bar{x} = \frac{A/R - \beta^{t^*}}{1 - \beta^{t^*}} < \frac{1}{2}$, the second

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[56]There is a parallel here with the contemporary problem of aggregation of bondholders. Although institutions as the British *Corporation* facilitated that aggregation within each country, membership was not mandatory, and there were certainly British bondholders who were not obliged by the qualified majority rules of the Corporation of Foreign Bondholders. For a similar comment on the French case see Lesueur (2002).

[57]These expressions differ from the equivalent conditions in Kletzer (2003) and Eichengreen, Kletzer and Mody (2003), because I posit that, without settlement, bondholders will receive full albeit delayed repayment (R), instead of their share of the proposed settlement (A). This is a consequence of the regime-switching model I used to endogeneize t^*.

condition is redundant, if all bondholders share the same discount rate.[58] And the converse applies if $\bar{x} > 1/2$.

The only difference between the AR and IR regimes is in the discount rate, which being larger in the latter case implies $\beta_b < \beta$. Although the partial derivative of $\bar{x}$ with respect to β is negative, t^* is also dependent on β, and with an undefined sign. As seen in subsection 3.2.2, if the opportunity cost of punishment in terms of output loss $(\mu_1 - \mu_0)$ is sufficiently large then $\partial t^*/\partial \beta > 0$. In that case $\partial \bar{x}/\partial \beta > 0$, so that an indirect representation system would actually decrease the size of the largest successful minority $\bar{x}$.[59]

The results from the previous section imply that, in equilibrium, the *aggregate* probability of accepting a settlement P depends negatively on x. So, the two regimes differ in the probability of settlement (higher under IR than AR), and in the distribution of the value appropriated by the bondholders under a settlement, which is more concentrated in the AR case. They will also differ in the *ex post* return in case of default, although the implications for the rates of return are ambiguous. A *sufficient* condition for a larger minority (under AR) to imply a higher *ex post* return rate is a large enough elasticity of P with respect to x. In that case the probability of settlement will fall sufficiently fast to more than offset the depressing effect of a higher x on the payoff of a member of the majority. In a sense this expresses a fairly intuitive trade-off for bondholders between costs of delaying and the chance of getting full repayment. On the one hand, a smaller hold-out minority $\bar{x}$ increases the probability of reaching a settlement, where the bondholder could be among the minority (and, hence, get full repayment with no delay). On the other, the punishment delay (t^*) also increases in P, which implies that the costs of not reaching a settlement will be larger the smaller is $\bar{x}$, unless P falls sufficiently fast with x, as mentioned.

Case II: AR vs. IR

Consider now the case where the defaulted bonds are held by bondholders with different types of organization. For sake of simplicity, I will start with two classes of bondholders, one with AR, and the other with IR representation. I also make the crucial assumption that the bondholders play a war of attrition *within* their class.[60]

The usual condition for the formation of a majority applies to both classes:

$$x \quad < \quad \bar{x} = \frac{A/R - \beta^{t^*}}{1 - \beta^{t^*}} \tag{19}$$

$$x \quad < \quad \bar{x}_b = \frac{A/R - \beta_b^{t^*}}{1 - \beta_b^{t^*}} \tag{20}$$

In the previous subsection I argued that there was a reasonable expectation that $\bar{x}_b < \bar{x}$. The conse-

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[58] I will be assuming that $A/R > \beta^{t^*}$.

[59] More precisely, the result carries through for a sufficiently small elasticity of t^* with respect to β: $\frac{\partial t^*}{\partial \beta} \frac{\beta}{t^*} < -\frac{1}{\ln \beta}$. Still, this is a reasonable condition for normal discount rates. For instance, if $\delta = 0.05$, the right hand side of the last expression has a value of 20.5. If the output cost of punishment is not large enough to make $\partial t^*/\partial \beta > 0$, the contrary result, $\partial \bar{x}/\partial \beta < 0$ holds.

[60] Otherwise the game would fall into a war of attrition between players with different time preferences, which has the trivial equilibrium where players with higher discount rate always concede.

quences of the aggregation of these two classes of bondholders can be readily understood from Figure 2.

Only if the share of bondholders under an AR regime exceeds $1 - \bar{x}$ will these bondholders be willing to form a majority to accept the settlement and pay out the remaining minority share of $\bar{x}$. Similarly, only if the bondholders with AR do not exceed a fraction of $\bar{x}_b$ will the IR bondholders agree to compensate them and form their own majority. For any distribution of bondholders in which the share of AR lies between $\bar{x}_b$ and $1 - \bar{x}$ no class of bondholders will have interest in leading the renegotiation towards a settlement.[61]

This result can be interpreted in the sense that a settlement is harder to reach when bondholders are split into different types of organizations. Now, the probability of reaching a settlement, P, depends on the actual distribution of bondholders among classes:

$$ P = \frac{A - \bar{x}R}{A + R - 2\bar{x}R} \left[1 - F\left(1 - \bar{x}\right) \right] + \frac{A - \bar{x}_b R}{A + R - 2\bar{x}_b R} F\left(\bar{x}_b\right) = P_{AR}\left[1 - F\left(1 - \bar{x}\right) \right] + P_{IR}F\left(\bar{x}_b\right) \quad (21) $$

where $F\left(\cdot\right)$ is the c.d.f. of some distribution of the share of bondholders with AR. This share cannot, however, be considered purely random, because it was partly determined by the choice of the issue markets by the sovereign.[62] In other words, the sovereign would have interest in either placing all of its debt with the same class of bondholders, or then, to distribute it in such a way that the share owned by AR bondholders would either be below $\bar{x}_b$ or above $1 - \bar{x}$. Equalitarian distributions across classes would therefore be perceived as disadvantageous *ex ante*.

Implications for rates of return are, again, ambiguous. It is possible to derive that the aggregate probability P is smaller than the probability of reaching a settlement under IR, although it may be greater than the corresponding probability under AR. By itself, this would imply a larger *ex post* return in case of default under IR. Nevertheless, even in this case there are countervailing effects, as can be concluded from the expression for i_1 of a bondholder represented by a IR arrangement:[63]

$$ i_1 = (1 - P)R^{1/t^*} + F\left(\bar{x}_b\right)P_{IR}\left[\left(1 - p^*\right)R + p^* \frac{A - \bar{x}_b R}{1 - \bar{x}_b} \right] + \left[1 - F\left(\bar{x}\right) \right]P_{AR}R - 1 \quad (22) $$

The first term is larger then in case I, but the nonconvex combination of the next two may be larger or smaller than the second term of (16).

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[61]The Figure was drawn under the assumption that *both* $\bar{x}$ and $\bar{x}_b$ were lower than $1/2$, which is reasonable, since they represent the maximum size of *minorities*. If only $\bar{x} > 1/2$ then the share with no settlement is reduced. If $\bar{x}_b > 1/2$ there will be no such share.

[62]Naturally, bondholders could use the secondary market to redistribute the bonds issued according to their preferences, not the sovereign's. Indeed, contemporary literature frequently mentions these operations of "international arbitrage". See, among many, Clarke (1878), ANPFVE (1900), and Marx (1913).

[63]The comprehension of this expression is as follows: with probability 1-P there is no settlement, and all bondholders receive R after t^* periods of punishment. With probability $F\left(\bar{x}_b\right)P_{IR}$ the bondholders represented by IR organizations will carry through the settlement, and receive R with the usual individual probability of joining the minority (which in this case may also include the bondholders represented by *ad hoc* committees). Finally, with probability $\left[1 - F\left(\bar{x}\right)\right]P_{AR}$ there are enough bondholders under AR to make it worth for them to compensate a minority among them *plus* the IR bondholders with full repayment R.

Case III: Corporations of Bondholders

The main departure from the two previous cases comes from the bondholders' corporation ability to define a qualified majority (q) necessary to make any negotiations with the sovereign binding for all bondholders.

The outcome will then only materially differ if $q < 1 - \bar{x}$, i.e., if the prescribed majority is lower than the minimum share of bondholders necessary to carry out a settlement without binding majorities. In that case the settlement will be carried out with probability 1, because the bondholders who would settle (i.e. form the necessary majority) are now strictly better since they no longer need to compensate a hold out minority. [64]

Relative to case II, this would more likely be relevant if bondholders under a CFB were paired with IR, than if they had to deal with AR representatives - given that the minimum size of the voluntary majority is expected to be larger in the former than in the latter regime.

As in the previous two cases, the model predicts a relation between the institutional structure of bondholders' organizations and the *ex post* return after a default. Even so, the overall impact of a smaller qualified majority on *ex post* returns is ambiguous. Depending on whether q, the prescribed qualified majority rule, exceeds or is below $1 - \bar{x}$, the expected return after a settlement will be given by (16) or $A - 1$. Intuitively, this is another variation on the trade-off between costs of delay and hold-out incentives I mentioned before. In the first alternative, the bondholder may have to bear the costs of delay t^*, but, with some probability, he may also receive full repayment. In the second he receives less than full repayment with certainty. Naturally, a *necessary* condition for the bondholder's return to benefit from the existence of a qualified majority rule is that those costs of delay are high enough to make the first alternative less attractive than the first.[65]

Eichengreen, Kletzer, and Mody (2003) correctly identify a moral hazard problem, coming from the impact on *ex ante* incentives of a relatively greater ease at reaching a settlement after default. The regime-switching model under moral hazard I just outlined is formally similar to the authors' discussion, except for endogeneizing the time of delay. However, the model has no direct implications for *ex ante* bond spreads, since the contractual yield is assumed constant at R. Nevertheless, two of the results of the model are indirectly related to the authors' analysis.

The undefined sign of the derivative of the ratio of return ρ with respect to the probability of default γ echoes the authors' result that *"deteriorating fundamentals can either increase or decrease the return difference between bonds issued with or without CACs, depending on the distribution of private information and expected costs of delay under UACs"* (p. 42)

The evidence reported by Mauro, Sussman and Yafeh (2002) points to a substantial convergence in yield spreads just before 1914. In that sense, it may make more sense to tell a story about credit rationing than yield spreads. Still, the evidence of these authors should be taken with care, because all bonds in their sample were issued in London, and hence, all under a CFB regime. A more promising

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[64]That is to say, these bondholders get an *ex post* return of $A - 1$, instead of $\frac{A - xR}{1 - x}$, as with an AR organization.

[65]Technically, $A - 1 > i_1$, with the latter defined in expression (16), only if t^* sufficiently above 1.

way of settling this question may be to compare yield spreads between bonds issued, say, in London (under CFB) and Berlin (IR). And, if it is the case that a convergence of yields was also observed between these two classes of bonds, to inquire into the changes in the composition of the portfolio at the markets with different bondholders regimes. For instance, it would be interesting to relate the stylized fact about British divestment from European applications, since the 1880s (taken over by France and Germany), to the structure of its financial institutions, in general, and bondholders' organizations, in particular. If I am to assume that Continental European applications were subject to worse fundamentals (higher γ), this portfolio restructuring would be materially identical to the higher yields of bonds issued with CACs, as predicted by Eichengreen, Kletzer, and Mody (2003). That is to say, in a market that provided easier conditions for renegotiation of defaulted debt, bad debtors tended to be rationed out - because of problems of moral hazard -, either by higher yields (and, hence, lower *effective* capital calls), or simple quantity rationing, as since the 1880s.

3.6   Empirical Implications

This theoretical analysis yields five predictions that can now be confronted with data.

1. The form of bondholders' organization will affect the duration of renegotiation, with shorter delays under CFB and IR than AR. This difference will be greater the lower the qualified majorities q required by CFB and the larger the financial interests in the defaulting sovereign from the banks representing bondholders under IR.

2. Settlements in the presence of different types of bondholders' organizations should be less frequent or involve longer delays than under a single regime.

3. When settlements are achieved without the intervention of CFB, the share of bondholders holding out will be larger under AR than IR.

4. The delay that ensues after the termination of preliminary settlement negotiations (t^* in the model) will vary positively with the value of arrears (R) and with the losses to the sovereign from staying out of the international capital market ($\mu_1 - \mu_0$). The reaction of t^* to fundamentals (γ) and bargainers' impatience (β) will also depend on the degree of these losses.

5. There is no direct relation between the majority required to adopt a settlement agreement (and, hence, the structure of bondholders' organizations) and the returns to the bondholders after default. Whether a smaller blocking minority that needs to be coopted with full repayment translates into a higher return post-default actually depends on the size of the costs of delaying an agreement (t^*) and the sensitivity of the aggregate probability of default to the maximum size of the minority.

4 Empirical Results

In this section I test the main claim of the paper - that reputational mechanisms matter for sustaining a decentralized market for sovereign debt - and, in particular, that the nature of bondholders' protective institutions affected the efficacy of those mechanisms. I also contrast this hypothesis with the competing claim that *direct* sanctioning devices are necessary to align the sovereign's incentives for repayment.

To test the relevance of reputational and direct sanctions for the probability of default, I estimate an unobserved effects probit model.[66] Next, I study the impact of debtors' reputation, bondholders' institutions and direct sanctions on the workouts of sovereign defaults. I characterize the settlements by two variables - the time in default before a settlement is reached, and the realized rate of return for the bondholders after the settlement.

4.1 The Sample

Suter (1990) lists 27 countries defaulted in 72 distinct episodes between 1820 and 1913. I follow this author's definition of a default episode, which includes partial or total default on amortization or interest (or both) as well as outright repudiation.[67] This definition only includes debentures issued by governments or state corporations (e.g. regional or municipal governments), despite the fact that private stock or debt was often floated under government guaranty or taken over by the government in case of insolvency.

Table 4 reports descriptive statistics for these countries: geographic region, number of defaults, whether these countries suffered an international intervention after a default, and the typical bond-holders' organizations with which they had to negotiate settlements. This enumeration suggests a concentration of defaults in Latin America (17 countries and 53 episodes), a relative infrequency of default episodes (the median is 2 per country) and of foreign interventions (which occurred in slightly more than a third of counties but barely 10 per cent of default episodes), and the ubiquity of bond-holders' committees in settlement negotiations. [68]

Because the relevant data are only available for a small number of countries in earlier years, I limited the sample period to the interval 1870-1913. I then included all countries for which data were available and that enjoyed sovereign status for at least a fraction of the sample period.[69] The outcome was

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[66]This extends the previous results by Suter (1990) to an earlier time period and the estimates of Flandreau and Zumer (2004) to a larger sample of countries.

[67]Voluntary conversions of old securities into lower coupon bonds are not included, although they had a negative impact on the bondholders' returns.

[68]In fact, the last pattern is partly a proxy for the omnipresence of British investment interests throughout the period, at least until the late 1890s, when other similar bondholders' protection organizations were created in France and Belgium. To be more precise, the British Corporation of Foreign Bondholders was founded in 1868, while there were only 28 default episodes before this date. Likewise, between this date and 1898 (when the French and Belgium organizations were created) only the Dutch bondholders had followed the British example in creating a permanent bondholders' organization. This period is also the one with the largest concentration of defaults: 33 overall. Finally, as far as I could ascertain, the British *Corporation*, after its inception was only absent from the negotiation of one settlement involving British interests - the Brazilian default of 1898.

[69]The latter provision excluded countries like India, Indonesia, or the Philippines.

a sample of 37 countries, 18 of which defaulted on their foreign liabilities during the period under research.[70] According to Nash (1899) and United Nations (1946), these countries represented 95% of world sovereign debt in 1888 and 1913-14.[71]

Despite the loss of almost 40% of the default episodes owing to this time constraint, the choice of 1870 as a breakpoint makes sense in terms of the objective at hand, namely, the study of institutional variation in bondholders' protection, since the first CFB-type organizations emerged in the 1870s.[72]

Table 5 compares the characteristics of the sub-sample of defaulting countries with the population of defaulters.

Evidently, picking countries with data selected against small countries, with no organized statistical apparatus, as can be inferred from the very low share of the debt in default accounted for by the 9 countries out of the sample. Likewise, the high percentage of creditors' interventions within the sample may indicate a systematic bias into selecting countries for which data were collected under the requirement of the creditors themselves.[73] This implies that the selection process of defaulting countries into the sample was not purely random. Nevertheless, the share of the included countries on the total debt defaulted in the period is overwhelming. One might also worry about selection into the debt market. That is, there might have been sovereigns who couldn't issue debt abroad and were therefore excluded from the sample. However, this possibility does not seem relevant because almost all countries with sovereign status sometime between 1870 and 1913 issued debt in foreign markets. The only significant exception was Persia.[74]

The non-defaulters form a relatively broad sample in terms of both their position in the international capital market and their geographical location (with the exception of Africa). The 19 countries include the core lenders (Britain, France, and Germany), smaller lenders (Belgium and the Netherlands), as well as the main non-defaulting borrowing countries.[75] Table 6 provides the breakdown of the sample

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[70]To be more precise, Austria-Hungary, Ecuador, and Greece were already in default in 1870. I included the first two episodes in the sample reporting all the relevant variables to 1870. I left out Greece because I could not find information for all the covariates with respect to the full default period 1826-79. Moreover, this default episode had a strong political character, since it referred to debt guaranteed by the European powers. Moreover, during the official default period Greece was able to float new loans.

[71]The breakdown was 21.6% for defaulters and 73.4% for non-defaulters, in 1888, and 25.2% and 69.7% in 1913-14.

[72]Likewise, German foreign investments only acquired an international standing since the 1880s, thereby increasing the frequency of IR representation in the renegotiation of default settlements.

[73]I am thinking of such cases as the foreign debt administrations in Egypt, Greece, Tunisia, and the Ottoman Empire. Still, this is probably a more muted point, namely because, according to Suter (1990), the late decades of the 19th century and the early 20th are a period of increased "core rivalry", by opposition to the undisputed British dominance until then. In such circumstances it would naturally follow a more heavy-handed treatment of defaults by major lending nations.

[74]I measure significance from the criteria of Correlates of War Project (2005) "State System Membership List, v2004.1." Online, http://correlatesofwar.org. That is, countries with a population above half a million and that had diplomatic missions at or above the rank of charge daffaires with Britain and France. There are other 10 small states or statelets that didn't issue debt and failed to meet this criteria, e.g., Luxembourg, Ethiopia, Albania, Korea (independent between 1887 and 1905), and Tonga.

[75]Despite the 1872/73 defaults of 10 US states, I include the US among the non-defaulting countries because the federal government didn't assume any responsibility for these debts (as was the case, for instance, with the Argentine provinces in the 1890s), and also because I did not find the relevant data to quantify the states' economic fundamentals.

by geographical regions.

4.2 Default Probabilities

I begin by estimating the following panel data random effects probit for defaults:

$$P\left(y_{it} = 1 | x_{it}, c_i\right) = \Phi\left(x_{it} + c_i\right) \tag{23}$$

or, in latent variable form:

$$y_{it}^* = x_{it}\beta + v_i, \ y_{it} = 1\left\{y_{it}^* > 0\right\} \tag{24}$$

where $y_{it} = 1$ if country i is in default in year t, and the composite error $v_{it} = c_i + u_{it}$ is such that both the unobserved effect c_i and the idiosyncratic error u_{it} are orthogonal to x_{it}.[76]

The vectors x_i include five sets of covariates. First, location fixed effects, i.e., country and region dummies, where the region variable is coded as in Table 6. Their inclusion serves the purpose of controlling for specific unobservables related to each country or its region. I coded the variable region from simple geographic units, i.e., without imposing information on what we know about the regional pattern of defaults.[77]

The second group represents political conditions that may affect the likelihood of default. The first variable takes the value of one in case of wars or major domestic political disturbances. This was coded using the compilation of Kohn (1986).[78] A second dummy represents political dependency. It takes a value of one if the country is submitted to any form of political dependency (colony, or protectorate) at each date.[79] A third variable represents the impact of foreign interventions in the context of past settlements on the subsequent probability of default. This variable is in line with the literature on "supersanctions" (Mitchener and Weidenmier 2005) and takes the value 1 for each country after an intervention.

A third group of variables represents country "fundamentals" in each year. Following Suter (1990), Flandreau (1998) and Flandreau and Zumer (2004), I used the exports/ population and interest service of debt/ total government revenue ratios. Contrary to the authors cited, I standardized the first ratio across countries by converting the value of exports into pounds sterling.[80] Because of endogeneity

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[76]Although this imposes more stringent assumptions on the structure of the errors than a fixed effects formulation, I chose it here because I include some time-unvariant covariates in x_i. Furthermore, as noted in Wooldridge (2002), a fixed effects probit specification is undesirable because of an incidental parameters problem.

[77]That is why, for instance, I distinguished between North and South America, instead of "Anglo-Saxon" and Latin America, since the latter breakdown would be highly correlated with the indicator variable for years in default.

[78]To be more precise, I only considered wars that affected the national territory significantly, either because fought within the national borders, or, if not, because representing a major commitment of resources. For instance, I excluded the Spanish-American war from the US variable, as well as most of British and French colonial conflicts, but included the Russo-Japanese war for Japan, even if fought away from the Japanese islands.

[79]I included Canada, Australia, and New-Zealand as independent since their accession to the Dominium status. Clarke (1878: 333) confirms that these countries were considered by the markets to enjoy the same level of sovereign immunity as the US states, or the Argentine provinces.

[80]This implies that exchange rate shocks are already absorbed by this variable, which then measures more accurately the access of the country to foreign exchange. Flandreau and Zumer measure instead the ratio in national units of account, but add a covariate for exchange rate volatility.

problems, I lag the second ratio by one year, i.e. I measured it prior to default. The expected signs of these two variables are opposite. A higher volume of exports *per capita* should ease the service of foreign-denominated currency, and therefore reduce the probability of default, whereas a higher burden of debt was naturally associated with a higher default risk.

A categorical variable for the country's monetary regime is also included because of the potential reputational gains from adherence to the gold standard. Several authors have found that countries benefited from adherence to this monetary regime through lower spreads on their sovereign debt (Bordo and Rockoff 1986 , Obstfeld and Taylor 2003) and higher trade intensity (López-Córdova and Meissner 2003). Lower spreads were associated with smaller default probabilities, at least as perceived by the markets. On the contrary, Flandreau and Zumer (2004) claim that political and economic fundamentals were more relevant than formal monetary regimes. In their regressions, the participation in the gold standard has, at best, a marginal effect on the probabilities of default. Another dimension of reputation is captured by the variable "Memory", namely, the effects of market's memory on the reputation of the debtor. Flandreau and Zumer (2004) and Tomz (2001) emphasize the relevance of reputation formation in the sovereign debt market during this period. This variable is measured as the number of years since the country's last default.

Finally, I add year effects to control for the observed tendency for defaults to concentrate around periods of generalized debt crises.[81]

Table 7 details, by country and by variable, the periods for which data is available.[82] Because coverage is uneven, I estimate an unbalanced panel. Because the information on the second measure of "fundamentals" (the ratio of debt service over government revenue) is harder to come by, I can only estimate the full model for a smaller sample, roughly corresponding to the period 1880-1913.[83] For comparison, I also provide the results of the equations estimated using only the first ratio (*per capita* exports) in both periods.

Results are in Table 8. As expected, domestic political instability has a positive impact on the probability of default, whereas a better level of fundamentals reduces that probability. In regression (3), estimated for the full model and with all geographic and time constants, the coefficient on Exports/ Population implies that an increase of one pound sterling *per capita* decreases the average probability of default by 78%.[84] However, the results with respect to fundamentals are weaker when measured by the ratio service/ revenue. Comparing regressions (3) and (4), estimated for the shorter sample, confirms this, as the omission of the ratio debt service/ revenue hardly changes the estimates of the other coefficients.

The result for the gold standard are also interesting, because the coefficient, although correctly

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[81]What Suter (1990) refers to as "global debt cycles".

[82]For an abstract of sources see documental Annex

[83]I have information for the second ratio before 1880 only for seven countries, while I can expand the sample to 21 countries - 7 defaulters, and 14 non-defaulters - by using the shorter time period.

[84]Because the covariates include a number of dummy variables, I calculate this effect by comparing the average predicted probability of default before and after adding £1 to *every* country in the sample. The usual procedure is to evaluate the change at the average values of the covariates, which does not make much sense for the country, region, and year constants.

signed, is insignificant throughout. This supports Flandreau and Zumer's (2004) conclusion for a different sample and a longer period. The variable memory has a consistent and significant impact on the probability of default in all regressions. This result underscores the gains for the debtor of keeping a good reputation, as one extra year since the last default is estimated to reduce the average probability of a new default by 3.4%.[85]

Finally, the coefficients on political dependency and past intervention are, for the most, insignificant and not estimated with much precision. The only exception is regression (5), estimated for the longer period 1870-1913, where the relevance of foreign interventions is very significant. As all the interventions included in the sample occurred after 1880, one may interpret this result as evidence of a regime change. That is, the impact of such interventions was not specific to each country, but the occurrence of such interventions signalled a possibility of intervention for every debtor. Once the countries had adapted their decision processes to this possibility (that is, in the later period), new interventions no longer had a significant impact on the probabilities of default.

In sum, we learn from these estimates that reputation mattered in the decision process of sovereign debtors. Market memory and foreign interventions seem to have constrained the governments' use of default as an easy solution to their financial problems. Furthermore, a debtor's reputations seems to have mattered more directly through its record of defaults, than indirectly through its acquisition of the golden "seal of approval".

4.3 Model of Debt Renegotiation

Next, to study the determinants of renegotiation outcomes, I estimate the linear system:

$$Length_{ik} = z_{ik}\alpha_1 + u_{ik} \tag{25}$$

$$Ratio_{ik} = z_{ik}\alpha_2 + w_{ik} \tag{26}$$

where $Length_{ik}$ and $Ratio_{ik}$ stand for the length of default (in years), and the ratio of the IRR after the settlement and before the default. Because these two variables were jointly determined in the settlement of a default, it is reasonable to estimate the two equations by seemingly unrelated regression (SUR) to capture the likely correlation between the error terms. The unit of observation now refers to the pairs of bonds k defaulted by country i.[86]

Data

The rationale for using the IRR ratio as the dependent variable is straightforward. Instead of measuring the capitalization of arrears, the change in interest and/or amortization rates, and the

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[85]Again results from regression 3 obtained by adding one year to every country.

[86]I also experimented with a random effects panel specification to keep the time dimension, but the share of variation due to unobservables was not significantly different from zero. Because of that, and also given the small sample size, I preferred to use a pooled regression method.

reduction in the principal outstanding separately, I combine them by calculating the internal rates of return (IRR) earned by the bondholders before the default and after the settlement. To calculate *ex ante* returns I use the original subscription price.[87]

This procedure has several advantages. First, it provides a more comprehensive measure of debt relief for the sovereign. It is plausible that bondholders and their representatives assessed the return on their investments in analogous fashion. Second, these internal rates of return vary across bonds, allowing me to expand the sample size from the number of default episodes to the number of defaulted bonds.[88] A final advantage has to do with the simplistic way in which the fragments of information mentioned above are sometimes interpreted. Oftentimes, inferences are made from reductions in interest and/ or principal without taking into consideration the new and old amortization conditions or any special provisions about increasing interest schedules, new capital issued without interest, or delayed amortization plans. The assumption seems to be that all debt is perpetual, in which case the yield only depends on the coupon and the emission price. However, historical experience suggests that this was more the exception than the rule, in particular for recurrent defaulters, who could only get money through amortizable loans, often with fast sinking plans.[89]

In the vector of covariates z_{ik}, I include region dummies, political and economic variables, and institutional variables.[90] The group of political variables is formed by the same indicator function for wars and other political disturbances I used in the probit regressions, and by another indicator for foreign intervention after a default. Events as the English *de facto* occupation of Egypt after 1882 or the introduction of an autonomous administration of the fiscal monopolies in Serbia, in 1895 are coded as 1.

Economic fundamentals are now represented by the rate of recovery of the export/ population ratio during the default period and also by the amount in arrears prior to settlement. The growth of export revenues is included to control for trade retaliation following a default. Its expected sign is therefore positive in the equations for both duration and ratios of rates of return. A problem of endogeneity may also be relevant here. If trade was used as a sanctioning method for sovereign default, then the pattern of trade would be influenced by the state of default. In order to gauge the significance of this problem I repeat the regressions instrumenting for the rate of growth of trade. The amount in arrears serves to test the prediction of the model in section 3.1 that the higher the amount in arrears the longer the

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[87]An alternative would be to calculate an yield based on pre-default prices from the bond market. This choice is not warranted because those prices would be affected by the market own expectations of default and settlement. Hence, they would not provide an accurate measure of the *ex ante* vs. *ex post* rates of return. For details consult the documental Annex.

[88]As an example, the 1893 *Arreglo Romero* of the Argentinean default included provisions for the settlement of 14 defaulted bonds.

[89]To be sure, not all literature follows this practice. Lindert and Morton (1989), as well as Eichengreen and Portes (1989) also calculate effective yields. This last advantage also has drawbacks. Specifically, the reconstruction of the amortization and service plans of each loan under the pre-default and post-settlement conditions involves a considerable amount of research. The relevant data is to be found in the reports of bondholders' organizations, and in numerous contemporary or recent monographs on each national case. See the documental Annex.

[90]Relative to the probit estimations, I only kept regional dummies to conserve on degrees of freedom. Nevertheless, the estimates do not differ materially when I substitute country for region constants.

period in default.

Critical here is a group of variables that represent the institutional environment of the debt renegotiations. These are: the shares of the defaulted debt owned by bondholders represented through *ad hoc* committees (AR) or a permanent organization (CFB), as well a dummy variable for the involvement of multiple bondholders' organizations in the negotiation of the same default case.[91]

Again, I include the variable "Memory" coded in the same way as in the probit estimation. The final covariate is the pre-default rate of return on each bond. This controls for the fact that whenever the pre-default IRR was already low (e.g. as the result of a previous settlement) the new settlement typically fixed a "high" ratio for the new IRR. In these cases, the relatively small sacrifice by bondholders does not reflect an improvement in the debtor's ability to pay but an additional deduction from an already meagre rate of return.

The estimation results are for the settlement of 58 bonds defaulted on by 10 countries: Argentina, Brazil, Chile, Egypt, Greece, Guatemala, Mexico, Portugal, El Salvador, and Turkey (see Table 9).[92]

Results

Before presenting the estimation results, I would like to illustrate the main observable changes in the working of the market with some summary statistics. Table 10 suggests that, over time, sovereign workout procedures became more efficient, both in terms of the duration of defaults and the recovery rates of bondholders' investment. Although I did not calculate the IRR for the period prior to my sample there is an increase of 24% in the average IRR ratios for the period and countries included in the sample. Given that the creation of self-standing independent bondholders' organizations starts in the 1870s and continues until the 1930s, the summary statistics in this Table seem to suggest a positive impact of this type of institutional innovation for the regulation of the market. In order to confirm this suggestion I now turn to the full model controlling for other possible factors, other than the institutional set faced by each sovereign.

Table 11 reports the results for both variants of the model. The first two equations were estimated using the duration of default as the dependent variable, the last two for the ratio IRR after/ IRR before. For comparison, results without region fixed effects are also reported.[93]

The estimated impact of the institutional variables on the duration of defaults is in accordance with the model. The results suggest that an increase in this share or in the representation through standing bondholders' organizations would speed the settlement of defaults. The estimated coefficients are both statistically and economically significant. A rise of 1% in the share of AR representation increased the

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[91]Notice that, to avoid redundancy, the share of the debt owned by bondholders represented by their banks (IR) is dropped. The values for these variables were collected from sources including the reports of bondholders' organizations, contemporary literature, and a number of recent studies. See the documental Annex.

[92]The reduction in sample size reflects data requirements to calculate the rates of return, especially after the settlement of defaults. See the documental Annex.

[93]Standard errors are robust and clustered by defaulting countries.

duration of the default in about 21 months. The presence of multiple types of bondholders' committees evidently postponed the resolution of defaults.

Political intervention only has a significant impact in accelerating settlements in the regression without region fixed effects. This is suggestive of the geographical concentration of such interventions, which are absorbed into the regional dummies in the second regression.[94] A higher rate of recovery of fundamentals seems to have allowed for longer defaults, perhaps because it reduced the dependence of the defaulting country on foreign refinancing.[95] Finally, the coefficient on arrears has the expected positive sign but is not significant, whereas memory has a significant and negative impact on this duration. The latter is consistent with the intuition that the dimmer the memory of a default, the less adamant the bondholders would be in prolonging negotiations or punishment of the defaulter in the expectation of imposing a harsher deal.

In the equation for realized rates of return, the coefficients on the institutional variables are again consistent with the formal framework and intuition. Bondholder-only organizations (CFB and AR) had a positive impact on *ex post* rates of return after settlements, with the CFB exacting slightly better terms. As expected, the pre-default rate of return has a significant negative coefficient. So, curiously, does the coefficient for political interventions. It may be that this type of intervention was used as last resource to protect national creditors from especially impecunious governments, who could only serve a minor fraction of their previous engagements. In these cases, intervention was needed to ensure foreign bondholders of the financial situation of the debtor, and of the correct application of resources to the reduced service of the debt.[96] Faster recovery rates don't seem to have allowed for better settlement terms for bondholders, although the coefficient was not estimated with precision. The coefficients on mixed representation and memory are now estimated with less precision.

Robustness checks

The precedent results could be distorted by the fact that trade is influenced by default, according to the trade sanctions hypothesis. To adjust for this I ran the same system of equations after instrumenting the rate of growth of export revenues during the default period using variables typically included in gravity models of international trade. Because the rationale for this endogeneity postulates the use of trade to sanction debt defaults, the instruments used refer to the main creditor country of each defaulted bond. The list of instruments includes ocean distance between the debtor and the main creditor, the product of the areas of debtor and main creditor nation, the products of the populations of the two countries at the start and at the end of default, and indicator variables for each major lending nation. [97] The major difference in results (Table 12) is that the coefficients for the rate of

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[94]This is especially true of Central American and Caribbean countries.

[95]Recall that "fundamentals" are measured here by *per capita* exports in pounds sterling. This result would seem to support the existence of direct sanctioning mechanisms through trade, but, as we shall see below, the result is not robust.

[96]The Turkish case is emblematic of this situation. Despite the foreign control of a substantial share of public revenue, it was not able to serve significantly more than 1% of interest and one fourth of this in amortization during the tenure of the *Dette publique ottomane*.

[97]I also experimented with instrumenting with these variables for the two main creditors, instead of just the largest.

recovery of "fundamentals" are now uniformly insignificant.[98] This is in agreement with Mitchener and Weidenmier (2005), who also failed to find a significant impact of trade sanctions. More relevant to my point, the values of the coefficients of institutional variables are not affected.[99]

I also used the probit results from subsection 4.2 to correct for self selection of the countries included in the sub-sample of defaulters. Wooldridge (1995) provides a direct extension of the Heckman's (1979) selection correction to panel models. Despite having rejected the hypothesis of self selection, the small number of observations with observed defaults does not allow for a powerful test.

Because the pattern of settlements was influenced by the characteristics and history of the country in default and also by the conditions in each episode, I also tried clustering the standard errors by default episodes that affected more than one bond. The results did not change however. Finally, to control for the presence of outliers, I estimated equations (25) and (26) dropping one country at a time. This exercise did not affect the value and significance of the coefficients of the relevant variables either.

This evidence allows us to draw conclusions on the determinants of sovereign debt workouts. Despite the relevance of political variables (interventions and "supersanctions"), the relevance of the institutional structure of bondholders' protective organizations is manifest. The latter mattered for the outcomes reached in accordance with the predictions of the theoretical model of section 3. Specifically, a greater share of debt represented in the negotiations by bondholders-run committees allowed for a better protection of bondholders financial interests. Permanent organizations (CFB) also dominated *ad hoc* committees by providing slightly higher *ex post* returns and shorter default periods. Consistent with theory, banking intermediation (IR) allowed for shorter defaults but at the cost of the highest sacrifices for bondholders after settlement. The creditors' memory also had an impact on the time to reach a settlement, but not on the final terms of the debt workout.

5   Concluding Remarks and Extensions

The operation of the globalized market for sovereign debt before 1914 offers a testing ground for contemporary discussions of reform of international financial architecture. The decentralized nature of the market and the contractual hazards of sovereign debt are largely identical then and now. To these observations, this paper adds three things: it characterizes the menu of institutional solutions, uses theory to derive the implications of those different solutions, and tests their significance for the outcomes in a sample of historical cases of sovereign debt default and renegotiation.

The results support the basic tenet that institutions for bondholders' protection matter for the set-

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The results were not materially different. In alternative, I also instrumented the bilateral trade levels with the major creditor, and not the total value of exports. However, the quality of the information on bilateral trade is lower than total trade statistics. In fact, first stage regressions have a lower fit in this case.

[98]Because of the problem of weak instruments, I also tested the significance of the coefficient of Recovery using the conditional approach developed in Moreira (2002). The coefficient is still insignificant under this approach.

[99]The coefficient of CFB in the duration regression, although still negative, becomes non-significant, implying that this type of organization was not responsible for a considerable acceleration of settlement agreements, relative to indirect representation by banks.

tlement of sovereign defaults. Forms of organization friendlier to bondholders yielded better results for their members, especially when they were ongoing and independent. The intermediation of financial houses was less beneficial for the bondholders because of conflicts of interest. These conclusions are based on a detailed analysis of post default returns and are robust to the inclusion of variables controlling for direct sanctions of default, either through trade flows or political intervention. This underscores the role of reputational mechanisms in sustaining the market for sovereign debt. A similar conclusion is supported by the results for the *ex ante* default probabilities.

Two main implications flow from this analysis. First, there is the potential for decentralized market-based institutions to improve the governance of the sovereign debt market over and beyond non-market sanctioning devices. Second, the orderly resolution of sovereign defaults requires that the settlement of old debts and the refinancing of defaulting countries be entrusted to separate segments of the financial markets (as argued in the modern context by Lerrick 2001).

The comparative study of the organization of the national bondholders committees should also provide for a better understanding of the stylized facts about the history of capital flows and security markets. The different ways by which the same information asymmetries were translated into agency relations may shed light on the patterns of capital flows, and also on the timing of the rise of the two international securities markets (Paris and Berlin) that operated under a substantially different mechanism than the British. That is, the variation between the three solutions for bondholders' protection, in terms of their renegotiation- or borrower-friendliness, could have affected the *ex ante* choice of placement markets by sovereigns and, hence, the more "developmental" or "revenue" nature of the foreign applications of European capital (Fishlow 1985). These issues are addressed in a companion paper.[100] Pursuing them further will be important if we want to draw "lessons from the past".

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Table 1: **Comparative Statics of t***

Increase in...	impact on t*
R	increase
μ_1	decrease
μ_0	increase
ℓ	increase
P	increase
γ	uncertain
β	uncertain

Table 2: **Comparative Statics of p***

Increase in...	impact on p*
A	increase
R	decrease
x	decrease
n	uncertain

Table 3: **Comparative statics of ρ**

Increase in ...	Impact on ρ
p^*	decrease
P	decrease
t^*	decrease
R	uncertain
A	uncertain
x	uncertain

Table 4: **Defaulting Countries, 1820-1913**

Country	Region	Defaults	Intervention	Bondholders
Egypt	Afr	1	yes	CFB+AR
Liberia	Afr	2	yes	CFB+IR
Morocco	Afr	1	yes	IR
Tunisia	Afr	1	yes	AR
Turkey	Asi	1	yes	CFB+IR+AR
Costa Rica	C-Am	4	no	CFB+AR
El Salvador	C-Am	2	no	CFB+AR
Guatemala	C-Am	4	yes	CFB+IR
Honduras	C-Am	2	no	CFB+AR
Mexico	C-Am	5	no	CFB+IR
Nicaragua	C-Am	3	yes	CFB+AR
Santo Domingo	C-Am	4	yes	CFB+IR+AR
Greece	Eur	2	yes	CFB+IR+AR
Portugal	Eur	4	no	CFB+IR+AR
Serbia	Eur	1	yes	IR
Spain	Eur	3	no	CFB+AR
US states	N-Am	2	no	CFB+AR
Argentina	S-Am	2	no	CFB+IR+AR
Bolivia	S-Am	1	no	CFB
Brazil	S-Am	2	no	IR+AR
Chile	S-Am	2	no	CFB+AR
Colombia	S-Am	5	no	CFB+AR
Ecuador	S-Am	5	no	CFB+IR+AR
Paraguay	S-Am	2	no	CFB
Peru	S-Am	2	yes	CFB+AR
Uruguay	S-Am	2	no	CFB
Venezuela	S-Am	6	yes	CFB+IR+AR

Key: Afr - Africa, Asi - Asia, C-Am - Central America, Eur - Europe, N-AM - North America, S-Am - South America. CFB - Corporation of Foreign Bondholders, AR - Ad hoc Representation, IR - Indirect Representation.

Table 5: **Characterization of Population and Sample of Defaulting Countries**

	Population (1820-1913)	Sample (1870-1913)
Number of countries	27	18
Share of Latin America	68.0%	61.1%
Median number of defaults	2	1
Fraction of Interventions	11.1%	27.8%
Most frequent bondholders' mix	CFB+AR	CFB+AR
Share in total debt defaulted	100%	91.2%

Sources: Table 4 and Suter (1990) for debt shares. The sample's share of total debt was calculated with respect to the total debt in default in the sample period 1870-1913.

Table 6: **Countries Included in Sample**

Region	Defaulting	Non-defaulting
South America	Argentina*, Brazil*, Chile*, Colombia, Ecuador, Paraguay, Peru, Uruguay	
North and Central America	Guatemala*, Mexico*, El Salvador*	Canada, US
Africa	Egypt*	
Asia and Oceania	Turkey*	Australia, China, Japan, New Zealand
Southern Europe	Greece*, Portugal*, Serbia, Spain	Italy
Eastern Europe	Austria-Hungary	Bulgaria, Romania, Russia
North and Central Europe		Belgium, Denmark, France, Germany, Netherlands, Norway, Sweden, Switzerland, UK

* Countries also included in regressions with ratios.

Table 7: **Data coverage in probit model**

Country	Pol. Disturb.	Dependency	Exp/ Population	Service/ Rev.	Gold Standard	Memory
Austria-Hungary	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Argentina	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Australia	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Belgium	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Brazil	1870-1913	1870-1913	1870-1013	1881-1913	1870-1913	1870-1913
Bulgaria	1870-1913	1870-1913	1880-1913	N.a.	1870-1913	1870-1913
Canada	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913
Chile	1870-1913	1870-1913	1870-1913	1878-1913	1870-1913	1870-1913
China	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Colombia	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Denmark	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Ecuador	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Egypt	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
France	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Germany	1870-1913	1870-1913	1880-1913	1880-1913	1870-1913	1870-1913
Greece	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913
Guatemala	1870-1913	1870-1913	1880-1913	N.a.	1870-1913	1870-1913
Italy	1870-1913	1870-1913	1871-1913	1880-1913	1870-1913	1870-1913
Japan	1870-1913	1870-1913	1871-1913	1875-1913	1870-1913	1870-1913
Mexico	1870-1913	1870-1913	1872-1913	N.a.	1870-1913	1870-1913
Netherlands	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
Norway	1870-1913	1870-1913	1870-1913	1880-1913	1870-1913	1870-1913
New Zealand	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Paraguay	1870-1913	1870-1913	1880-1913	N.a.	1870-1913	1870-1913
Peru	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Portugal	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913
Romania	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Russia	1870-1913	1870-1913	1870-1913	1882-1912	1870-1913	1870-1913
El Salvador	1870-1913	1870-1913	1870-94, 1901-13	N.a.	1870-1913	1870-1913
Serbia	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
Spain	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913
Sweden	1870-1913	1870-1913	1870-1913	1881-1912	1870-1913	1870-1913
Switzerland	1870-1913	1870-1913	1885-1913	1880-1913	1870-1913	1870-1913
Turkey	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
UK	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913
Uruguay	1870-1913	1870-1913	1870-1913	N.a.	1870-1913	1870-1913
USA	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913	1870-1913

Sources: see documental Annex.

Table 8: **Results from Probit Model**

Variables	(1)	(2)	(3)	(4)	(5)
Constant	-1.27090	0.48262	1.15708	0.48957	0.477510
	(-3.30)***	(0.77)	(0.00)	(0.00)	(0.69)
Pol. Disturb.	1.28274	1.19760	1.79441	1.75435	0.48527
	(3.37)***	(3.22)***	(2.92)***	(2.92)***	(1.79)*
Dependency	-5.26505	7.24135	38.12121	34.79568	-7.62447
	(-0.00)	(0.00)	(0.00)	(0.00)	(-0.00)
Intervention	-8.58067	-7.63965	-6.92152	-7.16295	-2.06583
	(-0.00)	(-0.00)	(-0.00)	(-0.00)	(-3.81)***
Exports/ Pop	-0.82077	-0.57404	-1.96788	-1.76441	-0.87484
	(-4.57)***	(-4.26)***	(-4.02)***	(-4.09)***	(-4.16)***
Serv/ Revenue	2.07970	1.92265	2.21061		
	(2.24)	(1.80)	(1.00)		
Gold standard	-0.44344	-0.21937	-0.76414	-0.58072	-0.45321
	(-1.45)	(-0.79)	(-1.19)	(-0.96)	(-1.71)
Memory	-0.02977	-0.03604	-0.05486	-0.04865	-0.05950
	(-3.24)***	(-3.77)***	(-3.51)***	(3.46)***	(-6.16)***
Region FE	No	Yes	Yes	Yes	Yes
Country FE	No	No	Yes	Yes	Yes
Year effects	No	No	Yes	Yes	Yes
N	768	768	768	768	1563
pseudo-R^2	0.26768	0.28819	0.66449	0.66034	0.50593
ρ	0.76894	0.40662	8.315e-7	8.315e-7	8.315e-7
χ^2	34.64059	17.69350	0	0	0

t-statistics in parenthesis. ***(**[*]) statistics significant at less than 1%(5%[10%]).

Table 9: **Bonds included in regressions**

Country	Bond	Default	Settlement	Arrears (£m)
Argentina	6% 1824	1890	1893	0.17
Argentina	5% 1884	1890	1893	1.47
Argentina	5% 1886-87	1890	1893	7.58
Argentina	5% 1887 (German)	1890	1893	1.89
Argentina	5% 1887 (Treasury)	1890	1893	0.59
Argentina	5% 1887 (North-Central RR)	1890	1893	3.77
Argentina	4.5% 1888 (Internal)	1890	1893	3.67
Argentina	4.5% 1889 (Sterling)	1890	1893	5.03
Argentina	5% 1892 (Waterworks)	1890	1893	6.32
Argentina	5% 1892 (Port of BA)	1890	1893	1.38
Brazil	4.5% 1883	1898	1898	3.29
Brazil	4.5% 1888	1898	1898	5.29
Brazil	4% 1889	1898	1898	18.39
Brazil	5% 1893 (Oeste de Minas)	1898	1898	19.46
Brazil	5% 1895	1898	1898	7.33
Chile	4.5% 1858 (Baring's)	1880	1884	0.97
Chile	7% 1866 (JS Morgan)	1880	1884	0.63
Chile	6% 1867 (Sterling)	1880	1884	1.31
Chile	5% 1870 (JS Morgan)	1880	1884	0.82
Chile	5% 1873	1880	1884	1.93
Chile	5% 1875	1880	1884	0.97
Egypt	7% 1862	1876	1880	2.51
Egypt	7% 1864	1876	1880	1.47
Egypt	7% 1865	1876	1880	1.62
Egypt	9% 1867	1876	1880	1.08
Egypt	7% 1868	1876	1880	10.57
Egypt	7% 1870	1876	1880	5.79
Egypt	7% 1873	1876	1880	30.78
Greece	5% 1881	1893	1898	4.87
Greece	5% 1884	1893	1898	4.28
Greece	4% 1887 (Monopoly)	1893	1898	6.04
Greece	4% 1889	1893	1898	7.06
Greece	5% 1890 (Piraeus-Larissa)	1893	1898	2.80
Guatemala	5% 1856	1876	1888	0.11
Guatemala	6% 1869	1876	1888	0.81
Guatemala	4% 1887	1894	1899	0.94
Guatemala	4% 1895	1899	1913	1.50
Mexico	3% 1850 (Londres)	1867	1886	26.09
Portugal	3% (Consols)	1892	1902	46.80
Portugal	4.5% 1888-89	1892	1902	16.86
Portugal	4% 1890	1892	1902	2.34
El Salvador	6% 1889	1897	1899	0.24
El Salvador	6% 1892	1897	1899	0.49
Turkey	6% 1858-9	1875	1881	4.00
Turkey	6% 1860 (Mirès)	1875	1881	1.75
Turkey	6% 1862	1875	1881	5.34
Turkey	6% 1863-4	1875	1881	5.55
Turkey	6% 1865	1875	1881	4.36
Turkey	5% 1865 (1st General Debt)	1875	1881	37.76
Turkey	6% 1869	1875	1881	21.82
Turkey	3% 1870 (*Lots Turcs*)	1875	1881	20.10
Turkey	3% 1872 (*Lots Turcs*)	1875	1881	12.67
Turkey	9% 1872 (Treasury Bonds)	1875	1881	5.29
Turkey	5% 1873 (2nd General Debt)	1875	1881	11.89
Turkey	6% 1873	1875	1881	28.56
Turkey	5% 1874 (3rd General Debt)	1875	1881	41.54
Turkey	6% 1854 (Tribute loan)	1875	1877	1.85
Turkey	6% 1871 (Tribute loan)	1875	1877	5.58

Arrears include principal and unpaid interest at date of settlement.

Table 10: **Summary Statistics, 1820-1913**

Averages	Durations (years)		IRR Ratios
	Population	Sample	Sample
1821-70	14.00		
1871-89	7.88	8.04	0.58
1890-1913	2.35	5.30	0.72

Sources: Suter (1990) and calculations of the author.

Table 11: **Results from the Model of Debt Renegotiation**

Variables	Durations	Durations	Ratios	Ratios
Constant	11.28561	15.01100	1.06951	1.14515
	(1.50511)***	(3.24786)***	(0.17426)***	(0.11862)***
Old return	-42.93372	-13.01739	-4.63471	-6.83902
	(16.20739)***	(10.38554)	(1.82909)**	(1.76224)***
Interventions	-5.05950	0.76165	-0.09534	-0.58113
	(1.88287)***	(1.21912)	(0.11210)	(0.10710)***
Recovery	14.90347	30.43672	-0.50912	-0.02981
	(8.09773)*	(11.72494)***	(0.73563)	(0.49579)
Arrears	0.00801	0.00956	-0.00203	-0.00091
	(0.02211)	(0.01280)	(0.00113)*	(0.00088)
CFB	1.61661	-1.73494	0.15269	0.23141
	(1.13913)	(0.70869)**	(0.10658)	(0.09866)**
AR	6.98986	1.72237	-0.33441	0.20648
	(1.69482)***	(0.95582)*	(0.18138)*	(0.10882)*
Mix	3.10007	1.58449	-0.17514	-0.00068
	(0.75935)***	(0.92685)*	(0.08967)*	(0.07289)
Memory	-0.2437	-0.18574	0.00075	0.00209
	(0.02412)***	(0.05300)***	(0.00217)	(0.00288)
Region FE	No	Yes	No	Yes
N	58	58	58	58
R^2	0.6852	0.8746	0.7412	0.8076
Fam	13.33***	26.17***	17.54***	20.92***

Robust standard errors, clustered by countries in parenthesis
***(**[*]) statistics significant at less than 1%(5%[10%]).

Table 12: **Results with Instrumental Variables**

Variables	Durations	Durations	Ratios	Ratios
Constant	10.32312	14.25618	0.98162	1.10172
	(2.72782)***	(2.39230)***	(0.19372)***	(0.14767)***
Old return	-37.73886	-11.77052	-4.16041	-6.76726
	(14.06885)***	(10.45648)	(2.16212)*	(1.88531)***
Interventions	-4.79216	0.60165	-0.07092	-0.59034
	(1.91940)**	(0.99384)	(0.12147)	(0.09939)***
Recovery	1.65953	20.17951	-1.71855	-0.62003
	(24.77947)	(43.80309)	(1.82385)	(1.87806)
Arrears	0.01902	0.014082	-0.00102	-0.00065
	(0.02921)	(0.02170)	(0.00158)	(0.00132)
CFB	2.21230	-1.02822	0.20709	0.27208
	(1.55662)	(2.90768)	(0.12275)*	(0.15480)*
AR	6.94262	2.02162	-0.33873	0.22370
	(1.57781)***	(1.26608)*	(0.18618)*	(0.08687)**
Mix	3.23796	1.79475	-0.16283	0.01218
	(0.81438)***	(0.87440)**	(0.09433)*	(0.06633)
Memory	-0.09611	-0.17894	0.00116	0.00248
	(0.02504)***	(0.04079)***	(0.00219)	(0.00265)
Region FE	No	Yes	No	Yes
N	58	58	58	58
R^2 (1st stage)	0.6082	0.6082	0.7186	0.7186
R^2 (2nd stage)	0.6600	0.8664	0.7114	0.8025
Fam	11.77***	22.80***	16.25***	20.43***

Robust standard errors, clustered by countries in parenthesis
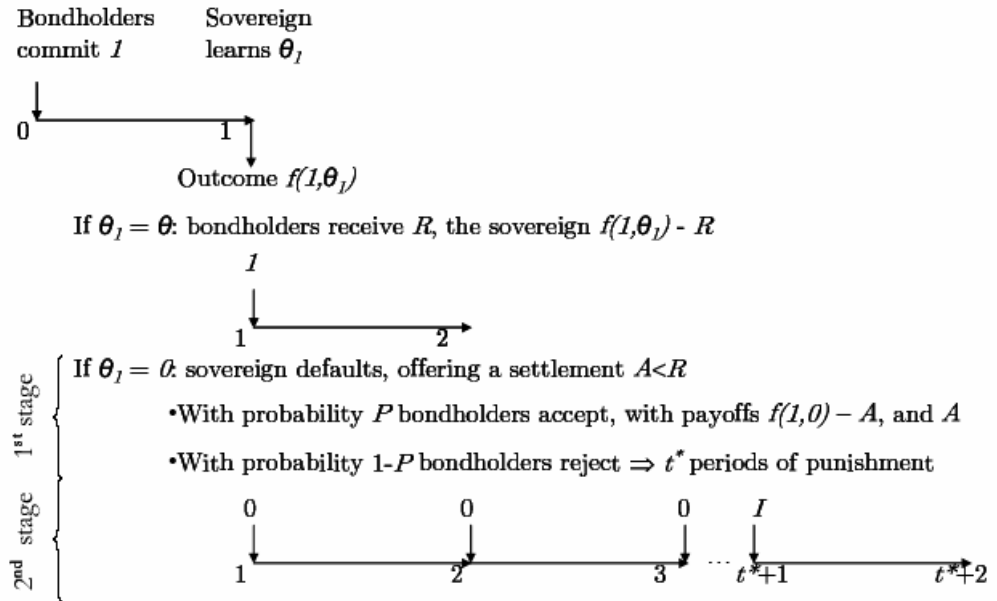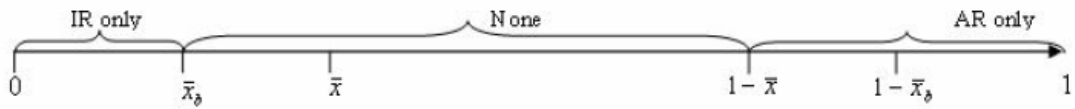***(**[*]) statistics significant at less than 1%(5%[10%]).

Bondholders   Sovereign
commit *1*   learns θ_1

0 ——————————————— 1

Outcome *f(1,θ_1)*

If $\theta_1 = \theta$: bondholders receive *R*, the sovereign *f(1,θ_1)* - *R*

1

1 ——————————————— 2

If $\theta_1 = 0$: sovereign defaults, offering a settlement *A<R*

•With probability *P* bondholders accept, with payoffs *f(1,0)* − *A*, and *A*

•With probability *1-P* bondholders reject $\Rightarrow$ t^* periods of punishment

0   0   0   *I*

1 ————————— 2 ————————— 3 ··· t^*+1 ——————— t^*+2

1st stage

2nd stage

Figure 2: Percentage of bondholders under AR

IR only   None   AR only

0        $\bar{x}_\partial$ $\bar{x}$ $1-\bar{x}$ $1-\bar{x}_\partial$ 1

Documental Annex

1 Default Probabilities

1.1 Ratio Exports/ Population

This ratio was calculated from three series: the export value, usually expressed in domestic currency, the exchange rate of the domestic currency against the pound sterling, and the population of each country.

Population data was gathered from Mitchell (2003a, b, c) for Austria-Hungary, Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, Chile, Japan, Mexico, New Zealand, Paraguay, Romania, Serbia, and the United Kingdom. For Denmark, France, Germany, Greece, Italy, Netherlands, Norway, Russia, Spain, Sweden, and Switzerland, I combined Mitchell's data with Flandreau and Zumer's (2004). Mitchell's data was still used for three other countries in combination with interpolated data from other sources: Paz y Miño (1942) for Ecuador, the reports of the Corporation of Foreign Bondholders for Guatemala, and Baron Castro (2002) for Ecuador. The same sources used by Clemens and Williamson (2002) were employed for China, Colombia, Egypt, Peru, Turkey, and Uruguay. Finally, the information on Portuguese population comes from Nunes, Mata and Valério (1989), and on US population from the electronic edition of the Historical Statistics of the United States compiled by Carter *et al.* (1993).

The series of **Exports** in domestic currency were again primarily gathered from Mitchell (2003a, b, c). Exceptions are: Chile from Mamalakis (1978); Carbo (1953) for Ecuador; Smits *et al.* (2000) for the Netherlands; Carter *et al.* (1993) for the United States; and the sources quoted in Clemens and Williamson (2002) for China, Colombia, Peru, Serbia, Turkey, and Uruguay. Because these are expressed in 1990 US dollars, I converted the values to current pounds with the help of the American consumer price index from Carter *et al.* (1993), and the dollar/ pound exchange rate mentioned below. For Australia, New Zealand, Ecuador, and, obviously, the United Kingdom the data was already expressed in pounds sterling. For the remaining countries I divided the export series by the price of sterling in domestic currency. In the cases of Bulgaria, Chile, Guatemala, and Romania, the statistics measure the exports in gold equivalent currencies, allowing me to use the par exchange against the pound.

Exchange rate data come from two main sources: Schneider et al. (1991) for Austria-Hungary, Argentina, Belgium, Brazil, Canada, Denmark, Egypt, France, Germany, Italy, Mexico, Netherlands, Paraguay, Russia, Spain, Sweden, Switzerland; and the *Global Financial Database* for China, Colom-

bia, Japan, Norway, Peru, El Salvador, Serbia, Turkey, Uruguay, and the United States. The Greek exchange comes from Flandreau and Zumer (2004), and the Portuguese was taken from Esteves (2002).

1.2 Ratio Debt Service/ Government Revenue

For this ratio I use the database compiled in Flandreau and Zumer (2004) for 13 countries: Austria-Hungary, Argentina, Belgium, Brazil, Denmark, France, Germany, Italy, Netherlands, Norway, Russia, Sweden, and Switzerland. For Greece I used Lazaretou (1994); for Portugal Mata (1993); for Spain Carreras (1989); for the United Kingdom Mitchell (1962); and for the United States Carter *et al.* (1993). The data on debt service of Canada was taken from Urquhart and Buckley (1965), whereas government revenue is reported in Mitchell (2002c). I combined the same source for revenue with service expenditures for Chile from Mamalakis (1978), and from Japanase Statistical Association (1987) for Japan.

1.3 Gold Standard

The classification of the monetary regime of most countries comes from Clemens and Williamson (2002). For Belgium, the Netherlands, and Switzerland I used Flandreau and Zumer (2004); for Ecuador, Guatemala, and Paraguay Schneider (1991). The monetary regimes of Bulgaria and Romania were established from the appendices to the Annual Report of the United States Comptroller of Currency. Finally, Lindo-Fuentes (1990) provides detailed information on the monetary regimes of El Salvador.

1.4 Other Variables

The variable **Political disturbances** was coded from Kohn (1986), whereas instances of foreign **Intervention** were taken from Suter (1990) and the reports of the British Corporation of Foreign Bondholders. Suter (1990) was also the source for the variable **Memory**. The dates of default were fixed from Suter (1990) and from the reports of the Corporation of Foreign Bondholders.

2 Model of Debt Renegotiation

2.1 Durations

The main sources (adjusted in specific cases) for the duration of defaults are Suter (1990) and the reports of the Corporation of Foreign Bondholders. For Chile I used Mamalakis (1978) and Urzúa (1945). The durations were calculated in months and converted to years.

2.2 Internal Rates of Return

In order to establish the ratio between post-settlement and pre-default IRR one needs information on the original debt contract's provisions about issue price, coupon, and amortization procedure - namely

the rules about the sinking fund (if any). On the side of the settlement, the relevant information regards the rates of capitalization of past principal and interest in arrears, as well as the new dispositions for amortization.

The basic formula used to calculate the IRRs is as follows. If c is the nominal coupon rate, a the sinking fund quota, P_0 the issue price, and n the maturity of the loan (in semesters), the IRR r solves the equation: $K_0 = \sum_{t=0}^{n} (c + a) (1 + r)^{-t}$.

Given the complexity of the calculations, which vary from bond to bond, I will only mention here the main data sources by country. There are two sources of general interest: the annual reports of the Corporation of Foreign Bondholders, and the 1889 edition of the *Fenn's Compendium of the English and Foreign Funds*. For the countries covered in their study, I also compared other sources with the amortization tables reconstructed for Lindert and Morton (1989). These tables are available from http://www.econ.ucdavis.edu/faculty/fzlinder/Sovereign

Apart from this general sources, I also used specific works for each country. For Argentina Peters (1934) and the overviews of securities introduced in German stock exchanges, published annually in the *Vierteljahrshefte zur Statistik des deutschen Reichs*; for Brazil Bouças (1950); for Chile Urzúa (1945); for Greece Levandis (1944); for Mexico Casasus (1885), Payo (1862) and the 15th edition of the *Saling's Börsen-Papiere*; for Portugal Esteves (2002); and for Turkey Roumani (1927).

2.3   Arrears

The amounts in arrears comprise the principal unpaid at the date of default, and the interest until settlement. As sources, I used the annual reports of the British Corporation of Foreign Bondholders for Argentina, El Salvador, Greece, Guatemala (1876 and 1894 defaults), and Portugal. For Egypt, the data in Lindert and Morton (1989); Suter (1990) for the 1899 Guatemalan default; Wynne (1951) for Mexico and Turkey; for Brazil Bouças (1950); for Chile Urzúa (1945) and Mamalakis (1978).

2.4   Debt Shares

As in the case of the internal rates of return, I used a great variety of sources to identify the shares of defaulted debt represented by each of the three types of bondholders' protective committees. I mention here the most relevant.

For the Argentinean default I used Stone (1999), Marichal (1989), Schaefer (1993), and the reports of the Corporation of Foreign Bondholders. The latter together with Bouças (1950) was used for Brazil; Marichal (1989) for Chile; Stone (1999), Wynne (1951), Hamza (1944), and the *Fenn's Compendium* for Egypt. The Greek distribution of debt was established from Stone (1999), Schaefer (1993), the *Fenn's* and Levandis (1944); the distribution of Guatemalan debt from Marichal (1989) and the reports of the Corporation of Foreign Bondholders; the Mexican from these reports and Wynne (1951); the Portuguese from Esteves (2002); and the distribution of the debt of El Salvador from the reports of the Corporation of Foreign Bondholders. Finally, I used these same reports, Ducruet (1964) and Pamuk (1987) in establishing the division of Turkish debt defaulted in 1875.

3   Instruments

The **Ocean Distance** between each defaulting country and its main creditor was established from the distances between ports listed in National Imagery and Mapping Agency (2001). The list of ports used is: London (United Kingdom), Le Havre (France), Hamburg (Germany), Buenos Aires (Argentina), Rio de Janeiro (Brazil), Valparaíso (Chile), Alexandria (Egypt), Piraievs (Greece), San José (Guatemala), Vera Cruz (Mexico), Lisbon (Portugal), Acajutla (El Salvador), and Istanbul (Turkey). The land **Areas** were taken from the *Encyclopædia Britannica*. The sources for **Population** and **Main creditor** are the same described in 1.1 and 2.4, respectively.

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