Development Centre Studies

The Making of Global Finance 1880-1913

By Marc Flandreau and Frédéric Zumer

OECD

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Publié en français sous le titre :

Les origines de la mondialisation financière 1880-1913

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Foreword

The 2001-2002 OECD Development Centre Work Programme, *Globalisation and Governance*, revealed a number of transversal issues relevant to virtually all the themes. This book is the result of steps to cover some of those issues.

Acknowledgements by the Authors*

The present monograph was presented in a variety of places, including most prominently the OECD Development Centre seminar (Paris, April 2002) which proved essential in bringing the project to fruition. In addition, we are grateful to participants to the Universidad Carlos III economic history seminar (Madrid, May 2002), the Humboldt Universität Departmental seminar (Berlin, May 2002), the Venice International University Summer School (Venice, September 2002), the Cambridge University "Economics and History" Lectures (Cambridge, February 2003), the Banca d'Italia economic history seminar (Rome, March 2003) and the OFCE Convergences in Economic History Seminar in Paris (April 2003). The suggestions and reactions of the audiences proved most useful in fostering our thinking.

Finally, for their detailed remarks on earlier drafts we especially wish to thank Jorge Braga de Macedo and Colm Foy at the OECD Development Centre in Paris.

This book is dedicated to the memory of Charles P. Kindleberger for his comments, criticism and, above all, inspiration.

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Preface

The OECD Development Centre's 2001-2002 Programme of Work on "Globalisation and Governance" (G&G) showed that well governed developing countries tend to benefit from globalisation. Positive G&G interaction requires policy credibility on national, regional and global levels. If financial crisis in some countries leads to sudden stops in capital flows to others, globalisation can reverse development: the G&G interaction may be negative.

The debate on monetary integration and exchange rate regimes, whose roots go back to the first age of globalisation, reflects this complex interaction. At a 2001 Development Centre Seminar, Marc Flandreau presented his original series of fiscal and monetary variables for sovereign borrowers and showed the determining influence of financial and political reputation for bond market spreads. Based on some of that discussion, this book confirms that in the past a positive G&G interaction was already essential in investors' perceptions of development prospects in what were then called capital-poor countries.

The concern with governance dominates cultural stereotyping of "Latin" versus "Nordic" sovereign borrowers and contrasts with the alleged preference of investors generally for authoritarian regimes. To the extent that a disenfranchised population pays lower taxes, narrowing and lowering state revenues with a heightened risk of instability, a combination of political and financial freedom is most attractive to investors in capital-poor countries.

The authors use their data set to analyse financial flows in a period of intensive capital movement, and find that it was the quality of the fundamentals that drove investors' choices, rather than adherence, or not, to the gold standard. Expert opinion of the time set indicators of sound fundamentals as a ratio of debt service to exports below 20 per cent and a ratio of debt service to government revenues below 35 per cent, which the authors here label the "trade" and the "tax" tests. They show that the tax test (which reflects a greater concern with governance, including political participation) gradually replaced the trade test, which only reflects openness. Usually, the tax test is more pessimistic than the actual spread.

The movement towards concern with political governance followed the 1890 Baring crisis — and is an element in explaining why the risk of default declines with the extension of the franchise. For example, with the 1910 Republican revolution in capital-poor Portugal, the franchise was extended to cover 6.2 per cent of the population, from only 2.5 per cent previously. The effect was a decline of over 20 per cent in the probability of default in 1911, more than twice the sample average.

This book confirms that adopting a common monetary standard does not provide a fast road to policy credibility. Much more important are governance structures and institutions which imply predictability and stability, especially when the economy is growing rapidly as many did during the first age of globalisation. Then as now, a positive G&G interaction is the only basis for investor confidence and improved prospects for capital-poor countries to attract finance for development. It also reflects and sustains worldwide economic Growth, bringing in a third, and crucial, G.

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Jorge Braga de Macedo
President, OECD Development Centre,
Paris, 30 June 2003

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The Making of Global Finance 1880-1913

Introduction: Reputation and Development

> Unless we know why people expect what they do expect, any explanation that refers to expectations as *causa efficientes* is worthless.
>
> Joseph Aloys Schumpeter, *Business Cycles*, 1939

What guides investors' decisions? How is market sentiment shaped, and how does this influence the course of global financial integration? Economics has straightforward answers. Modern theories help identify the relevant variables that researchers ought to consider when trying to explain both individual choices and aggregate outcomes at any moment. The theories are then tested on the variables thus defined. This method is valid in any sample period, and the same models should be able to account for both present and past phenomena. Economics provides the analytical tools through which we can interpret numbers.

This approach, which sometimes gives short shrift to that of historians, has scientific virtues but also inherent limitations. It has generated or at least justified a seemingly natural division of labour between economic analysis and data gathering. Statisticians and economic historians may collect the relevant numbers, which economists use later to implement models developed deductively. The numbers may serve as little more than fodder for intellectually powerful, but not necessarily correct theories. Other disciplines, such as physics, where the methodology is inductive (apart from the sub-branch of theoretical physics) generally recognise that the separation of observation and analysis is meaningless.

Perhaps no other context more aptly illustrates this simple but far-reaching point than that of the perceptions by market participants of the quality of government policies. It is well known that consensus develops regarding the appropriate policies countries should adopt given the times and circumstances. The "Washington consensus" of the 1990s, which favoured openness and liberalisation, was an illustration. Consensus does matter because it helps define "best practices" in policy making. Policy makers get judged on their ability at implementing the policies considered as a test of policy

success. In an affluent international financial system where countries compete to attract capital, market participants reward policy makers through lower borrowing costs and a greater supply of funds[1]. If this is true, certain variables should play a kind of focal role for investors who monitor policy developments. Concerns about them should lie at the heart of policy making, because the authorities will have to worry about getting the variables right. Economists and political scientists describe such situations as policy regimes[2].

It is fairly difficult, however, to document these highly important policy issues from a purely abstract model. Pinning down the relevant variables and their influence on market perceptions (let alone how policies themselves react to them) is by no means easy. Pure theory is a poor guide. Beliefs shape policy practices and policy practices shape beliefs. It is an established result in economic theory that forward-looking expectations lead to multiple equilibriums. This means that examining a given situation or equilibrium says nothing about the forces that have brought it about. The only way to sort out these difficulties is to open the black box of market perceptions to see how they determine the allocation of capital.

To make this point, this monograph considers the first large experiment in financial globalisation. It occurred in the second half of the 19th century when capital flows were basically unrestrained, with a potentially very high degree of capital mobility. Empirical evidence provided by the Feldstein-Horioka measures of financial integration support the consensus view that during those years financial integration was indeed very great. It shows conclusively that the late 19th century displayed a very high degree of current-account openness, illustrated by a large disconnection between domestic saving and investment[3]. This integration has only recently been revived, thus raising the possibility of many useful parallels between the first age of globalisation (1848-1914) and the second (1973 to the present)[4].

Nevertheless, understanding the sources of international financial integration before World War I has remained a major challenge. Following a view that emerged in the inter-war period when contemporaries associated the dislocations of the global economic system with those of the global exchange-rate system, scholars often point to the gold standard as the backbone of pre-1914 integration. The international gold standard was an informal arrangement whereby countries independently fixed and sought to defend the value of their currencies in terms of gold or some gold-related unit, thus creating a *de facto* fixed exchange-rate system among followers of this policy rule. As a regime, it thus provided both a stable exchange-rate environment and a number of policy prescriptions, because monetary expansion beyond a certain point was over the long run incompatible with maintenance of the gold parity.

Analysts have therefore come to see the pre-1914 gold standard as the epitome of what a global policy consensus could be. The supposedly restrictive policies of the so-called "classical" gold standard have been often described as an ethos developed during the long boom of the late 19th and early 20th centuries, and that acted as a disciplining device promoting financial sobriety. As a result, "the gold standard came to symbolise the mentality and patterns of conduct of the intellectual and economic elite".

Policy makers expected that the market would expect them to remain on gold and adjusted their behaviour correspondingly. As a regime, the gold standard is said to have embedded the list of orthodox recipes that became the backbone of the policy consensus of the time[5].

Some argue that this mentality played a decisive role in shaping later responses to economic turmoil. Policy makers were prepared to go to any lengths to avoid devaluation. When crisis hit in the inter-war years, governments and leaders trained during the pre-war period reached for gold adherence as a natural remedy. This can explain the troubling persistence of deflationary policies during most of the Great Depression and why governments resisted the lax policies that any modern undergraduate student would recommend. Gold became the millstone around the neck of national economies, helping them to sink (Eichengreen and Temin, 2000).

The reference to "mentality" is undoubtedly a radical way to solve the conundrum of expectations and policies. In any case, one should definitely ponder the broader implications of this strategy, which raises questions that obviously go beyond the specific issues of the inter-war crisis. All too often, "mentality" is treated as some kind of residual that remains when other factors have been taken into account. Yet when it determines the very credibility of policy actions, it arguably becomes the principal factor. It would be very helpful to have a method to identify the variables that mattered most in shaping contemporaries' beliefs. Under the gold standard, did people worry about the exchange-rate regime (adherence to gold), fiscal policy (balanced budgets) or monetary policy (a sound currency)? What weights did market participants and policy makers give to these alternative goals? If 19th century orthodox writers had been asked to choose between, say, adherence to gold and fiscal balance, what would have they preferred?

Proper answers to these questions are essential given the difficulties in making comparisons between the first and the second eras of globalisation. To a very large extent, globalisation takes place today in a system of essentially floating exchange rates (at least among developed areas such as Europe, Japan and the United States) without this constituting a major obstacle[6]. If the conventional view on the sources of pre-1914 globalisation is correct, if it rested on a sustained belief in the virtues of fixed exchange-rate regimes, one would have to admit that a major paradigm shift has occurred and that the modern drivers of globalisation are radically different. Today (after, it is true, several decades of debate) the choice of the exchange-rate regime has become a less and less distinctive item on the good-governance menu[7].

This monograph studies the roots of credibility during the first era of globalisation. It gives much attention to economic ideas regarding best policy practices. It focuses on the views of those involved in international macroeconomics (as the subject is known today) during the years when the gold standard ethos supposedly coagulated. It tries to develop a method that facilitates study of investors' thinking and behaviour "in the wild", as anthropologists say. The acid test of the intuitions formalised here will be the ability of the methodology to make sense of the well-known but so far

unexplained phenomenon of interest-rate convergence over 1875-1913, which resulted in very low interest premiums paid by most countries during the early 1900s. The broad goal is more ambitious — to explain the making of global finance.

The study develops a new, "grass-roots" analysis. It follows an inductive approach, and, rather than projecting modern theories — some would say modern prejudices — onto past data, it considers the theories in use at the time under study. Archival and secondary sources are used to reconstruct what people in both academia and financial circles thought good macroeconomic policy management should be. This allows the formulation of assumptions about what types of variables people ought to have considered, and in turn naturally leads to an empirical discussion of the validity of the behavioural model thus constructed. This approach avoids the pitfalls of *a posteriori* reconstruction. It provides a way to determine what macroeconomic indicators truly mattered, and it can challenge the myth of the gold standard ideology.

To test whether contemporary theories influenced pricing behaviour requires obtaining the information set available to contemporary investors. A vast database was therefore gathered, for a sample of 17 countries over 34 years (1880-1913). The wide array of nations[8] includes both capital-rich and capital-poor countries, in both Europe and Latin America, both South and North[9]. This database differs from existing ones in being larger (especially for capital-poor countries, for which figures are harder to get) and in including more variables. Unlike those in other studies, this database, because it makes extensive use of archival sources, is as close as possible to the information monitored by contemporary investors. Collecting it also helped to reveal flaws in the official sources normally used in similar studies. Contemporary observers often knew of them and routinely adjusted official figures when they included known biases. Investors, the study finds, knew better than modern scholars working with official retrospectives.

Combining the analysis of beliefs and the data thus collected, the study then proceeds to reconstruct from the theories in use a more meaningful and relevant picture of investors' behaviour under the gold standard. Given the importance that writers have given to the *Belle Epoque* record to account for inter-war problems, and given its parallels with today's globalisation, this exercise provides a wealth of theoretical, historical and, above all, policy lessons. It provides an opportunity to revisit a number of important debates on the relations between development and international financial integration. It shows that technology (financial innovation) did not play a leading role in promoting the globalisation of capital. Simple policies that mechanically favour openness (such as free trade) were not essential either. Instead, the making of global finance rests on striking a careful balance between fiscal development and economic growth. The ability of states to collect resources and maintain strong records of interest payments determines the cost at which they can attract capital. This brings to the fore the question of governance as a key feature of financial globalisation and thus puts the state back into the supposedly *laissez-faire* pre-1914 context, a conclusion anticipated by Alexander Gerschenkron (1962) in a different perspective.

Section I sets the analytical stage by relating capital markets integration and the cost of capital imports. It also identifies interest-rate convergence as a key aspect of the integration of the pre-1914 international financial system. Section II reviews existing attempts to explain interest-rate convergence. Section III outlines the weaknesses of "regime" dummies in empirical studies. Section IV provides an outline of the methodology, showing that contemporary ratings of sovereign risk display a high correlation with market prices. This demonstrates that it is useful to document perceptions from a survey of contemporary sources. Section V surveys the theories and views regarding sound macroeconomic management used by contemporaries of the pre-WWI international financial system to assess sovereign risks. Sections VI and VII exploit the results of this survey to develop and test, using the new database, two alternative models explaining the pricing of sovereign bonds. The results point to a ranking of the macroeconomic priorities in the minds of 19th century investors that contradicts the main claims of the conventional literature on the pre-war gold standard. Section VIII solves the convergence puzzle. It outlines the importance of successful development strategies in bringing about interest-rate convergence. Section IX develops this point by relating alternative rating techniques to alternative development views. Section X provides conclusions and policy lessons.

I. The Rules of the Game: Interest Convergence and Financial Globalisation

To clarify the discussion, it is useful to start from a simple analysis of the relation between perceptions of sovereign risk and measures of financial integration[10]. One feature of the first era of globalisation, common to the second as well, was an almost complete absence of formal barriers to the free mobility of capital. Apart from small taxes on foreign-exchange transactions (motivated by financial considerations) and a measure of control on initial public offerings (politically motivated), portfolio reallocation, international bond circulation, etc. were basically left unhampered[11]. An abundant literature has shown that, indeed, the prices of similar bonds quoted in several markets were fully arbitraged[12].

Was this structural situation of basically free capital mobility conducive to a high level of financial integration, i.e. was the actual movement of capital effectively as large as it might have been? The possibility for capital to migrate suffices to equalise the prices of identical assets in various markets, but that does not mean that large flows of capital take place. The analytical workhorse to address whether capital did move consists of the Feldstein and Horioka (1980) measures of financial integration. Intuitively, their rationale is that a low correlation between domestic saving and investment reveals that investment is not constrained by domestic resources. This is tantamount to saying that the degree of financial integration is high. Therefore, to track the ebbs and flows of global finance, these measures compute cross-section correlation coefficients between saving and investment ratios, for a given sample of countries and for a given year: the lower the correlation, the higher the integration. The resulting time series of correlation coefficients captures the evolution of financial integration.

Many authors (e.g. Obstfeld and Taylor, 1998) have pointed out the apparent similarity between coefficients computed for recent periods and for a century ago (with a period of deglobalisation coinciding with the Great Depression). Yet few have noted that international financial integration fluctuated quite widely even within periods with high average financial integration, such as before 1914. Consensus estimates, for instance, show progress in international financial integration in the 1880s, followed by a brutal interruption in the early 1890s, resumption after 1895 and progress afterwards that surpassed the levels of the late 1880s.

A priori, several factors might have accounted for that. Technological improvements can be brushed aside as secondary at best; had they truly mattered, the progress of financial integration should have been much more regular, and reversals should not have occurred. The factors favoured here, which this monograph documents in detail, embrace market perceptions regarding the quality or "soundness" of

borrowing countries — especially perceptions regarding sovereign risk. There is a simple, intuitive relation between the premium a country must pay to attract foreign capital and the degree of financial integration it achieves. Suppose that, starting from a situation of low perceived sovereign risk, a country suddenly becomes rated as much more risky (because it cannot balance its budgets, because it experiences a revolution or a war or for any other reason). The supply of external capital will dry up and the country will now have to rely exclusively on domestic resources to fund domestic investment[13].

The previous simple analysis predicts that, on average, a positive association should appear between the yield premium of borrowing countries and the degree of international financial dis-integration. The lower the risk premium paid by capital-poor nations, the more financially integrated the world is. This relation can in turn serve as the basis for a straightforward test to illustrate the relevance of the approach adopted here. Figure 1 compares Feldstein and Horioka measures of financial integration and the yield premium on a pre-1914 "Emerging Markets Bond Index (EMBI)"[14]. The correlation between the two lines is striking and perceptible for both trends and cycles. A first wave of financial integration (decline of saving-investment correlation coefficients) took place in the 1880s and was accompanied by a corresponding decline in yield premiums. This trend was interrupted in 1890 when Argentina defaulted and caused the fall of Barings. The yield premiums ratcheted up and remained high before receding later, reaching record lows after 1900 when international financial integration was at its maximum.

Figure 1. **Emerging Market Premiums and Global Financial Integration**
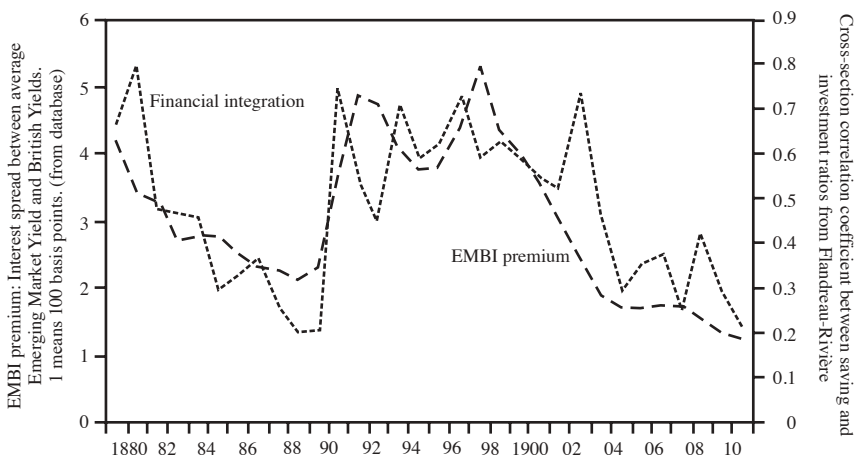
Source: Flandreau and Rivière (1999) and authors' database.

Several implications appear. First, the process of financial globalisation before WWI was not linear. It fluctuated a lot. In a general context of free international capital mobility or, differently put, in the absence of formal capital controls, the actual degree of international financial integration and thus the extent to which the international system avails itself of the benefits of globalisation may vary considerably[15]. These variations seem tightly related to the perceived risks of lending to emerging economies, because the interest premiums borrowing countries face measure the perceived default risks. Borrowing costs and financial integration may be seen as the two sides of the same coin; they obey the same laws of motion.

Beyond cyclical fluctuations, the evolution of yield premiums in the period under study also displays a clear downward trend. This massive interest-rate convergence was perhaps the most striking financial phenomenon of the late 19th and early 20th centuries. It is illustrated in figure 2, which depicts the reduction in interest-rate spreads between 1880 and 1913 with respect to UK interest rates. The figure compares the reduction in terms of the initial spreads. The greater the initial spreads had been, the greater the convergence achieved by the eve of WWI[16]. This appears for both capital-poor and capital-rich countries, although it is perhaps more striking for the former than the latter. Italy, for instance, enjoyed a roughly 200 basis-point reduction in its borrowing rates relative to Britain between 1880 and 1913[17].

Figure 2. **Conditional Convergence of Yields Spreads, 1880-1913**

Spread 1880 = R_i (1880) - R_{uk} (1880)
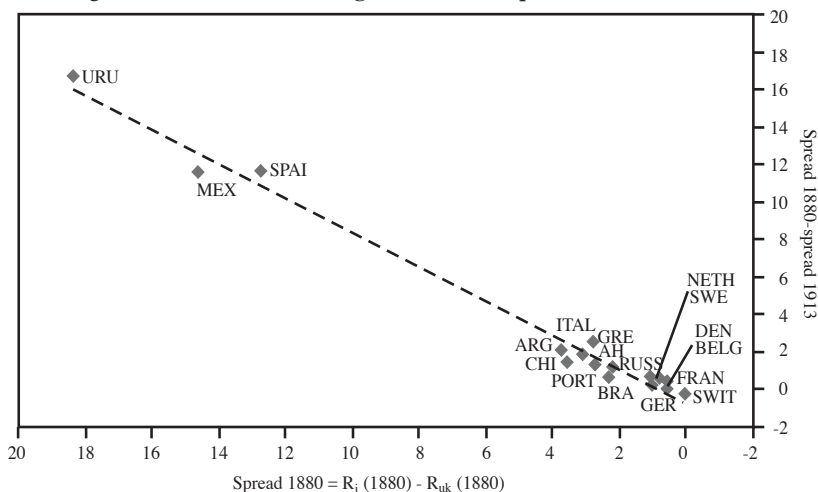
Source: Authors' computations, 17 countries.

The decline of yield premiums means that after 1900 the risks of lending abroad were perceived as significantly smaller than they had been in the past. Contemporaries appeared to feel that the world was becoming much safer financially. Recent crises have provided some *a contrario* evidence that lower premiums for "emerging markets"

mean smoother financing of their current accounts by the capital market, and the same should basically apply to any other country. It is thus tempting to relate the well-known financial stability of the early 20th century to the lower risk premiums countries faced throughout the world.

This suggests a straightforward interpretation of financial globalisation before World War I. The progress of integration after 1900 might be seen as a gradual rightwards shift of the supply curve of capital arising from successive reductions in lending premiums, which in turn supported ever-rising capital movements. A large literature has shown that the export of capital peaked in those years — British capital exports, for instance, reached 10 per cent of national income. In this view, after the mid-1890s, the global capital market became friendly to borrowing countries, which began to exploit to their full extent the benefits of free capital mobility[18].

The careful analyst, however, may point out that the correlation exhibited in Figure 1 could work the other way around. Suppose that "animal spirits" led for no sound reasons to an increase in capital exports. This is likely if, as suggested by Kindleberger (1988), "manias" drive both domestic and international financial markets[19]. Regardless of the actual risks, the supply curve of capital still shifts to the right, causing yield premiums to decline. The association depicted in Figure 1 remains, but the causality is reversed. In this case, financial integration proceeds randomly as a result of mood changes and drives the fluctuations in yield prices. Thus the question arises: What drove the process of financial integration? Identifying empirically the variables that affected risk premiums can put one in a better position to sort out the causality and provide an interpretation of the sources of pre-1914 globalisation.

II. Worshipping Mammon

The usual suspect for explaining pre-1914 financial globalisation is the gold standard. This system, initially adopted only by Britain (1821), Portugal (1854) and a few German towns, gradually expanded over the second half of the 19th century. A first wave took place during the 1870s, after France unofficially put an end to bimetallism (Flandreau, 1996, 2003a). The process stalled in the early 1890s, and a partial reversal occurred when some countries that had operated or shadowed a gold standard experienced exchange crises. Propagation resumed in the late 1890s and early 1900s, with the final outcome being a fairly brief period, 1900-13, when most of Western Europe, the Americas and portions of Asia were on gold. A landmark of global exchange-rate stability, this episode became known as the heyday of the gold standard[20]. Most later observers were quick to relate the simultaneous record highs of financial globalisation with the gold standard's reaching its maximum geographic scope. A regime had spread, borrowing premiums had declined and capital markets had globalised. It ended in a bloodbath, but a powerful myth had been born.

The resulting nostalgia cast a long shadow on 20th century monetary thinking, a shadow extending until the most recent developments of macroeconomic history. The conventional view holds that "[I]t is of course common knowledge that British investors viewed securities issued by countries not on the gold standard as riskier than those of countries that were." (Madden, 1985, p. 255.) Countries on gold did pay lower interest rates, and the decline in interest differentials was seen as resulting from the spread of the gold standard[21]. Academic product differentiation has led to marginally different formulations of the underlying economic mechanism, but the basic point is everywhere the same. Some prefer to emphasise the incentives associated with gold adherence; being on gold signalled a commitment to "good" macroeconomic policies — the popular "good housekeeping seal of approval" story[22]. Others stress that gold adherence provided greater capital market integration through exchange-rate stability; the gold standard reduced transaction costs and uncertainty (Obstfeld and Taylor, 2003a, 2003b). They have portrayed the spread of the gold standard as supporting a transition from "autarky" in the 1870s to "integration" after 1900 (Clemens and Williamson, 2002). Whether through improved reputations, reduced uncertainty or both, all these interpretations assume gold adherence to have shifted the supply curve of foreign capital to the right and thus associated it with the decline of interest-rate premiums and financial integration.

The empirical workhorses of this literature are gold standard "dummies" used to capture the effect of gold adherence on borrowing terms[23]. The pioneering work of Bordo and Rockoff (1996) reported that participation in the so-called gold "club" was

associated with a reduction of marginal borrowing rates of about 50 basis points. Strikingly, gold adherence in this study and subsequent similar ones has always been the only statistically significant relevant variable[24].

In view of the problems discussed in this monograph, these findings provide a natural starting point, at the heart of empirical investigation of the existence of a policy consensus during the first era of globalisation. If floating was, before WWI, associated with substantially higher borrowing rates, one may understand why governments, concerned with securing the best possible terms for their own loans, inadvertently succeeded in building a harmonious international financial architecture by all moving to gold[25]. The gold standard and its rewards would have been the invisible hand that provided for "spontaneous" global harmony.

One can quickly show that this story is partial at best. Suppose that it deserves full credit and seek to measure the contribution of gold adherence to interest-rate convergence. The rewards of gold adherence must have been extraordinary to account for the dramatic convergence observed in Figure 2. Several countries saw reductions in borrowing premiums of several hundreds of basis points. This itself should invite caution. Computing the correlation between interest-rate convergence and the adoption of the gold standard provides a conservative estimate of the contribution of the gold standard to interest-rate convergence[26]. The results show an estimated 150 basis-point reduction associated with gold adherence. This is large and significant, and it beats earlier results. It does not mean, however, that the spread of the gold standard actually explains much of the process of interest-rate convergence. To show this, Figure 3 compares actual interest-rate convergence with the residual convergence (that is, convergence net of the contribution of gold adherence). The little diamonds correspond to actual convergence, while the little squares correspond to residual convergence. The two overlap when the corresponding country was either always on gold or never on gold throughout the period (adoption of the gold standard can explain nothing in these cases). As seen, the two fitted lines that compare actual and residual convergence barely differ. The gold standard explains at best only a tiny fraction of the convergence of interest rates and thus only a fraction of financial globalisation.

It is easy to understand why this is so. Some countries indeed floated in the 1880s or 1890s and then adopted a gold standard (Argentina, Brazil and Russia). They did experience interest-rate convergence. Yet others left the gold standard in the early 1890s (e.g. Portugal) or never quite adopted it (e.g. Spain), and they too followed a pattern of convergence[27]. Still others stayed on gold throughout but nonetheless experienced interest-rate convergence. Thus, the evidence shows a process of interest-rate convergence that is merely concomitant with the gold standard spread before 1914. For this reason, and because the countries always on gold tended also to be richer and more developed than the rest of the sample (so that they tended, *ceteris paribus*, to face lower borrowing rates), gold adherence was, on average, associated statistically with lower borrowing rates across countries and time. That does not mean that this regime was the invisible hand behind financial integration in the first great era of globalisation.

Figure 3. **No Golden Handshake**

Convergence: observed

Convergence: net of gold adherence

Spread 1880-spread 1913

Spread 1880
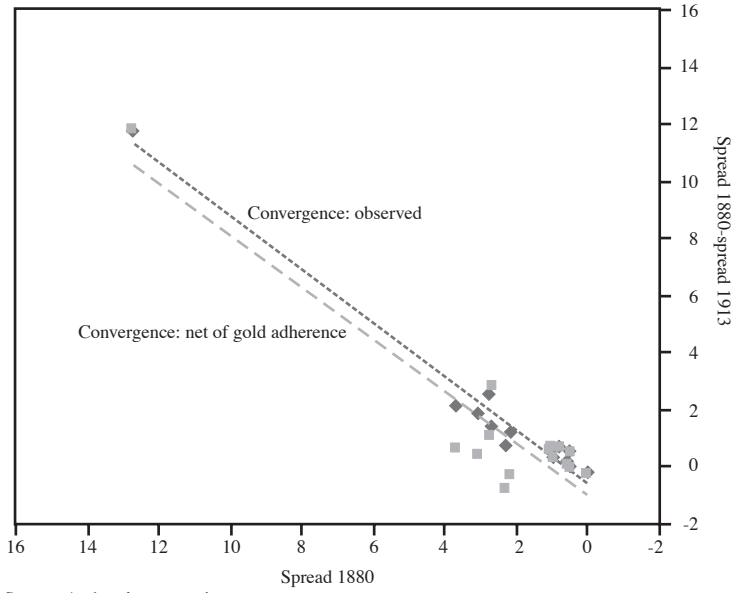
Source: Authors' computations, see text.

III. Religion and other Dummies

The use of gold dummies also raises numerous methodological questions, not easily sorted out and almost never discussed. This is worrying given the relevance for policy recommendations of obtaining sound interpretations of the economic significance of the correlation between certain regimes (such as gold adherence) and certain outcomes (such as lower rates for sovereign bonds). A task that appears as simple as identifying periods of gold adherence is truly problematic. Some countries switched to gold without formally announcing it; others adopted gold pegs *de facto* long before adopting them *de jure*. Apart from England, most countries had various forms of the gold standard that did not imply compulsory gold convertibility. Instead, they relied on various exchange-rate targeting schemes. Years of gold adherence are thus typically identified *ex post* by looking for periods when their exchange rates were stable enough to be consistent with the notion that the gold standard prevailed. Pinpointing successful exchange stabilisation programmes serves to identify the years of adoption of the gold standard. Almost by definition, both exchange-rate stability and successful stabilisation programmes tended to be associated with better environments, better reputations and the absence of any major economic or political problems. It comes as no great surprise that such conditions associated, on average, with lower borrowing rates. Gold adherence thus risks proxying for something else.

Policy reforms tend to come in clusters. The deliberate development policies in countries whose leaders wanted to emulate Western success, such as the Meiji revolution after 1868 in Japan or the Witte System (1892-1903) in Russia typically involved wide-ranging changes in trade, financial and budgetary policies. New institutions, such as "modern" central banks, mimicked their Western counterparts (Conant, 1896 and Lévy, 1911). In many cases, these transformations involved more symbols than content, more publicity than substance, because they all were made with an eye to their effects on financial market perceptions[28]. Publicity could work, but it also could fail. This typically makes it difficult to disentangle the contributions of individual factors.

The Japanese experience provides a good illustration of the pitfalls that this creates for research. After the Meiji restoration in 1868, Japan undertook a long string of reforms. They began with the abolition of the feudal system and consolidation of property rights in 1873 and culminated with the adoption of the gold standard in 1897, accompanied by many other changes, including a move to trade liberalisation[29]. A casual look at Japanese yield premiums shows a dramatic decline after 1897. Some researchers concluded that the gold standard had acted as a kind of IMF badge of good behaviour (Sussman and Yafeh, 1999, 2000). Upon closer scrutiny, however, it does not seem that the decline of yield premiums after 1897, of which a large part is spurious, means much[30]. The year 1897 was over-determined. The adoption of the gold standard

concluded a gradual transformation that provided both a legal and a political infrastructure to develop Japan's integration into the international economy. As one contemporary Japanese lawyer explained in French for the benefit of the international public, the main short-term effect of the Meiji reforms had been to secure domestic property rights. Only later was the basis for the rights of foreigners reinforced, through the removal of a number of regulations pertaining to the country's former "trading post" status (Tomii, 1898). These measures, completed only in 1897, coincided with the adoption of the gold standard. Moreover, 1897 followed Japan's victory over China and marked its emergence as a regional power. The war also endowed Japan with a substantial indemnity, which it collected in London and left there as collateral for future loans. The adoption of the gold standard coincided with so many other political, diplomatic and institutional changes that little can be said about its specific effects. Given the historical overlap of events, there is just no way to tell[31].

In general, interpreting the significance of dummy variables intended to capture institutions, regimes and the like is always difficult. Properly identifying the contributions to expectations and credibility of culture, ideology and general consensus is a daunting challenge. Discussion of this old problem in the social sciences is usually associated with the work of Max Weber and his famous suggestion (made during the period under study) that some cultures or religions might provide better development conduits than others[32]. The wide debate on the role of cultural beliefs has often tempted social scientists to build comprehensive theories of human development that relate beliefs and economic performance. Macroeconomics never fully escaped this tendency. Growing nationalism after 1873 spawned an expansion of theories that related "races" or religious beliefs to national economic performance. It was common among academic economists and statisticians to associate such things as the management of public finances with cultural features. Baxter, a leading British statistician writing in 1871, posited a sharp divide between the "Latin" tendency to imprudence and the virtues of thrift displayed by "Anglo-Saxons":

> "The reduction of National Debts has been practised by few nations […]
> All of these are Anglo-Saxon and Teutonic or Scandinavian nations. […].
> The Latin Nations by contrast are injuring their industrial prospects by the
> recklessness with which they are plunging into debt[33]."

The analysis of monetary arrangements was subjected to similar claims. For instance, in the midst of the European debate on bimetallism *vs*. the gold standard, one German economist argued:

> "Without insisting further on the historians' theory, who, calling nations
> to their tribunal, emphasise the ascent of Germans and decline of Latins,
> [one] may remark that the ideas supporting bimetallism are especially
> French, or adopted by those nations that get easily lured by the seductions
> of the French spirit[34]."

Today, disparaging Latin finance is still alive and well. To give just one example, the late Rudiger Dornbusch was fully up to the 19th century standard when he suggested as a millennium resolution:

> "Abolish southern currencies […] Nobody can put faith in something called a Turkish lira because lira is bad and Turkey does not make it better[35]."

Relying on appearances even when they seem justified by economic models involves serious danger of developing mistaken interpretations of the relations between beliefs, institutions and performance. For example, even the classification provided by Baxter has some bizarre aspects. He put French-speaking Belgium in the Anglo-Saxon and Teuton group, while including German-speaking Austria in the Latin one. The most probable interpretation is that there were more Latins among the "bad guys" and more Anglo-Saxons and Teutons among the "good guys", so that problem countries became Latin *honoris causa*, and *vice versa*. Baxter did just the same as those who draw conclusions from the significance of gold dummies. Many countries went on gold at the same time as interest convergence occurred, but many countries did not change their exchange-rate policies and yet experienced convergence.

Moreover, it is not always in the writings of theoreticians that we find the insights most useful to decisions makers. People with direct roles in the market mechanism did not develop the "racialist" theories of macroeconomic performance. Financial economists were generally critical of such views. For instance, Paul Leroy-Beaulieu, a staunch liberal economist and teacher of generations of public finance analysts, devotes space and energy in each edition of his famous handbook *Sciences des Finances* to outline what he calls the racialists' "too absolute claims, presented with considerable exaggeration[36]". The international banking and financial community's culturally heterogeneous origin made it still more reluctant to accept racialist theses. Yet bankers and financiers acted as the relevant intermediaries in the globalisation of capital. They played an essential role in the pricing of sovereign risks. This suggests that one should look at the nexus of formal or qualitative analyses, rules of thumb, applied theories and operational research that they developed to guide actual decision making. What were the macroeconomic variables of concern to the investors of the time? What were the "theories in use"? Only if this is properly done can the effect of gold adherence on borrowing terms be measured adequately or the trade-off faced by policy makers when deciding to tie their currencies to gold assessed.

IV. Micro Motives and Macro Behaviour

"The price of public securities is, with good reasons, considered as the exact measure of the degree of trust which national credit deserves[37]", James de Rothschild wrote in 1868 in a letter sent to the Austrian Finance Minister Beust. He was advising the policy maker on the dangers for Austrian credit of implementing a contemplated capital levy. His words show that any notion of risk premiums "increasingly becoming [after 1870] an indicator of credit worthiness" (Clemens and Williamson, 2002) is questionable to say the least. Investors understood as early as in the first half of the century that the fluctuations of government securities could be put in relation to the vicissitudes of a nation's creditworthiness. In 1824, Laffitte, a leading French banker, had provided the following definition of the market place: "[Financial markets are] the thermometer [and the] grand jury of European capital. [They are] where states' credit is ranked … just like individual credit is ranked according to wealth, probity and intelligence[38]."

Bond prices (or equivalently the corresponding yields premiums or default probabilities) may be seen as the left-hand variable of an implicit equation through which investors priced sovereign risks as a function of a number of variables. This equation serves as an excellent tool to identify the determinants of reputation and to study market perceptions of government policies before WWI. Once its existence in the minds of investors has been recognised, it is possible to use it by retrieving the information available at the time to back up these variables and their influence on bond prices. Moreover, in contrast with conventional studies, the selection of candidate variables depends not on the vantage of a modern analyst but on the perspective of contemporary observers.

In an earlier study, a direct source of inspiration for the ideas pursued in this monograph, one of the authors examined the sovereign rating techniques developed by Crédit Lyonnais, a French deposit bank with an investment banking arm[39]. Crédit Lyonnais, created in 1863, became the leader of most syndicated sovereign bond issues in the Paris market between 1890 and 1914. To guide its policies, the bank had set up in the early 1870s a formal *Service des études financières* (Economic Unit). After 1890, in direct response to the implication of the Baring crisis that investors had misjudged Argentinean bonds, the size and scope of the research department expanded dramatically[40]. Under pressure from the bank's management, it started to develop systematic measures of state solvency. It sought, by relying on economic reasoning, to identify a number of relevant parameters, which it then monitored. An 1898 internal document provides perhaps one of the first instances of formal sovereign rating. Spreadsheets show countries grouped in three risk categories. Category I included

the most creditworthy, category II an intermediate group and category III the least creditworthy. Performance parameters are also reported for each country. Because the bank used an implicit formula to rank countries, and because this formula exploited the information on the performance parameters, one can retrieve the weight of each parameter in the formula[41].

The information retrievable from such exercises depends on the extent to which individual ratings and market consensus coincide. The Lyonnais was only one bank — albeit a huge one and for international investment, hugely important — and it was only French. What did other investors and intermediaries think, including its British, German, Belgian or Swiss counterparts? To address this question, the individual grade can be compared with the premium a country had to pay when it sought to borrow abroad. Figure 4 compares the Lyonnais grades with market premiums in 1898. The grades were computed using the implicit formula estimated on the basis of the information contained in the Lyonnais tables (Flandreau, 2003*d*). It shows a close association between the individual ratings and "consensus opinion" as reflected by market premiums[42]. Because of archival limitations[43], the econometrics are bound to be somewhat crude[44]. Nevertheless, the high correlation between individual ratings and market prices suggests that individual views may be treated as representative of global opinions[45]. Therefore, looking at what investors looked at can explain a lot about prevailing views of macroeconomic management. History becomes a guide to understand the making of global finance. To a large extent, therefore, Figure 4 represents this entire monograph in a nutshell. It shows it is possible to work out inductively, from contemporary sources, a number of hypotheses regarding market perceptions of sovereign risk, and then to test, using bond prices and macro data, whether these views are consistent with the pricing of sovereign debt.

This perfectly natural strategy nonetheless implies a fundamental reversal from standard approaches and deserves some elaboration. In contrast with the conventional approach that relies on Friedman's "as if" clause (according to which one should use modern theoretical insights and economic concepts to try to guess what the market thought), it seeks to infer the pricing of risks from an analysis of actual perceptions. It builds on a reconstruction, from direct observation of the beliefs of contemporaries, of how the market operated and how it weighed risks. The goal is to derive the "model of the world" in the minds of contemporary investors and then use the techniques of economics to see whether such a model indeed reflected itself in pricing behaviour. This approach is the only practical one to study the features of the prevailing macroeconomic orthodoxy and, more broadly, the question of expectations, which plays a decisive role in allocating wealth globally.

Figure 4. **Individual Beliefs and Market Opinion**
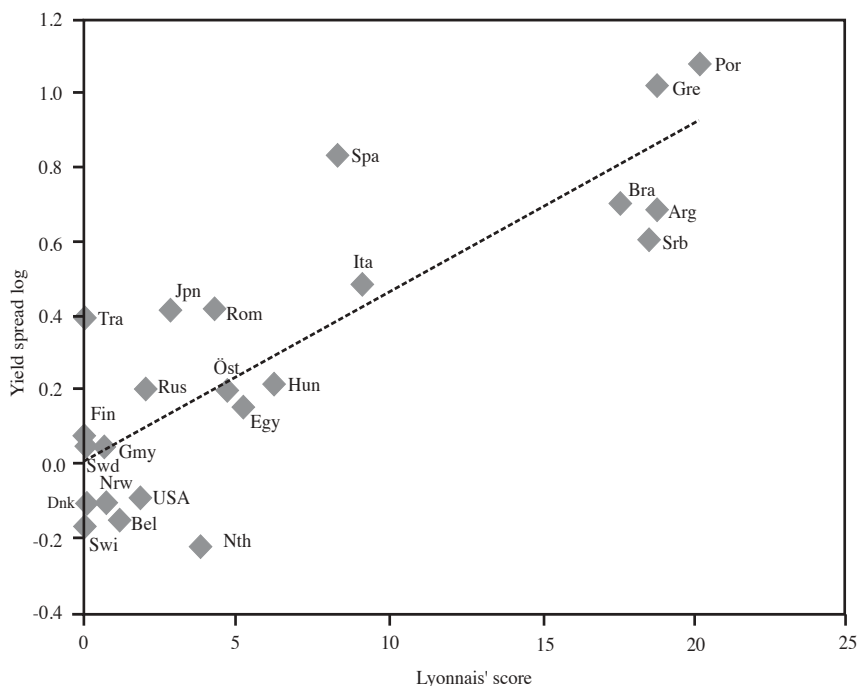
The basic intuition of this study is to transform the limitation of case studies into an asset. The study looks for a direct route from microeconomic beliefs to aggregate behaviour as reflected in bond prices. It requires combining both historical insights and economic methods. From history, it borrows the need to investigate contemporary views carefully before deriving a general model of investors' perceptions. History by itself would not reveal sufficiently robust lessons on which to base policy prescriptions. Any attempt to infer a general view from one individual source is of course bound to fail, and replication cannot help[46]. The appropriate technique is not to add a whole library of supporting material on top of a selected reading list. For proofs, the study turns to the universal techniques of economics. Taking as left-side variables the price of government bonds and as right-side variables those suggested by an exploration of individual sources, it examines whether the beliefs identified in archives can be read from the data. This approach, if not conventional, is in the end none other methodologically than "Cliometrics", the application of the tools and method of economics to investigate history[47].

V. What's on Man's Mind: Theories in Use

The road crosses beaten tracks. The 19th century notion that sovereign rate spreads measure underlying default risks has stayed alive through the 20th century and into 21st century economics. With some formal refinements, the basic intuition that interest-rate spreads may be explained or modelled with a variety of factors has remained[48]. Recent work has investigated this relation. Factors such as macroeconomic fundamentals, institutions or politics have been considered on top of the gold adherence variable generally if inappropriately favoured by researchers[49]. These alternative views need not be exclusive. Macroeconomics might have played a role, just like institutions and politics. Economists quickly succumbed to the temptation to organise "horse races" to see what view works best[50], risking the emergence of an industry of cheap mass production whose only limit would be data availability. This study's discussion of the role of theories in use in determining perceived risks warns strongly against the efficiency losses of investing one Euro in this sort of enterprise.

The alternative views on the determinants of bond spreads in fact relate closely to one another. To interpret regression output properly, one needs clear indications of how people gathered and processed information. The problem surfaces when explanatory variables get selected. Relying on a mix of more or less rigorously specified models and constrained by historical data availability, researchers make compromises that are often far from satisfactory. Debt-to-GDP ratios provide a characteristic example. Flandreau *et al*. (1998) pioneered their use to show that fundamentals mattered in the eyes of investors. Obstfeld and Taylor (2003*a*, 2003*b*) followed. Yet these ratios have one big shortcoming. As contemporaries were well aware, nominal debt is a poor measure of indebtedness. The true burden of the public debt depends on the interest rate at which it is issued, not on its nominal amount[51]. Contemporaries fully realised this and consistently preferred alternative measures. In line with the methodology advocated above, one should start from evidence on contemporary beliefs and information to identify the variables relevant for market participants. Debt-to-GDP ratios might of course have been correlated with something that interested people[52], but they were definitely not what people were looking at. The proper route advocated here is to identify first the variables that were on people's minds, then gather them from contemporary sources. Only when this is done can one begin to investigate, from what the data say, what mattered most in determining bond prices.

This section surveys 19th macroeconomic doctrines. It shows that debt sustainability was the key variable influencing creditworthiness, first because it was a proximate determinant of the probability of debt default and second because most other variables (macroeconomic, institutional, political, or other) could be reduced to a public finance problem. The debt burden was a kind of universal unit to which other risks could be reduced.

The Debt Burden and Default Risk

An examination of pre-1914 discussions of the factors influencing the probability of default immediately reveals considerable concern for what was referred to as the "debt burden". Applied economists and statisticians emphasised the volume of public debts, and market participants echoed them. Baxter (1871) devotes long sections to the matter. Leroy-Beaulieu's handbook (1878) has a full chapter on it[53]. Mulhall's (1892) statistical dictionary provides a long entry. So did *Fenn's Compendium*, the British investor reference book first published in the 1830s. The Lyonnais rating techniques also gave a lot of emphasis to the debt burden (Flandreau, 2003*d*). The *Investor's Monthly Manual*, a companion publication to *The Economist*, also reported measures of the debt burden. Finally, the conference reports of the Société Internationale de Statistique (between 1887 and 1913) provide several introductions to the problem by Alfred Neymarck (e.g. Neymarck, 1913).

Contemporaries' main concern was not to prove that debts mattered (everybody understood that they did) but to make sure that their weight would be properly assessed. This involved identifying the best measure of indebtedness and finding a proper benchmark to which it could be compared. Baxter (1871), for instance, describes four available methods. In broad terms, a ratio had to be computed. Choosing the proper numerator proved quite uncontroversial. For the reasons discussed above, nominal debt was considered inappropriate, and the annual service of the public debt was preferred. Because public debts typically comprised instruments with very long maturities, the annual interest service, referred to as "the annuity", varied little from year to year and therefore accurately reflected how much cash had to be paid out "on a permanent basis".

The identification of the denominator raised more questions. Baxter's fourth and "most perfect" method related the interest service on the public debt to "the gross income of the population" (p. 5). As Baxter recognised, this approach (analogous to computing debt service-to-GDP ratios) stumbled on the difficulty of obtaining reasonable estimates of national income or, to use a contemporary word, "wealth"[54]. The problem would not be fixed until WWI[55]. The consensus view thus became that national income or national wealth estimates were "of a nature more conjectural than scientific, and the subject of much criticism"[56]. The prevailing opinion was that "general adoption of such a method had to be left for an age of more complete statistical knowledge"[57].

Faute de mieux, a cheap denominator could be population, which was typically well documented. Even users of this method systematically pointed out its obvious limitations[58]. Two alternative benchmarks thus emerged. One, more widespread and obviously the conventional one around 1900, compared the debt service with government resources. This study will refer to it as the "tax test". Those who argued in favour of this ratio emphasised that it closely captured default risks because it focused on the ability of a given state to service its obligations. The result was a hypothetical relation between probability of default and the variable thus measured.

In Leroy-Beaulieu's words:

> "The lower this ratio, the more likely the state is to pay without difficulty the interests on the public debt. …By contrast, when the share [of interest service] in the total budget is very high, one can fear that the slightest accident shall put the government in a situation where it is impossible to fulfil its promises"[59].

The other approach compared the annuity on the public debt to exports. A brief description and defence of it appears in the "Introduction" to the 1889 edition of *Fenn's Compendium*, which refers to it as the "trade test". Because of its lesser scope, and because reference to it disappears in the 1890s, the focus here is on the tax test. A later section, however, returns to it in a discussion of the economic significance of alternative methods from the perspective of economic development.

Renegotiation and Memory

The interest service burden was also a crucial variable when default occurred. Unilateral default was always followed by a renegotiation period during which creditors sought to persuade governments to resume interest payments. The ratio that ought to have been serviced then assumed tremendous importance because it measured creditors' bargaining power. Any increase in the virtual debt burden reduced the likelihood of a settlement palatable for them. Any decrease had the opposite consequence.

Once a default had been settled, a new, reduced, interest service was agreed upon. The country now faced a lower debt burden, but the new ratio actually reflected a worse performance than it appeared to do. People in the market likely would remember this and inflict penalties on previous defaulters. The Lyonnais ratings show that low debt burden countries whose "good" prospects had resulted from a failure to meet their obligations were mechanically downgraded into the infamous "group III" of "junk" nations. The low burden had been achieved not through policy efforts but through repudiation. The debt burden, hanging or not, weighed much on countries' perceived prospects.

Fiscal and Monetary Variables

Investigation of contemporary sources shows that fiscal and monetary variables played at best a secondary or indirect role, operating through the debt burden rather than having an effect of their own. The Lyonnais' studies did list fiscal performance (computed as the average deficit for a five-year period, thus approximating a "structural" measure) alongside debt-burden measures, but they put little emphasis on it, and its measure made a tiny contribution to overall grades. This can be understood easily by recalling that the key issue from investors' point of view was to determine whether enough resources could be pledged against the interest-service commitments. In this perspective, a deficit meant, through intensified borrowing, only a marginal

increase in interest service in proportion to the resulting increase in the outstanding debt. If growth or taxation grew more quickly than the public debt, deficits did not matter. Only in the case of structurally persistent deficits over a long period did fiscal performance begin to become a worry, but then its influence was identical to that of an increased debt burden[60].

Something similar occurred with monetary factors. The financial press did document in much detail note issues, central bank reserves, exchange-rate fluctuations and exchange-rate regimes. Yet it is not clear from contemporary investors' perspectives that these variables had autonomous influences on perceived risks[61]. Strictly speaking, faithful adherence to gold as an intrinsic virtue received very little attention in the pre-WWI period[62]. One does sometimes find quotes praising the gold standard as a superior regime, but they typically belong at best to the more metaphorical type and at worst to the religious-maniac type discussed in Section III. Given the record available to contemporary investors, floating currencies tended to display poorer performances in terms of both economic development and financial probity. The capital-rich countries of Western Europe had much better records of gold adherence than the capital-poor nations on the periphery. That did not mean that floating in itself translated into downgrades. The "intermediate" group in the Lyonnais risk tables included both floating and fixed exchange-rate countries, and floating did not appear as an aggravating factor.

Thus, other things being equal, exchange-rate depreciation mattered only to the extent that it resulted from monetary expansion, creating a burden of state liabilities that would have to be paid back. A country that had experienced recurrent public-finance problems and had financed them by printing money or through central bank advances often ended with a depreciating currency. Return to the pre-float parity required repurchasing the excess issue of paper money or repaying the overdraft to the bank of issue. A standard way to do this was to issue a stabilisation loan[63]. Since this loan would add to the debt burden, a good measure of the "opportunity cost" of floating was to consider the excess money issue as part of the debt burden. Because floating currencies often had experienced "excess issues" it is not surprising that inconvertibility would entail a discount, but it must have been small[64].

Similarly, one finds occasional comments that portrayed a large foreign-exchange reserve as a buffer against currency flight. A 100 per cent cover ratio (as in countries such as Russia after the turn of the century) protected in principle against currency runs, just as modern currency boards are supposed to do, but foreign loans could provide such cover to governments in need of it. Insurance against exchange-rate volatility could always be purchased by the fiscally sober. In the end, the gold reserve gave no better guarantee than sound policy, because credit would be made available to the sound country[65].

Currency Clauses and Default Risk

In one instance, however, floating could magnify public-finance problems. It could be hazardous when a country had a large external debt denominated in foreign currencies and the exchange rate depreciated. Depreciation could then generate servicing

difficulties. It led to an increase in interest service that was not necessarily matched by an increase in nominal tax resources, because taxes revenues lagged[66]. Between 1890 and 1898, Argentina, Portugal, Greece and Brazil all fell into what may be called liquidity crises through that very channel. Contemporary observers fully understood the danger. As early as 1878, Leroy-Beaulieu warned against the risks of currency depreciation when the debt is denominated in foreign currency. His case in point was Russia:

> "In the 1876 Russian Empire budget the amount devoted for the interest service on the public debt was set to 108 418 000 rubles…. By itself, this number was not very large…since it represented only 19 per cent of expenditure. However, this weight is most heavy because it has almost entirely been collected abroad. It therefore varies with the course of exchange. In periods of crises it is likely to rise dramatically. Thus it is inconvertibility which makes the debt burden most importune and painful. Suppose that following concerns or political dangers, or because of adverse economic circumstances, the paper ruble, which is legal tender in Russia, depreciates by 20 per cent. This is a 20 per cent increase in the arrears of the public debt"[67].

This point brings back the question of the exchange-rate regime, but through a quite different channel from the incentive story referred to in Section II. If a fixed exchange rate was to some extent good news for public credit, it did not operate through some signalling effect that would have impressed investors, but through a quite material, down-to-earth mechanism whereby exchange-rate depreciation impacted the soundness of public finances. In contrast, sustained defence of the parity protected against the perils of a run on the public debt, which in turn reverts to the issue of fiscal abstinence. If the external debt was tiny or denominated in domestic currency, much of the problem disappeared. The challenge, here again, was to be fiscally sober.

The Role of Politics

Politics, domestic and international, obviously mattered in the eyes of contemporary investors. Political crises create uncertainty, and uncertainty drives financial markets down. Wars were bad financial news and caused violent fluctuations of bond prices; so did domestic conflicts such as uprisings or civil wars. Because investors discounted the effects of political news on the debt burden, they were bound to factor in the consequences of wars, which always affected the sustainability of public finances. Armed conflicts increased military expenditures and led governments to borrow (Barro, 1987). Increased debts typically followed. When conflict erupted, investors computed the costs of alternative outcomes, to which they sought to attach probabilities[68].

The spread of war indemnities as a routine procedure for victors to finance wars *ex post* compounded the direct effects of wars on public finance. The history of the 19th century is replete with these policies: the indemnity of Austria to Prussia in 1866, of France to Germany in 1871 and of China to Japan in 1895, to name just the

34

most famous ones. While the victorious country solved any pending public-finance problems, the defeated one would long bear scars of an increased debt burden that would damage its borrowing terms and thus in one way or another its capacity to grow[69].

Politics also mattered through reputation. Contemporaries carefully monitored political regimes. Douglas North's and Barry Weingast's now famous analysis (1989) of the British Glorious Revolution of 1688 has popularised the so-called "New Whig" interpretation of the role of democratic institutions (such as parliaments) in fostering credibility. Because parliaments committed the sovereign to pay back public debt, they improved borrowing terms and facilitated economic development[70]. Such views, right or wrong, were perfectly standard a century ago. To illustrate, Laffitte (1824) said that the credit of a state is indeed "ranked according to its wealth" but also "to the institutions that guarantee it". Similarly, Leroy-Beaulieu (1899) argued that "A parliamentary regime functioning in certain conditions of discipline … and a firm commitment to established institutions are of course guarantees against financial prodigality"[71]. In 1863, Adolph Wagner emphasised that a constitution was a precondition for issuing long-term (perpetual) debt:

> "It is not only about financial or material, but more about political guarantees. Only in a constitutional state founded on the rule of law, where an effective and independent control of public finances is in place, is there the guarantee for well ordered public finances and a trustworthy public debt and only here will it be possible to resort to the most rational and healthy form of public debt, the perpetual debt."

It would not take much effort to provide a boring enumeration. The financial press and bankers dealing with sovereign risk devoted much time to deciphering the logic of alternative political regimes and understanding the implications of events. *The Economist* always commented on political developments with an eye to their implications for foreign investors. In Crédit Lyonnais archives one finds a wealth of notes discussing the situations of the main political parties, analysing — as for Russia — the risk of potential crises that could threaten the interests of foreign bondholders, and tables describing the principal coalitions running governments[72]. Yet unlike what Ferguson and Batley (2001) have claimed, it is not clear that politics constituted an independent factor shaping market views. Rather, in a system where debt sustainability is the key variable determining creditworthiness, politics can have an impact on credit through their influence on debt dynamics, as the machinery through which the books are or are not balanced. And there again debt service still features as a crucial variable.

VI. Empirical Evidence:
Interest Spreads and the Debt Burden

The foregoing survey of contemporary beliefs reveals conclusions at odds with the modern literature and its considerable (some would say disproportionate) attention to exchange-rate regimes. They suggest that contemporaries focused mainly on debt-sustainability variables. Investors believed in the debt burden (measured as the ratio between debt service and tax revenue) as the key factor influencing debt sustainability — the likelihood of a continued payment of the coupon. In this view of the world, the money supply, foreign-exchange reserves, fiscal deficits and politics were mostly intermediary variables. Can one prove this numerically?

The Model

The explanatory variables fall into four groups. The first includes the "structural" factors monitored by contemporary investors. With the debt-to-GDP ratio left aside, the alternative, the ratio of interest service to tax revenues, becomes key. The presumption is that this variable was strongly significant and had a large, positive effect on interest spreads. Other structural variables monitored by investors and collected here include the circulation of banknotes, central bank reserves, exports, population and the fiscal deficit. The original, contemporary spreadsheets provide a flavour of the kinds of ratios people contemplated: central banks' cover ratios, deficit-to-revenue ratios and exports per head[73]. The likely effects of these ratios on spreads might be postulated from contemporary accounts. High cover ratios should reduce spreads, and so should high degrees of trade openness[74]. In contrast, high deficits should increase them. On the evidence that people considered such ratios to have secondary importance, they are not expected *a priori* to drive the results much. Finally, to capture the feedback from exchange risk to default risk, an asymmetric measure of exchange-rate volatility, the average depreciation experienced by a given country in a given year, enables distinguishing between instances of depreciation and of appreciation. A volatile but appreciating currency is not bad news for servicing external obligations, while a volatile but depreciating currency is[75].

The second group of variables includes reputation factors. Countries with recent experience of default should have been downgraded. Investors with memory should have discounted the bonds of those with default records, reducing the penalty as time passed. Once settlements had occurred, markets should have been prepared to take defaulters' bonds again, but at lower prices, other things equal. Moreover, during the renegotiation period that typically followed unilateral default, bonds likely traded at

lower prices than otherwise owing to the obvious uncertainty. Investors based their fundamental assessment of creditworthiness (the probability of recouping capital and interest) on the "counterfactual" or "virtual" service (i.e. the interest that should have been paid, absent default). Yet they certainly also factored in the renegotiation itself as an aggravating factor until settlement was reached.

The third group comprises political variables. Their identification raises a number of problems. There seems to have been no simple, consensus definition of what "good" institutions were (beyond the general notion that a well ordered, representative parliament was preferable to a cruel autocracy) let alone any index to quantify quality, an index whose reconstruction will always suffer from observers' biases. Identifying political regimes using modern criteria would obviously not do, and getting a precise idea of how people related institutions and performance seems difficult. Moreover, because of a relative lack of genuine changes in political regimes over the period under study, one must give up any hope of using time controls to identify anything. To complicate matters further, political regimes were also broadly associated with economic ones. Faithful adherents to the gold standard before 1895 were typically Western European parliamentary systems (with the possible exception of Italy), which again makes identification difficult.

Given the lack of consensus on the theoretical relation between political systems and creditworthiness, the study uses a simple criterion. It focuses on the percentage of the population that was enfranchised. Contemporary accounts show that estimates of the enfranchised population were in the information set of 19th century investors. Moreover, the broadening of the electoral body had been a recurrent request of the left throughout the 19th century, and there is evidence that investors closely monitored its progress. Some scholars have suggested that the limitation of democracy was a basis for the credibility of the pre-1914 gold standard. This predicts a negative association[76]. This study lets the data decide, but its presumption is that contemporaries thought differently and associated democratic institutions with higher credibility. There is evidence that foreign investors encouraged borrowing countries to adopt parliamentary systems. For instance, the Russian finance minister Kokovtsov recounts in his memoirs that after the so-called October Manifesto of 1905, French bankers pressed Russian authorities to give large powers to an elected Duma. They went so far as to make it a condition for continued lending[77]. Finally, on top of the proportion of the people that voted, the study considers a wealth of dummies capturing political events such as wars and uprisings.

Last and to a very large extent least, gold adherence is introduced in the regressions. The general framework used here allows testing whether adherence to gold had any effect on interest-rate spreads and, if so, how much[78]. The criterion for gold adherence was whether the exchange rate remained close enough to the parity during at least six consecutive months for a given year, "close enough" meaning "within the gold points". The conventional defence that changing the precise timing does not alter the results is a matter more of concern than of comfort, and it is not used here. The authors do not feel compelled to defend further the logic of this variable because they feel a limited liability toward it. Its contribution is in any case marginal.

Readers will find at the end of this study both a long Data Appendix and an equally detailed Technical Appendix. The former serves two main purposes. First, it explains the variables described above in far greater detail and carefully presents their sources and derivation. Second, it reproduces the database in its entirety, for use in future research. The Technical Appendix fully describes both the model and the estimating procedures used, and it presents the results in far greater detail than those highlighted below.

Empirical Evidence

The analysis begins by examining the simplest conceivable model, where the variable to be explained is the interest-rate spread (country i's interest rate minus the UK interest rate) and the explanatory variables are those reported in the previous subsection. The model captures the memory effect of past default as an asymptotically decaying penalty paid on top of borrowing rates[79]. A dummy variable corresponding to the period of renegotiation is also used, because the uncertainty surrounding any debt renegotiation is likely to be considered as an extra cost. The political variables are as described above, and gold adherence is included.

The results reported in Table 1 are simple estimates of the sensitivity of interest spreads to explanatory variables when they are all included together. Alternative estimates are reported and discussed in the Technical Appendix[80]. Because capital does not flow freely from one country to another — what 19th century economists called the "disinclination of capital to migrate" and is today known as the "home bias" — it is useful to document results separately for alternative groups of nations. Table 1 therefore provides results for the entire sample, capital-rich countries and capital-poor countries. Because there might have been some changes in the stability of coefficients between periods, the Technical Appendix reports results for sub-periods.

Table 1. **Determinants of Interest Spreads**

	All Countries	Capital Rich	Capital Poor
1. Structural factors :			
- Interest service/Revenues	7.751 (8.50)	4.144 (6.18)	7.677 (5.35)
- Reserves/Banknotes	-0.286 (-0.96)	0.223 (1.34)	-0.402 (-0.83)
- Exports/Population	0.601 (1.59)	-0.160 (-1.41)	2.279 (1.95)
- Deficit/Tax revenues	0.725 (3.16)	0.319 (1.71)	0.747 (2.21)
- Exchange-rate volatility	0.997 (1.14)	2.825 (1.97)	1.310 (1.05)
2. Reputation factors :			
- Default	4.836 (21.66)	-	4.917 (15.48)
- Memory	0.703 (2.56)	-	0.667 (1.62)
3. Political variables :			
- Franchise	-2.427 (-1.77)	-0.839 (-2.17)	-7.232 (-1.39)
- Political crises	F=3.797 (*)	F=4.15 (*)	F=1.889 (*)
4. Gold adherence:	0.056 (0.32)	-	0.099 (0.38)
Adj. R^2	0.854	0.585	0.798

Number of observations: 480. Not shown are the country-specific constants. (*) = F-test significant at 5 per cent.

Table 1 points to a number of findings. It outlines the overarching importance of the debt burden. It implies that on average, a 10 per cent rise in the debt burden (e.g. a rise of the debt service from 20 to 30 per cent of government revenue) increased borrowing rates by 70 to 80 basis points. This contrasts with the other explanatory variables, such as the cover ratio, the deficit ratio or the openness ratio, which get much less credit. While generally correctly signed[81], they have little impact on interest-rate spreads and are rarely significant, a finding consistent across the groups of countries. These results support the approach suggested here. They reveal the interest burden as an essential variable for investors; it drove perceptions of macroeconomic stability.

Default variables are also strongly significant. When debt renegotiation occurred, spreads went up by about 500 basis points. Once settlement was reached, a penalty of about 90 points was paid the first year, and it was still at 45 basis points ten years later. Just as observed in the study of individual ratings, markets did remember. Combined with the significance of the debt burden, this result is fully consistent with the rating formulas discussed in previous sections. In the end, the debt burden and debt default appear to explain most of the variance of interest-rate spreads. The significance of previous defaults in determining borrowing conditions may also help to reconcile the intuitive notion that investors should remember with the popular claim that markets do not remember. While there is indeed a penalty for defaulting, it turns out over the medium term to be of a smaller order of magnitude than the savings associated with the debt repudiation. Governments had a clear incentive for not repudiating their debt, but it was too small to act as a systematic deterrent.

Table 1 shows the exchange depreciation variable as non-significant. Results reported in the Technical Appendix for alternative specifications show it with more significance and generally with greater effects for capital-poor countries, which the previous section argued were more vulnerable to "twin" crises because of their large exposure to debt denominated in foreign currency. In fact, as the Appendix also shows, the introduction of the political crisis dummies swamps the significance of the exchange-rate vulnerability variable. This is quite understandable but also very important, because exchange crises are often triggered by political crises. Political uncertainty, which appears as the one significant factor besides the debt burden and debt default, often magnified financial crises and exchange-rate vulnerability. In contrast, the extension of the suffrage does not show up in the regressions reported in Table 1. Note, however, that it becomes significant in some of the regressions shown in the Appendix and will again surface in an alternative model.

Finally, the gold variable is never significant. In fact, as shown in the Appendix, its effect is not stable across equations, especially when one considers various groups or, even more strikingly, sub-periods, when it sometimes comes up with the "wrong" sign. Gold adherence works well only when an analysis gives it a kind of monopoly power. When it must compete with a few other variables, especially the debt-default variables but also the political-crisis variable, its effect declines or vanishes[82]. The gold dummy might simply tell us, when it comes out with the "expected" negative and significant sign, that a country in crisis is a country in crisis.

VII. Thresholds of Confidence

Did contemporaries see the world as linear? The previous section assumed that they did. Yet as observed, the effect of the debt burden on spreads varies quite substantially across groups of countries. One gets persistently higher sensitivities of the interest spread to the debt burden for capital-poor than for capital-rich countries (compare columns in Table 1). Figure 5 shows why these results occur. A pooled scatter plot of the interest spread in terms of the debt burden displays an obvious exponential relation. The line for the capital-rich countries is almost flat, while that for capital-poor ones is steep. One possible interpretation is that there was a difference of behaviour among investors towards alternative groups of nations. For instance, capital-poor countries needed to rely on foreign investors who were arguably less informed than domestic ones. This information asymmetry might have generated a "lemon premium", that is, a greater compensation for the risk they undertook, other things being equal.

Figure 5. **Elasticity of Spreads to the Debt Burden: Capital-Poor *vs* Capital-Rich Countries**
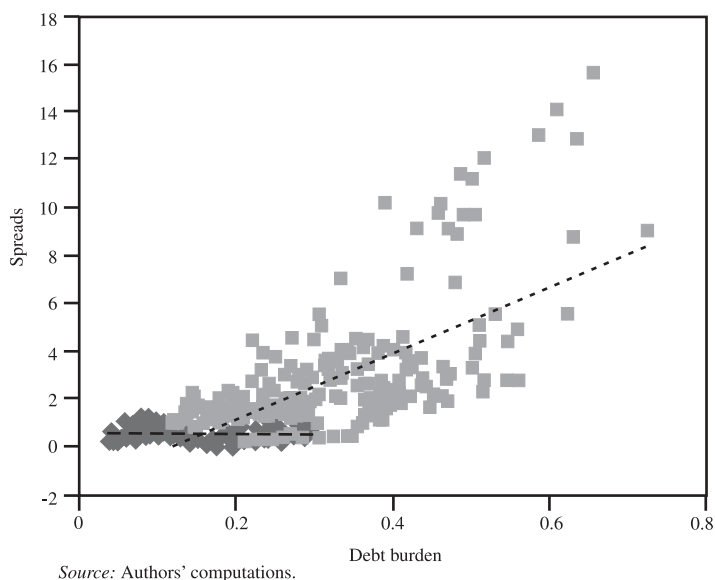
Source: Authors' computations.

Note, however, that in Figure 5 the respective clouds for each group of countries do not overlap, because the typical interest burden of a capital-rich nation is much smaller than that of a capital-poor one. The averages stand at 14 per cent of revenue for the first group and 32 per cent for the second (Table 2). It is easy to see that the debt burden does not matter in the same way depending on how close one is to default. A 1 per cent increase in interest service when it stands at 1 per cent of government revenue is not the same thing as a 1 per cent increase when it stands at 99 per cent. There are thus good reasons to believe that the sensitivity of the interest spread to the interest burden might not have reacted in a linear fashion to variations in the debt burden.

Table 2. **The Debt Burden: Descriptive Statistics**

	Mean Interest Burden (percentage)	Standard Error (percentage)	Minimum (percentage)	Maximum (percentage)	Number of Observations
All countries	23	13	3.9	72	464
Capital-rich	14	7	3.9	30	220
Capital-poor	32	12	12	72	244

Source: see database.

There is evidence that contemporaries thought in terms of interest-burden thresholds. The Lyonnais economists reported around 1900[83], "No sovereign bankruptcy has ever occurred with this ratio standing below 40 per cent." Experts such as Leroy-Beaulieu argued[84]:

"Whenever the interest service to government revenue ratio is larger than 35 per cent, the greatest prudence is in order, although creditors can still feel reasonably confident. Above 45 per cent the situation starts looking bleak. But when one reaches 55 or 60 per cent, the slightest problem shall induce the opening of negotiations with creditors."

These thresholds appear to have been treated as common knowledge. In 1904, for instance, a paper published in the *Economic Journal* discussed the sustainability of Russian finances in view of thresholds presented as generally acknowledged rules (Raffalovich, 1904, pp. 626-627):

"[In effect Russia can even] double the annual amount of the annuity for the public debt before touching the limit deemed to be dangerous for a state's creditors, such as may be held to come between 33 and 40 per cent of the annual Budget."

The notion that the sensitivity of interest-rate premiums changed as the debt burden went through successive thresholds is intuitive enough[85]. The quotes above suggest that contemporaries reasoned in terms of default probabilities rather than interest-rate spreads. They related the probabilities to the debt burden and other explanatory variables. This suggests trying an alternative specification where the variable to be explained is not $R_{it}-R_{ukt}$ (the yield premium of country i at date t), but π_{it},

the default probability. The relation between the two is straightforward and, as it turns out, non-linear[86]. Nevertheless, as Figure 6 reveals, a pooled scatter plot of the probability of default in terms of the debt burden actually displays a linear pattern; formal tests on the stability of coefficients across sub-groups can confirm this impression. The implication is that moving from yield premiums to default probabilities enables one to linearise the relations under study.

Figure 6. **The Interest Burden and Default Probabilities**
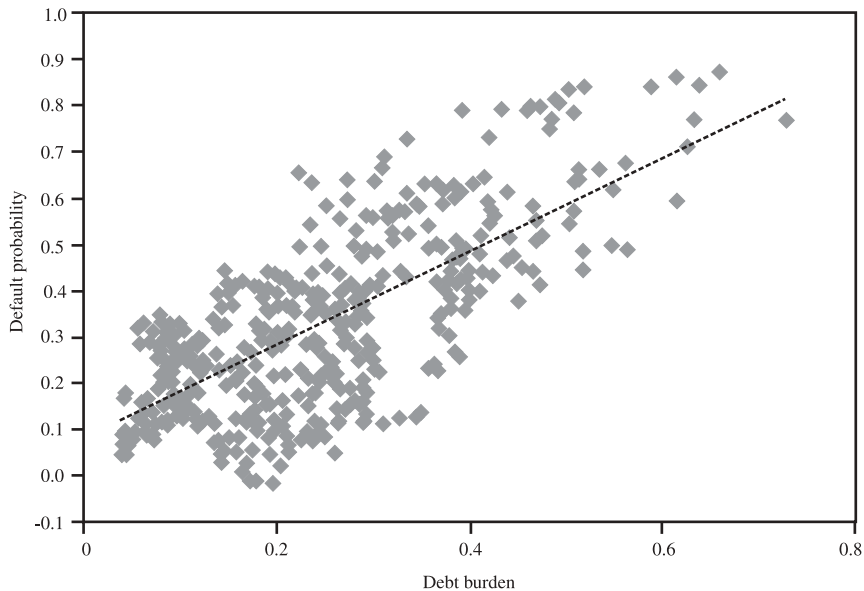
Finally it is possible to back up the theoretical relation between the debt burden and interest-rate spreads. This is shown in Figure 7, which is constructed using the elasticity of default probability to the debt burden reported in Table 3. The figure resembles Figure 5. Because the British rate enters the formula for the default probability, various curves correspond to various British rates. *Ceteris paribus*, spreads increased when the British rate increased. The figure also suggests that the sensitivity of interest spreads to the debt burden rose markedly when the debt burden approached and passed 40 per cent of tax revenues. This confirms the non-linearity and contemporary comments about threshold effects.

Figure 7. **The Debt Burden and the Interest Rate Spread**
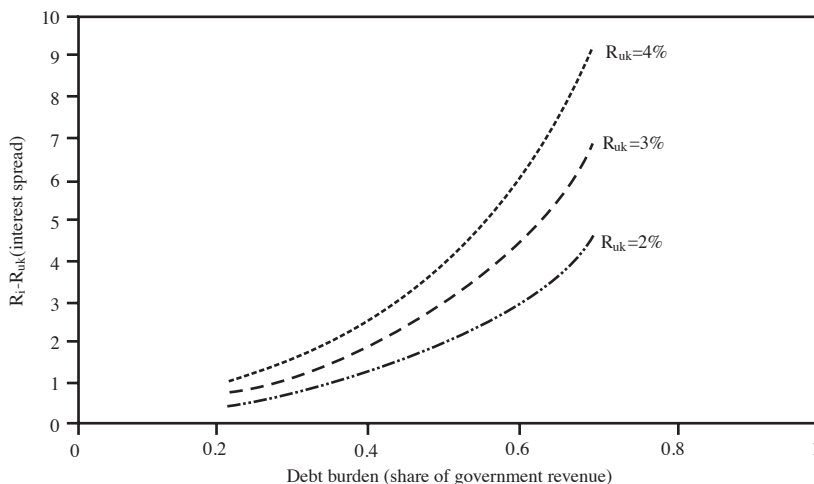
Table 3 reports estimates of the elasticity of the default probability in terms of alternative explanatory variables. The methodology is the same as before, and the results generally confirm, sharpen and refine earlier findings. Once again, the debt burden stands out as a powerful factor determining the probability of default. Moreover, its effect now works homogeneously across country groups. The gap between the effects of the debt burden on capital-rich and capital-poor countries is considerably reduced. The overall elasticity of the probability of default to the debt service is slightly below one: a 10 per cent increase in the interest service raises the probability of default by 0.1. When broken down into elasticities for sub-groups, the differences are non-significant (0.741 to 0.889), because the model now works more homogeneously across groups. The effects of the other structural variables (reserve ratio, export ratio and deficit) are again small or non-significant even if again generally correctly signed. The significance of the exchange-depreciation variable falls somewhat on the borderline, and taking political crises into account again challenges this result with the message that the dangerous exchange crises often coupled with political crises[87]. The default variables show up once more with large effects. Renegotiation is again significant, associated with an understandable 20 per cent to 25 per cent risk of losing the capital. The memory effect also shows up again as a strong signal of future default.

Table 3. **Determinants of Default Probabilities**

	All Countries	Capital-Rich	Capital-Poor
1. Structural factors :			
- Interest service/Revenues	0.847 (10.60)	0.889 (4.31)	0.741 (7.19)
- Reserves/banknotes	0.014 (0.53)	0.080 (1.76)	-0.021 (-0.60)
- Exports/Population	0.016 (0.48)	-0.032 (-1.02)	0.134 (1.60)
- Deficit/Tax revenues	0.001 (0.07)	0.095 (1.86)	-0.015 (-0.61)
- Exchange rate volatility	0.143 (1.89)	0.801 (2.04)	0.163 (1.82)
2. Reputation factors :			
- Default	0.164 (8.49)	-	0.178 (7.78)
- Memory	0.134 (5.61)	-	0.110 (3.70)
3. Political variables :			
- Franchise	-0.548 (-4.64)	-0.302 (-2.85)	-1.301 (-3.48)
- Political crises	F=3.088 (*)	F=4.83 (*)	F=1.928 (*)
4. Gold adherence:	-0.040 (-2.61)	-	-0.028 (-1.54)
Adj. R^2	0.859	0.527	0.758

Number of observations: 480. Not shown are the country-specific constants. (*)=F-test significant at 5 per cent.

The only substantial change from the previous results is that the extension of the suffrage now reduces the probability of default quite substantially. The effect of an increase in the enfranchised population from 0 to 25 per cent (as would typically have occurred through extending the suffrage to the adult male population at the turn of the century) reduces the probability of default by a considerable 0.125. This is consistent with the notion alluded to earlier that contemporaries saw democracy and parliaments as a source of greater stability, because they put checks and controls on the sovereign. This raises some intriguing questions in view of more recent research. If anything, the findings here suggest that the expansion of democracy, not its restriction, promoted financial stability during the period by facilitating international borrowing through lowered premiums. This contradicts the widespread view that the repression of democracy facilitated the operation of the pre-1914 international monetary system by making the external adjustment easier[88].

Finally, gold adherence again shows up as a borderline variable, non-significant when more explanatory variables are included. This residual effect is fully consistent with the view that a floating currency penalised countries to the extent that investors understood that excess paper money would have to be absorbed through international loans. But gold adherence, as such, was hardly a rewarding badge to wear. If one wanted to minimise the cost of borrowing, a low debt burden, a commitment to timely payment of coupons, a swift settlement if default occurred, more democracy and political and diplomatic stability were much more relevant than continued adherence to the gold standard. Investors could see through the veil of monetary regimes.

VIII. Convergence Explained

It now becomes possible to put together the findings and provide a comprehensive interpretation of the convergence of interest rates before WWI. As abundantly documented in previous sections, fluctuation in debt burdens was the backbone of long-term interest-rate movements. Hence, the convergence of yield premiums before WWI must have been related to a dramatic reduction of those burdens. Figure 8 illustrates this by showing the association between interest-rate convergence (reductions in interest spreads) and improved debt sustainability (reduction in debt burdens). The chart focuses on non-defaulters in order to purge the data from possible biases in favour of this claim[89]. It displays a striking association between the two processes. On average, a reduction of the debt burden by 5 per cent (e.g. a reduction of interest service from 20 per cent to 15 per cent of tax receipts) reduces the interest spread by 50 basis points. The story thus unfolds. Investors monitored debt burdens, which were reduced dramatically. They thus concluded that the world was turning into a much safer place financially and became increasingly more eager to lend abroad. This explains the astonishing degree of financial integration reached before WWI.

Figure 8. **Lower, Safer**
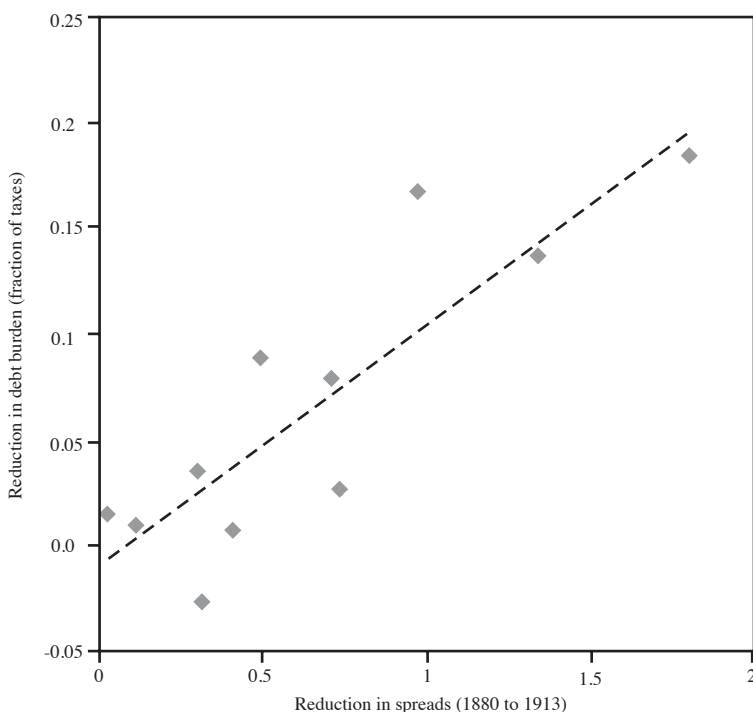
Source: See text and Statistical Appendix.

Fully documenting why debt burdens declined would go somewhat beyond the boundaries of the present monograph, which focuses on the supply side (the market mechanism) more than on the demand side (governments' borrowing policies). Some remarks are nonetheless in order. The dynamics of the debt burden can be broken down into a list of elementary components. On the one hand annual interest service increased with additions to the public debt. On the other, tax revenues rose; the sources of the rise can themselves be decomposed into economic growth, the scope of taxation (the extent of the tax ratio) and inflation. Higher growth, increased taxation or higher inflation all reduce the debt burden, other things being equal[90].

Figure 9 provides a decomposition of the sources of the reduction in debt burdens. It displays the annualised average growth rates of the various components of the debt burden dynamics: debt service, growth rates, increases in taxation and inflation[91]. Factors that deteriorated (i.e. increased) debt burdens bear a negative sign. Declines in public debt did not drive the reductions in debt burden in many cases, and gross debt service kept rising across time for most countries in the sample. In fact, public debts often climbed steadily throughout most of the period under study[92], but the dynamics of the other items more than compensated for this. Leaving aside inflation as a mostly exogenous variable during the period[93], the extension of taxation and growth are left as the main potential sources of international financial integration. Because the extension of taxation remained quite limited, growth was the chief factor offsetting the increases in public debt. It therefore served as the *modus operandi* in the financial markets a century ago, causing international financial integration. The period's favourable economic performance essentially propelled the process of globalisation.

The first great era of globalisation did not succeed because it displayed a particularly high commitment of governments to sound finances. In that respect the period was just as unexceptional as any other. Rather, success came because fairly remarkable economic growth characterised the times. Because this conclusion moves away from the realm of financial and monetary rules to problems of development, it seriously qualifies the conventional view that globalisation owed much to the gold-standard ethos. The question is whether contemporaries realised that, or if instead they only mechanically priced sovereign risk through the abstract formula identified here. The next section discusses this issue and explores the relations between risk perceptions and development policies.

Figure 9. **Convergence: A Decomposition**
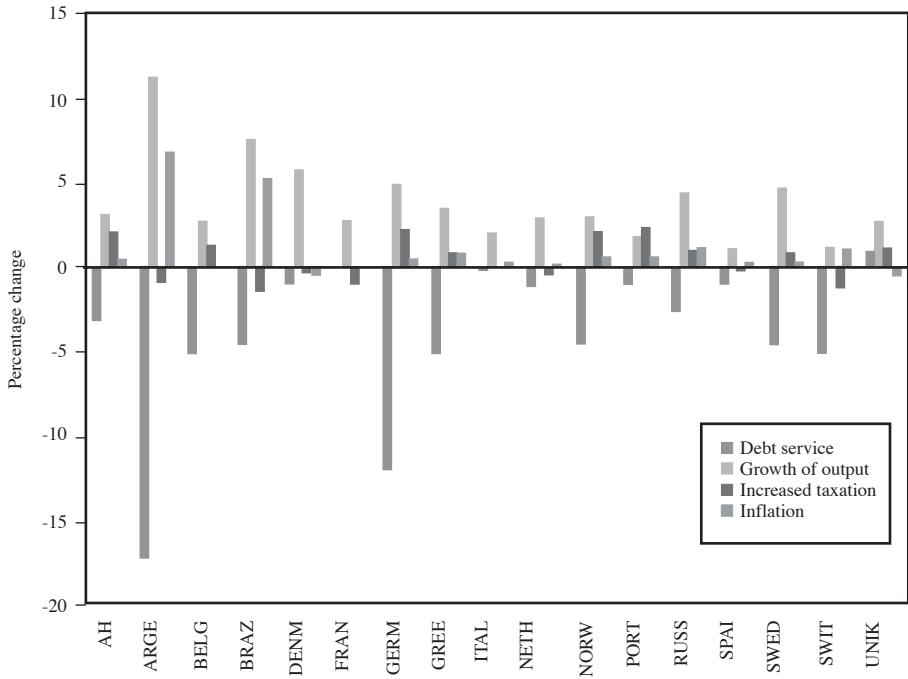
IX. Developmental Consequences

A crucial element has come to the fore. This study's interpretation of the mechanics of interest-rate convergence underlines the importance of growth and development in achieving a sustained reduction of borrowing prices. This is natural because over the long run the ability to service public debt relates ultimately to the adoption of policies that foster economic development. This section argues that there was a one-for-one correspondence between the assessment of sovereign risks and contemporary thinking on development strategies. If, as shown here, gold adherence played little role in shaping pre-1914 reputations, elaboration is needed on the stuff of which they actually were made. The analysis returns to the risk-assessment techniques reviewed in Section V and discusses the economics of the "trade test" and "tax test", which weighed the debt burden against national exports and government revenues. These alternative criteria corresponded to successive views on governance and development. While the trade test emphasised export promotion (and thus *laissez-faire*) the tax test stressed efficient fiscal and economic management (and thus to some extent government intervention). The watershed for the emergence of the tax test as a norm was the 1890 Baring crisis, which revealed the importance of good fiscal governance.

Openness, Development and the Trade Test (1848-1889)

The 1889 edition of *Fenn's Compendium* (pp. xix-xx) provides the most articulate presentation of the trade test. The editor, Robert Lucas Nash, explains its rationale by arguing that trade openness was the single most important variable to denote prosperity:

> "There is perhaps no better test of a nation's wealth than its foreign trade for, as a rule, countries which are rich have those things which other nations covet, and countries which are poor have not."

As later developed for the tax test, Nash further suggested thresholds that would enable identification of delinquent countries. Reasoning in terms of the "volume of the debt" which he computed by capitalising the interest-service annuity using a 5 per cent interest rate and dividing it by exports, Nash identified a danger zone lying above four (equivalent to a ratio of the debt service to exports equal to 20 per cent as explained in note 94)[94]:

"Wherever … the annual exports approach, or exceed the volume of the debt … the position of the National creditor must be one of as absolute security as it is possible to obtain. Further than this, no defaulters are to be found even amongst those states where it would take two or three years' purchase of total exports to cover the net indebtedness. But it is where as recently was the case with Spain, there were £500 000 000, against £20 000 000 of exports (25 years' purchase), that the defaults have in the long run occurred."

Good and bad performers were listed according to this criterion, as summarised in Table 4. The suggested benchmark of four identified a clean cleavage between capital-rich and capital-poor nations (with the exception of France).By and large, the safest countries were the Northwestern European industrialised countries while the risky ones included those on Europe's southern and eastern borders and in Latin America.

The trade test echoes the basic postulates of the modern Washington consensus. Its easily identified source of inspiration originated in the intellectual consensus that permeated European industrial elites in the 19th century and dates back to Adam Smith. They saw free trade as the most powerful growth engine. They castigated policies that represented moves away from it[95]. The repeal of the Corn Laws in 1846, the campaigns of *The Economist*, the need after 1848 to recycle the gigantic increase in the money supply that resulted from the California gold discoveries[96] and finally the eventual success of the ideas of liberal economists on the Continent (the so-called free-trade epidemic) paved the way for a drastic acceleration of European trade.Available figures suggest that it grew in the 1850s and 1860s at about three times the rhythm at which economies expanded[97]. By the mid-19th century, this emphasis on trade promotion drove European economic integration (Bairoch, 1974, 1976). As Kindleberger (1988) argued, free trade became in the European context a central feature of economic modernisation programmes[98]. This process in turn gave way to a wave of capital exports[99]. The evidence suggests a tight association during those years between trade integration and capital flows[100]. Countries signed trade treaties at the same time as they solicited foreign financial markets. They found the markets willing to provide, believing that open trade policies would inevitably result in greater economic development[101].

The trade test thus can be understood as a way to identify good policies through their revealed effects. For a given country, proportionately modest trade revealed a deliberate attempt to repress the "natural" tendencies towards international specialisation. These "artificial restrictions" by themselves indicated deficient development strategies. Therefore, other things being equal, the debt burden of a country with large trade flows was considered lighter than that of a similar country with small ones, because the trading record suggested that the former followed better policies than the latter.

Table 4. **The Trade Test** *Circa* **1888**

	(1) Net Debt Capitalised at 5% (£ millions)	(2) Net Debt (£/head)	(3) Annual Exports (£/head)	(4) Ratio: (2)/(3)
United Kingdom	396	10.58	7.50	1.41
Austria-Hungary	**465**	**11.36**	**1.75**	**6.49**
Belgium	63	4.11	16.65	0.25
France	**986**	**23.90**	**3.48**	**6.88**
Prussia	180	-	4.75	-
Greece	**28**	**14.65**	**1.73**	**8.49**
Italy	**430**	**13.25**	**1.45**	**9.14**
Netherlands	52	10.11	17.95	0.56
Norway	5	1.13	2.95	0.38
Portugal	**79**	**16.75**	**1.21**	**13.81**
Spain	**202**	**11.73**	**1.63**	**7.22**
Sweden	11	0.68	2.91	0.23
Russia	**535**	**4.91**	**0.75**	**6.55**
Argentine Republic	**85**	**21.40**	**4.00**	**5.35**
Brazil	**98**	**7.30**	**1.58**	**4.63**

Notes: The net public debt is obtained by subtracting interest on liabilities backed by assets (railways etc.) from total interest payments. The result is then capitalised using a uniform interest rate of 5 per cent. *Fenn's Compendium* reports Austria and Hungary separately for debt but aggregated for trade. The debt numbers are aggregated here to permit comparison. *Fenn's Compendium* apparently lacks data for Germany, but "Prussia" might be understood as a proxy (note alphabetical order). It is not clear to what trade (German or Prussian) the number in column (3) refers.

Source: From *Fenn's Compendium, 1889*, p. XV.

The Tax Test and Financial Development (1890-1914)

After 1890, reference to the trade test disappears from subsequent editions of *Fenn's Compendium* and the related literature. More and more references to the tax test start appearing. This reflected a change in development views and strategies.

As economic historians noted long ago, the 19th century's later developers in southern and eastern Europe tended to use the state to promote economic development. This observation is traditionally associated with Gerschenkron's thesis on "economic backwardness"[102]. Typically, public loans funded infrastructure — roads, canals, railways. The tax test in many respects seems to have been tailored for such countries. While public investment projects typically increased the interest service over the short run, they also improved prospects for future revenues and thus led to an eventual upgrading of fiscal resources through two different channels. First, to the extent that state projects were well run and well managed, they generated flows of "dividends" that alleviated or annihilated the corresponding debt service[103]. Second, more

infrastructure spurred growth and regional specialisation. Both improved public finances by increasing and broadening the tax base and thus favouring the collection of government revenue. States that actively promoted domestic development undertook steps that eventually affected the behaviour of the tax test.

In this respect the tax test was a way to focus on the success of government policies. It led observers to consider efficiency in the collection of taxes, to track the impacts on fiscal performance of centralisation, corruption or the training of tax collectors[104]. It led them to study the effects of financing development through alternative taxes, such as customs duties, excises, income taxes and stamp duties. One could also monitor the management of state companies and monopolies through the tax test because their creation and operation affected the behaviour of both the interest burden and government revenues. The tax test was a means to understand better the operation of the fiscal machinery.

Starting in the late 1880s, extensive evidence of attention to these problems appears in contemporary accounts. One typical illustration involved the frequent attempts to discount "reproductive investment" from the public debt[105]. As many observers recognised, establishing rigorous accounts of the debt burden, which would also enable discrimination between productive and unproductive debts, was both tremendously difficult and very important[106]. Sorting out these technical problems became a major challenge for investors, who devoted much time and energy to it. Such concerns became a key feature of the Crédit Lyonnais country reports, inevitably leading to comments on the relative abilities of states to promote national development. The reports of the Council of Foreign Bondholders carefully discounted productive debts from total debts[107]. The tax test thus led to discussions of governance[108]. In blatant contradiction with the popular belief that the late 19th century system rested on *laissez-faire*, during most of the period after about 1890 the assessment of default risks was rooted in a view that placed much emphasis on the ability of governments to manage their economies in ways that would foster their own fiscal resilience. "Good" policies were those that successfully struck a balance between fiscal development and national economic growth.

The Argentine Crisis as a Watershed

While the trade test corresponded closely in both timing and spirit to the first phase of 19th century globalisation (1848-1889), which mostly involved Western European integration, the tax test best fitted the experience of later developers with their experience of "hands on" government (1889-1913)[109]. It is tempting to stress the opposition between the trade and tax tests, but this would be somewhat inappropriate because the criteria were not mutually exclusive. Results in Sections VI and VII display evidence that openness mattered. Supporters of the trade test, such as *Fenn's Compendium*, did also acknowledge the high relevance of the quality of public spending. Finally, for all practical purposes, a stable empirical relation does exist, for a given

country, between taxation as a share of GDP and openness[110]. The Technical Appendix to this study reports results from regressions using both criteria[111]. The two criteria show very similar explanatory power for the overall sample.

To highlight the differences between the tests, Figure 10 provides a cross-section of the scores obtained by the countries in the sample in 1888[112]. A relation does exist between them; it explains their comparable overall records. The shaded rectangle, which is the intersection of the "danger zones" according to both tests, captures the usual suspects — in alphabetical order, Argentina, Greece, Italy and Portugal. Brazil and Spain are on the border. Note, however, that three high-risk countries, Argentina, Brazil and Greece, lie to the right of the adjustment curve. Together with Portugal (a looming disaster according to both tests) these countries were the ones that went bust in the 1890s. While recognised as highly hazardous under both criteria, they had bleaker prospects according to the tax test[113].

Figure 10. **Trade and Tax Tests in 1888**
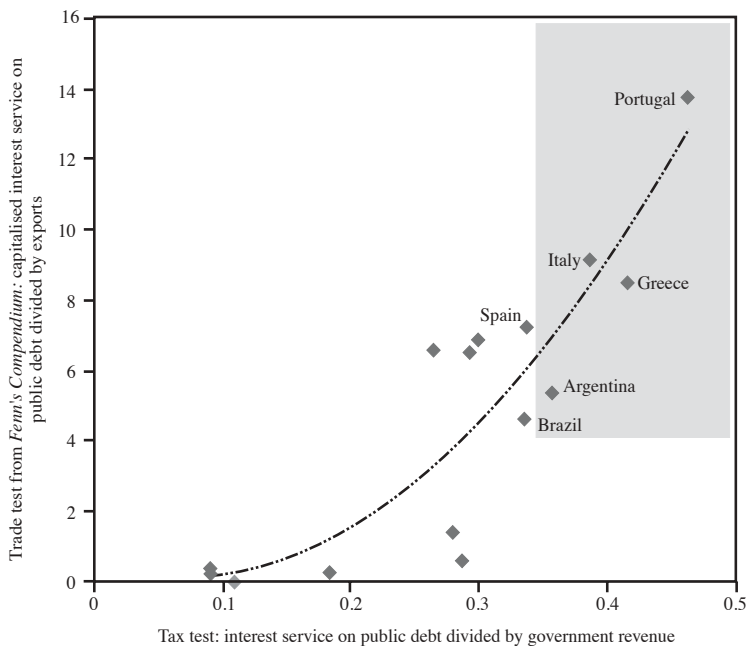
Source: Database and *Fenn's Compendium* as reported in Table 4.

As a matter of fact, the Argentine collapse in 1890 was the watershed that caused the emergence of the tax test as the key criterion. To see this, consider what ought to have been the interest premiums paid by Argentina in the 1880s on the basis of the relation between debt burdens and interest spreads as it emerged after the

crisis. One can estimate the basic model on 1900-13 using both the trade and tax tests, then simulate the spreads one gets according to each criterion. The result is shown in Figure 11, which compares the observed spread with the simulated ones. The trade test fits the actual rate quite well, suggesting that such a criterion was indeed used in the 1880s. The tax test, by contrast, shows how much the markets would have charged if they had priced the Argentine debt as they did in the 1900s. This alternative predicts a substantially higher interest spread, and it tends to increase as the crisis approaches, reaching 200 basis points in 1889. Obviously, a greater emphasis on the tax test might have led to a limitation on Argentine borrowing. The subsequent crises in Greece, Portugal and Brazil may therefore be understood in this light. The Argentine collapse led investors to monitor public finances and debt burdens more carefully. They realised that some countries, while possibly very open (Brazil), had deeply deficient fiscal systems. The Argentine wake-up call led investors to reconsider the hierarchy of risks in the light of Argentina's problems. The Crédit Lyonnais, for one, began carefully measuring interest burdens. The Council of Foreign Bondholders did the same. When the "bad performers" according to this criterion found themselves in trouble and sought to borrow, they did not find capital and collapsed[114].

Figure 11. **Forecasting Disasters: Alternative Measures**
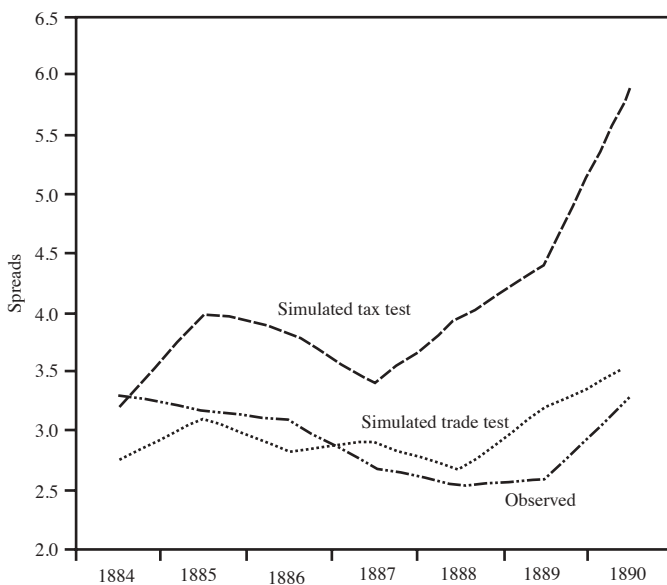
If this interpretation holds, one can understand the decline of popularity of the trade test and growing use of the financial-burden method thereafter[115]. This analysis underlines the links between assessment of sovereign risks and development views. It suggests that the international financial markets of the 19th century, while rewarding trade openness, became increasingly concerned about the very quality of financial policies. In the end, everything happened as if capital mobility had magnified the focus on individual financial achievements and led investors to realise that international economic integration created hazards (Calvo, 2003). As globalisation extended its reach beyond Western Europe to the broader world, people discerned that integration had been embedded in a much deeper fabric than the mere focus on trade openness had incorrectly suggested. This in turn gradually provided a new definition of what "good" policies were and magnified in this light the importance of sound fiscal machinery (an old feature of modern European states). People came to understand that dealing with globalisation required appropriate financial policies much more than the simple pursuit of free trade. The present epoch, it seems, is only relearning this lesson.

X. Policy Lessons and Conclusions

This monograph has sought to trace the roots of global financial integration in the first "modern" era of globalisation. It has shown that this integration, as measured by standard indicators, was not a monotonic process. A first wave of financial integration lasted until the 1880s, and a second one occurred in the early 1900s. This rules out a driving role for improvements in financial technology[116]. The interpretation focused instead on supply factors — perceptions by investors of the quality of the policies that borrowing countries followed. These perceptions shaped views regarding the relevant parameters people ought to monitor. As a result, investors "priced" government actions on the global capital market, because government securities were traded at levels that reflected the degree of trust they inspired. A deterioration of sovereign risk due to the perceived deterioration of a country's macroeconomic policies led investors to charge a premium for new loans, thus limiting the extent to which countries got access to international capital. This was especially problematic for developing or "capital-poor" countries, because, for them, access to international finance was paramount. One important conclusion is that formally removing capital controls is not enough for achieving a high degree of financial integration. The liberalisation of the capital account is at best a necessary but not sufficient condition for integration. Reputation is the true driver.

The interpretation of the sources of financial integration put forward here underlines the importance of domestic policies in actually facilitating the global circulation of capital. By emphasising the role of market processes, it answers the debate (see Bayoumi, 1990) on whether financial integration results from government policies or from some "endogenous" market behaviour. This contrasts sharply with the reading of globalisation put forward by Obstfeld and Taylor (1998), according to which policies affecting financial openness (removal of capital controls, etc.) propel the ebbs and flows of international financial integration. It has shown that policies reducing the perception of risks by the market are the true forces facilitating the circulation of capital. The adoption of "good" domestic policies expedites the globalisation of capital much more decisively than does the removal of legal barriers to financial exchange.

This points to an essential lesson for developing countries. Because sovereign debt stands in the front line when investors set a benchmark for the risk of lending to any given country, how they assess it is liable to play a decisive role in determining how much foreign capital that country can attract. This decisive element of the logic of international financial integration, surprisingly, has received only neglect in recent discussions of international financial integration[117]. Yet the recent troubles in which developing countries find themselves when they seek to attract foreign capital suggests that such forces prove decisive.

To identify the perceptions relevant for late 19th century investors, this monograph gathered material from individual sources in order to establish a list of potential candidates. Relying on a new database collected from primary sources, it sought to test whether the economic perceptions of the time were indeed reflected in "market prices". It related alternative measures of default risk to such variables as the debt burden, the cover ratio of the central bank, the deficit ratio, trade openness, default, past default, political regimes, political crises and exchange-rate regimes. Two alternative models were considered. One sought to explain interest-rate differentials with England (model I). The other sought to explain default probabilities (model II). In both cases the right-hand variables were the candidates identified above. Model II was shown to be preferable in many respects. It provided an elegant way to handle "threshold effects", i.e. markets getting the jitters when some performance parameters deteriorate relative to consensus-determined benchmarks.

The empirical findings show a hierarchy among explanatory variables. First, they reject the conventional view that the exchange-rate regime (participation in the gold standard) mattered in facilitating the global circulation of capital[118]. They demonstrate that such a conclusion is flawed and can result only from mis-specification and mis-measurement. Its significance in earlier studies comes from a general neglect of other variables that, in fact, people monitored carefully, as they should have. This study finds participation in the gold standard, even when statistically significant in determining borrowing terms, to be only marginally so with a small effect. Moreover, it explains a mediocre part at best of the convergence of interest-rate spreads after 1900 and of the resulting capital market globalisation. The gold standard was not the basis of the first era of financial globalisation.

Second, the debt burden was the one key variable that determined market access, because to a large extent it captured and summarised many macroeconomic features. Provided that a country had a low debt burden, it could finance its deficit without problem — the deficit itself often did not show up as a significant variable. A country with a low debt burden could borrow reserves to shore up its currency — and the exchange-rate regime had little if any effect.

That monetary regime variables did not appear as significant while the debt burden did suggests that to a large extent there was a disconnection, even before WWI, between the exchange-rate regime and globalisation[119]. Only when countries suffered from "original sin", i.e. when they could not borrow in their own currencies[120] and thus accumulated large currency exposures, could the exchange regime matter. Exchange crises when countries had large debts denominated in foreign currencies could be deadly. This led them to find ways to mitigate the fluctuation of their exchange rates or to seek to reduce their exposure to currency risk by encouraging the development of deep domestic markets to which foreigners could come. Hard pegs offered an option, of course, and some countries such as Russia adopted them. Yet gold adherence of the currency-board type acted not as a signal for good policies, but as insurance against the so-called "twin crises". The choice of exchange-rate regime was more a consequence than a cause of globalisation. This conclusion remains valid.

Other important results identified *en route* illuminated the costs of default. A renegotiation was an awfully costly exercise that basically shut the market down for defaulters until settlement was reached. This pushed borrowing premiums to sky-high levels, because renegotiation was a signal that at least part of the capital was about to be lost[121]. Moreover, markets remembered these experiences for a long time, a finding which seems to contradict received wisdom that former defaulters are able to tap the capital market again soon after default. The results here show that this comes at a price, which demonstrates both the merits and the limitations of the market mechanism as a mean of providing discipline. Defaulting entails costs, and nothing prevents a sovereign country from choosing to bear those costs. Investors treat default as a probability and increase this probability when previous default has occurred. If a country is nonetheless willing to borrow at the new, higher price, so be it. One cannot expect from the bond market more than what it can provide, namely penalties. The extent to which they are conducive to stability would require investigating the demand side, which this study has left out. Yet the persistence of problems in global finance is evidence that market incentives might not be enough.

The political variables were found to have a clear role. Political crises such as wars or domestic unrest were detrimental to a country's credit. Their inclusion typically dampens the effect of exchange-rate uncertainty, suggesting that many of the exchange crises meaningful for investors in fact resulted from political crises that caused all economic prospects to deteriorate. The study also found a tight association between the extent of democracy and borrowing terms. It was especially perceptible for the capital-rich Western European countries whose interest rates reacted strongly to the extension of the size of the enfranchised population. Contradicting the popular notion that markets like autocracy because it eases external adjustment, the findings say that markets like democracy because they worry about getting their money back. In fact, two major defaults that followed excesses of autocracy — not excesses of democracy — bounded the period under study. They were the 1793 French default and that of Russia in 1917. In the end, one may well conclude that smooth adjustment in the gold standard period was facilitated by the extension of democracy.

One correlate of the overarching importance of the debt burden is that interest-rate convergence between 1880 and 1913 occurred because countries were able to achieve substantial reductions of these burdens. Pre-1914 financial globalisation therefore had its roots in improved prospects for the sustainability of public debts. Moreover, viewing developments in terms of the drivers of globalisation, a clearer picture of what "good" policies are starts to emerge. Beyond a number of important transitory factors (such as the gold discoveries of the 1890s, which spurred inflation in the early 1900s) the reduction of public debts was achieved not through fiscal balance but *via* economic growth. This shows the importance of development policies in fostering international financial integration — a principle fully understood by both market participants and governments a century ago.

Furthermore, the international consensus regarding growth policies experienced an evolution that has a parallel in more recent experience. The experience of Western European economic development heavily influenced the global consensus that prevailed

before the Baring crisis. It put trade openness at the centre of views on development and debt sustainability. The financial crisis in Argentina changed the priorities and led to formalisation of a new consensus on the relations between public finances and debt sustainability. From then on and therefore during most of the period under study, greater emphasis went to the quality of fiscal management. Several states began to assume a considerable role in economic development. Fiscal success and economic success became so tightly intertwined that measures of a country's capacity to service its debt came to follow closely its economic performance — and its vicissitudes closely reflected the success of that country's development strategies[122].

The important lesson here is that the successful management of international financial integration does not rest very heavily on simple policy advice regarding the desirability of opening or closing individual economies to the international winds. In the last analysis, broader institutional and political factors as well as financial policies prove much more important. There can be no sensible route to globalisation — in fact no route at all — that does not put the problem of development first. The lack of international integration may slow growth, but the lack of growth in emerging markets will jeopardise globalisation. The inter-war economic difficulties should serve as a reminder. To bring back the golden age of pre-1914 globalisation, a number of contemporaries recommended restoring the gold standard. Yet with debt burdens at record highs as a result of the war and with growth hampered in the 1920s by desperate attempts to achieve drastic adjustment and in the 1930s by the Great Depression, there could be no other outcome than rising interest premiums and de-globalisation. The inter-war collapse was written in the equations this monograph uncovered. As navigators always knew, a fair sea and a good ship are equally important for a successful journey.

Notes

1. On this issue, see Oman *et al*. (2003). Some other mechanisms (such as peer pressure within the European Union, or conditionality *via* the IFIs) complete the market mechanism, or possibly compete with it by providing extra incentives. In the European context there exists an ongoing debate on the relative merits of both approaches. See Economic and Financial Committee (2003).

2. See Krasner (1983) for a discussion of the concept of regime.

3. See Feldstein and Horioka (1980) for a discussion of this methodology. Bayoumi (1990) is the seminal contribution on "historical" Feldstein and Horioka coefficients. See Flandreau and Rivière (1999) for a detailed survey.

4. Bordo and Flandreau (2003) contrast the pre-1913 and modern periods, showing that, today, financial integration is a developed world phenomenon.

5. Eichengreen and Temin (2000) is a typical illustration.

6. This point is emphasised in Bordo and Flandreau (2003).

7. See Braga de Macedo *et al*. (2002) for a recent survey of this matter.

8. Argentina, Austria-Hungary, Belgium, Brazil, Denmark, France, Germany, Greece, Netherlands, Italy, Norway, Portugal, Russia, Spain, Sweden, Switzerland and the United Kingdom.

9. The taxonomy of capital-poor/capital-rich countries is used here for simplicity following Schwartz (2003). The analytical perspective adopted here motivates it. At what price can one country attract capital? This contrasts with the more conventional reference to "core" *vs*. "periphery", which is done with an eye on exchange crises. Note also that some empirical elements (such as in Cameron *et al*., 1992) suggest that in 1913 all countries labelled as "capital-rich" in this study were net creditors.

10. A more formal discussion of the underlying model is provided in the Technical Appendix.

11. See Flandreau and Rivière (1999) for a discussion of 19th century "Tobin taxes". Fishlow (1985) is one of the best available surveys of late 19th century global bond markets.

12. The study by Neal (1990) is a pioneer. It remains unrivalled.

13. See the Technical Appendix for a formal discussion of the underlying model.

14. The EMBI is just the average yield premium on capital-poor countries for a given year. Alternative weighting techniques do not change the basic message.

15. Bayoumi (1990) must be credited for having been the first to point out that financial integration is not the result only of formal capital controls. He referred to the possibility of "endogenous behaviour" acting as a barrier to international financial integration.

16. For recent discussions of the question of interest-rate convergence see Foreman-Peck (1983). This pattern is also discussed in Eichengreen (1996), Flandreau *et al*. (1998) and McKinnon (1996).

17. Interest rates are constructed using securities listed in the Paris or London stock markets. Sources used are *Le Rentier* and *The Economist*. Arbitrage ensured that for any security quoted in both markets differences were negligible. Uruguay, Mexico and Chile were added to the complete list of countries provided in the Appendix.

18. See Cairncross (1953) for a discussion of British foreign lending. Ford (1962) discusses the ebbs and flows of capital between Britain and Argentina. For a discussion of the welfare gains/costs of foreign lending, see McCloskey (1970).

19. See also Eichengreen (1992) for arguments along similar lines. An early version of this view was the thesis of the "declining morality" of the market place, which developed after 1900. At that date, some observers deplored that markets were becoming insufficiently discriminating. This thesis was developed by former leaders of underwriting syndicates, such as the Rothschilds, who saw their market power in underwriting erode as competition grew. In their eyes, borrowers got better terms only because of intensified pressure among lenders (Ferguson, 1998).

20. See Eichengreen and Flandreau (1997) for a historical account and review of arguments. Early sceptics of the virtues and reality of the gold standard include Nogaro (1940) and Triffin (1964).

21. This notion may be found at the heart of recent discussions of pre-1914 financial globalisation, such as Eichengreen (1997), McKinnon (1996), Bordo and Rockoff (1996), Obstfeld and Taylor (2003*a*, 2003*b*) and Clemens and Williamson (2002). If product differentiation has led various authors to stress various aspects of the process, a basic consensus can nonetheless be identified. It is this consensus that is reviewed here.

22. This view was pioneered by Bordo and Rockoff (1996).

23. As a matter of fact, so strong is the notion that global economic integration before WWI had everything to do with gold adherence that the use of gold dummies to capture greater integration is turning into an industry. See Estevadeordal *et al*. (2003) and Lopez-Cordova and Meissner (2000) for examples of the use of gold dummies in the context of international trade.

24. See Obstfeld and Taylor (2003*a*), who consider a broader range of possible variables than Bordo and Rockoff do and report depressingly negative results beyond the effect of gold. Since they explain this in reference to a possible endogeneity problem with gold adherence capturing all the information from the other variables, they can be seen as basically siding with Bordo and Rockoff (1996).

25. Here, for simplicity, floating is considered as the only alternative to gold adherence during 1880-1913. There were some countries that operated convertible silver standards (such as India), but with the end of bimetallism in 1873, silver adherence essentially amounted to a free float (see Eichengreen and Flandreau, 1996, and Flandreau, 2003*a*).

26. Technically, the model uses as a left-hand variable the premium a given country had to pay above Britain's interest rates in a given year. The right-hand variable is an index variable reflecting whether or not the country was on gold during that year. Country-specific controls are also included. The results of this regression can be found in the Technical Appendix. Because no other variable is included, one can be sure of obtaining estimates that, if anything, exaggerate the effect of gold adherence. Recall that the other macroeconomic variables considered by Bordo and Rockoff (1996) and Obstfeld and Taylor (2003*a*) turned out to be non-significant.

27. See Reis (1996) and Braga de Macedo *et al*. (2001) for a discussion of the Portuguese experience. See Martin Aceña (2000) for a discussion of the Spanish one. Chile could be added to the list of the non-gold, yet convergent countries.

28. On Russia's "cosmetism", see Conant (1896).

29. On Japan's development policies, see Rosovsky (1961). On its external borrowing, see Suzuki (1994).

30. As was sometimes the case, the adoption of the gold standard was accompanied by a debt conversion. The implication is a repurchase of outstanding obligations at par and their reissue at a lower price. This means that standard estimates of the yields that rely on the classic coupon/price formula are biased.

31. It might also be added that the adoption of the gold standard was truly part of a broad international public relations operation. Not incidentally, Count Matsukata Masayoshi's famous *Report on the Adoption of the Gold Standard* (1899) was written in English. There is a danger that modern economists may become the last victims of late 19th century PR campaigns. On the symbolic role of gold adherence for 19th century developers, see Gallarotti (1995).

32. Weber (1904) argued that the Protestant ethic was more favourable to development.

33. Baxter (1871), pp. 125-126.

34. Bamberger, *Deutsche Rundschau*, October 1877, quoted by Cernuschi (1878), *La diplomatie monétaire en 1878*, p. 90. Bamberger was a prominent German politician and authorised writer, whose role in the unification of Germany and subsequent adoption of the gold standard was paramount. He was a leader of the Liberal party whose goals conflicted with Bismarck's objectives of centralisation. See Koehler (1999).

35. "Millennium Resolution: No more funny money", *Financial Times*, 3rd January 2000.

36. Leroy-Beaulieu (1899), Tome II, p. 629. Leroy-Beaulieu was the editor of the French counterpart to *The Economist*, *L'Economiste Français*.

37. James de Rothschild, 2nd June 1868, Quoted in Gille (1967).

38. Laffitte (1824), pp. 41-42. For similar views coming from the other side of the Channel, see Ferguson (1998).

39. Flandreau (2003*d*). This research was a source of inspiration for the work of Tomz (2001), to whom the authors communicated some of their data. On the history of Crédit Lyonnais, see Bouvier (1961).

40. See Flandreau (2003*d*) for data on the budget and number of employees of the research department.

41. Since we know to what group each country belonged and the intermediate variables contemporaries monitored, we can assess the weight that each variable had on the ranking.

42. Some discrepancies are to be expected, because these ratings, which the Lyonnais kept secret and used to advise its clientele of depositors, were meant to signal some investment opportunities that had been underestimated by the market.

43. We only have one instance of formal rating, while there is ample suggestion that such exercises were routinely carried out.

44. For instance, the third group comprised in 1898 mostly countries that were, had recently been or were about to be in default. While this motivated a general grading to "junk" status by Lyonnais economists (explaining the virtually vertical axis in which we find Portugal, Greece, Brazil, Argentina and Serbia) the market nonetheless discriminated among junk countries depending on default settlement prospects. This motivated potentially very different yield premiums, although the rating procedure tended to downplay idiosyncrasies among defaulters.

45. Correlation coefficients are 0.82 for spread *vs*. grade and 0.84 for log spread *vs*. grade.

46. The authors' understanding from actual reading of other sources is that individual analyses such as Lyonnais' were widely shared by the market.

47. Cliometrics was pioneered by Nobel Prize winners Robert Fogel and Douglas North, among others.

48. Formally, $R_{it}-R_{ukt} = \alpha_t+\beta X_t+\omega_t$. A refinement of the model is the use of the capital asset pricing formula (CAPM). Bordo and Rockoff (1996) and Mauro *et al*. (2002) employ it. Note that from the point of view of the "theories in use", it is safer to stick to the most parsimonious model and not complicate matters by relying on later theoretical developments, such as the CAPM.

49. Flandreau *et al*. (1998) pioneered the "structuralist" view, which holds that macroeconomic variables were strongly correlated with bond spreads. Ferguson and Batley (2001) developed a "political" view according to which political events were the drivers of spreads in the 19th century.

50. Obstfeld and Taylor (2003*a*) and (2003*b*) are prototypes.

51. Consider the situations of Japan and Argentina around 2000. While the debt burden of Japan was around 125 per cent of GDP, Argentina's stood at about 45 per cent; and yet a crisis occurred in Argentina. The reason is that no debt burden can be

properly assessed if one does not take into account the corresponding "annuity". Japan borrows at cheap rates while Argentina faced huge premiums. The result is that the actual burden supported by Argentina (10 per cent of GDP) was much larger than that supported by Japan (4.3 per cent). In the end, Argentina turned out to be the more vulnerable country. (Sources: OECD, 2002 and Moody's Investors Service, 2002).

52. That is how their significance is interpreted in Flandreau *et al*. (1998). In a similar vein, the historical GDP numbers were literally not available to contemporaries, because they typically are later reconstructions. They are nonetheless correlated with variables that were available to contemporaries.

53. Leroy-Beaulieu (1878), Vol. 2, Chapter XIV, "Des moyens d'évaluer le poids des dettes publiques."

54. This is because contemporaries sought to capitalise income flows (e.g. income from land) in order to reach an evaluation of the value of the corresponding assets.

55. This despite Mulhall's pioneering work. In effect, Mulhall's optimistic numbers for Argentina (Mulhall, 1887) were held responsible for fuelling excessive enthusiasm. The publications of the Société Internationale de Statistique contain early contributions to the modern art of GDP estimation.

56. Leroy-Beaulieu (1878), Vol. 2, p. 575. A similar caution is visible among Lyonnais economists (see Flandreau, 2003*d*).

57. Baxter (1871), p. 8 and various issues of the *Bulletin de la Société Internationale de Statistique*.

58. Baxter (1871), Théry (1887), Haupt (1894) and Canovai (1898) are characteristic examples.

59. Leroy-Beaulieu (1878), p. 578. A similar view prevailed in Crédit Lyonnais studies and in many other places. See Flandreau (2003*d*).

60. In a famous study of England in the 18th and 19th centuries, Barro (1987) found a statistically significant link between deficits and interest rates. During the period under study, however, deficits were motivated mostly by wars and thus surrounded by much uncertainty. If current deficits signal future ones, their effect on risk premiums can be substantial, because agents discount the consequences of increased indebtedness.

61. So that their influence on ratings seems to have been heavily discounted, which econometric investigations of Lyonnais ratings confirmed. For a study of the "monetary files" at Crédit Lyonnais, see Flandreau (2003*b*).

62. For instance, in the standardised country scorecards it produced, the Crédit Lyonnais had a special entry for the "monetary regime", but upon closer inspection it appears that it is the legal (nominal) regime which was recorded there, and not the actual one!

63. The analogy between this way of reasoning and the so-called tax based theory of money is striking. Its empirical success, when used on 19th century data (Calomiris, 1988), may be understood in this respect.

64. In effect, both the Lyonnais and *Fenn's Compendium* suggested that inconvertible paper money be added to the debt burden as a virtual liability. A table provided by the 1889 edition of *Fenn's Compendium* has an asterisk (p. xv) for Austria-Hungary, Italy, Russia, Argentina and Brazil that reads, "depreciated paper currency estimated to entail a 5 per cent burden on these countries." This is evidence of the debt-burden significance of monetary variables.

65. For contemporaries' views on the irrelevance of the cover ratio, see Flandreau (2003*b*).

66. This result was rediscovered more recently. It is known as the Tanzi effect (Tanzi, 1989, 1990).

67. Leroy-Beaulieu (1878) 2nd ed., Vol. II, p. 579-80. Similarly, the reports on public finances in the *Statesman's Yearbook* were careful to distinguish between domestic and foreign liabilities. In the Lyonnais archives, we find ample evidence that economists worked hard to sort out the contribution of exchange-rate variations to changes in the burden of the public debt. For this purpose, they tried to isolate the domestic and external debts, and used this information to assess the change in interest service that would result from a given depreciation of the exchange rate.

68. This way one finds applied economists trying to assess the fiscal implications of the 1898 military conflict between Spain and the United States. Their conclusion was that the financial imbalance between the two countries suggested that the war would be short or the Spaniards crazy. This led *The Economist* rightly to forecast a short conflict. Crédit Lyonnais Archives DEEF 82505.

69. *The Economist* complained in 1873 that such a procedure could involve serious dangers if it were to become a routine.

70. North and Weingast (1989). See also the 2000 special issue of the *Journal of Economic History*. For a contrary view, see O'Brien (2001).

71. Leroy-Beaulieu (1899), p. 630 (6th ed. of *Sciences des Finances*). The first two editions did not include the qualification on "discipline". Leroy-Beaulieu explains that he added it because the French experience suggested to him that "un certain régime parlementaire brouillon et subversif est une cause de gaspillage effréné." (Id. p. 630).

72. For a reprint of Russia's political risk analysis, see Crédit Lyonnais (1998), *Politique Etrangère*.

73. The exports-to-reserves ratio was also tried, as suggested by some comments in the Lyonnais archives. The results are reported in the Technical Appendix.

74. While cross-sectional measures of trade openness can rely on trade per head, in a given currency unit at a given point in time, panel comparisons require using a benchmark that controls for prices. Contemporaries did not construct uniform price indices, however. This study thus normalised the ratio of exports per head of country *i* at date *t* by dividing it by the British ratio of exports per head at date *t*. Technically,

[Exports(i,t)/population(i,t)]/[Exports(uk,t)/population(uk,t)]

75. The table reports the effect of a 0.1 per cent average monthly depreciation over one year, i.e. a 1.2 per cent average depreciation over the year.

76. Eichengreen (1992).

77. Kokovtsov (1933), pp. 55-62.

78. For each country, the period of gold adherence is taken from Flandreau *et al*. (1998) with a few additions and adjustments. The list is reported in the data appendix.

79. The effect we considered is $0.5^{n\theta}$ where n is the number of years since settlement with bondholders. This is similar to the formula used by Eichengreen and Portes (2000). The normal procedure is to perform a grid search to estimate the memory parameter θ. That was done in preliminary investigations, but all regressions consistently pointed to a parameter in a close range around 0.1, implying a fairly long memory effect. One-half of the initial effect is still felt after ten years. In a later stage, the memory effect was restricted to be equal to $\theta = 0.1$ thus allowing easier comparisons of regression output across equations.

80. Several other estimators computed are also of interest, if a more academic one. The study will nonetheless occasionally refer to them, for they often shed an interesting and complementary light on the evidence reported in the bulk of the study. The "pooling" estimates are reported in the Appendix. In contrast, the "between" estimates, which focus on cross-sectional average patterns, are not relevant here because they typically overlook dynamics.

81. Note, however, the results for the deficit-to-revenue ratio. The limited significance of the deficits variable contrasts with other results in the literature (e.g. Barro, 1987). When they were included without the debt burden measures, however, deficits were found to matter in a number of regressions. This is fully consistent with the interpretations developed in this paper.

82. Moreover, this takes place even before introducing exchange-rate depreciation. Some might argue that this is an unfair way to get rid of the gold dummy, but note that the exchange-depreciation variable is an asymmetric measure. It need not be correlated with gold adherence, unlike volatility.

83. "D'après nos études, jamais aucun État n'a manqué, en temps de paix à ses engagements tant que ces proportions ont été inférieures à 40 pour cent." (Crédit Lyonnais Archives, DEEF73324).

84. Leroy-Beaulieu (1878), p. 581.

85. Flandreau *et al*. (1998) relate this to the concept of "market discipline". While the case for non-linearities in the data is strong, however, its methodological implications are complex. There is much less consensus about non-linear models than about linear ones. Flandreau *et al*. (1998) provide alternative estimates of non-linear forms, which were also shown to perform better than linear specifications. Flandreau *et al*. (1998) rationalise the non-linearity from a constant re-negotiation model, where all the debt is short-term, so that an increased debt burden translates into an increased default risk, which feeds back onto the debt burden. One problem with this model, however, is that, as argued elsewhere, 19th century debts were typically long-term, and each period brought only marginal additions to them.

86. Consider two perpetual bonds, both gold denominated. The risk free bond (UK's bond) pays coupon 5 and trades at P_{uk}. The risky bond (country i's bond) pays coupon 5 and trades at P_i. For a risk neutral investor, we must have $P_i=P_{uk}(1-\pi_i)+0.\pi_i$ where π_i is a measure of the probability of a future default; yields are respectively defined as $R_{uk} = 5/P_{uk}$ and $R_i= 5/P_i$. We therefore have $5=R_{uk}.P_{uk}=R_i.P_i$. This finally gives $\pi_i =(R_i-R_{uk})/R_i$.

87. This is reminiscent of the recent literature on exchange-rate behaviour and political regimes. See Freeman *et al*. (1999). See Appendix for individual parameter estimates.

88. For a pioneering formulation of this hypothesis, see Eichengreen (1992).

89. Countries initially on the verge of crisis with very high burdens tend to have the highest interest premiums. They are the ones for which the convergence and debt reduction are most striking.

90. Recall that if B is the debt burden, we have $B=S/Tax$, where S is the interest service and *Tax* the tax revenue. Neglecting the role of exchange-rate changes, this can be rewritten as $B=S/(Y.T.P)$ where Y is real income, T is the tax rate, and P the price level. Finally, $\Delta B/B=\Delta S/S-[\Delta Y/Y+\Delta T/T+\Delta P/P]$, where the growth rate, the change in the tax rate and inflation are recognised.

91. For simplicity (i.e. to keep the chart legible) the contributions of default and exchange-rate depreciation are omitted.

92. Flandreau *et al*. (1998) show that deficits accumulated at a higher rate after 1900 than before.

93. Gold adherence implies that the money supply is set exogenously by gold discoveries. The price level then becomes endogenous (see Barro, 1983). Note that the contribution of inflation to the decline of debt burdens was large, as emphasised by Flandreau *et al*. (1998).

94. "Introduction", *Fenn's Compendium*, 1889 edition, pp. xix and xx. Capitalising at 5 per cent means that a service of 5 is tantamount to a debt of 100. If exports stand at 25, then the debt to exports ratio stands at 4. Converting *Fenn's Compendium*'s debt to exports danger threshold of 4 in (more conventional) terms of interest service to exports, we get that the interest service cannot exceed 5/25=20 per cent of annual exports as indicated in the text.

95. See Irwin (1996) for a stimulating intellectual survey.

96. On the interactions between trade expansion and bullion discoveries, see Flandreau (2003*a*).

97. Bairoch (1993) places the expansion of European trade at about 5-6 per cent. European economies grew at 1-2 per cent.

98. The emphasis on Europe is important here. As Bairoch (1993) argued, free trade remained a distinctly Western European phenomenon in the 19th century.

99. See Jenks (1927) for British capital exports and Cameron (1961) for French capital exports.

100. See Cameron (1961). Flandreau (2000) shows the association between trade treaties, monetary arrangements and financial interdependencies.

101. On the role of opinions in the mid-19th century free-trade epidemic, see Kindleberger (1988).

102. Gerschenkron (1962). This is the so-called "relative backwardness thesis".

103. In other words, even a loss-making railway, provided that it did not cost more to run than it brought in income, reduced the net service of the corresponding debt. Consider, for instance, a railway loan that involves an annual coupon payment of R, railway-operating costs of C and railway income of I. Provided that $I>C$, part of the debt burden is offset.

104. Nineteenth-century observers were only rediscovering things that had been at the heart of early experiences of economic development, beginning with Britain. As Brewer (1990) and O'Brien (2001) emphasised, the beginnings of the Industrial Revolution in Britain in the 18th century had been tightly associated with deep transformations of the fiscal machinery. The creation of a comparatively efficient tax bureaucracy enabled successive British governments to rely on abundant resources that in turn permitted both extensive borrowing and the building of a reputation for strong willingness to pay back creditors.

105. See Flandreau (2003*d*) for a discussion. Mulhall (1896) and *Fenn's Compendium* (1889), among others, are early illustrations. In a recent paper Kelly (1998) reports evidence that the composition of public debts did matter in determining market access.

106. On these difficulties, see *Fenn's Compendium* (1889), pp. xvi-xvii. "The question then arises: To what extent are these [public debt burdens] covered by reproductive works? Taking the heaviest debt per head on the entire list — that of Queensland — we find that it has been raised to the extent of some £15 000 000 for railways, £750 000 for telegraphs, £1 500 000 for harbours and navigations, £800 000 for roads and bridges, and £1 000 000 for loans to municipalities … for local water supply and other works, or together £19 000 000 out of a total of £25 000 000 bonds issued; and if to these items were added the money absorbed by immigration expenses and public buildings, we should find practically the whole of the debt had been contracted for works of utility, even if some of them are not directly reproductive. … We are scarcely, however, entitled to write off blindfold the whole of this outlay upon public works. … It has been impossible … to deal with accounts of all countries … and in the Table of net Indebtedness [which we give below showing the true burden of public debts] there may in some cases be assets which have not been fully allowed for."

107. It is no surprise, therefore, that Crédit Lyonnais economists sought to develop a systematic way to sort out "true" government revenues from gross numbers. As a result, the measure of the debt burden, which they monitored, subtracted from the interest service the net income from public companies. This in turn enabled them to assess the value of government assets. The next stage, of course, was to make pair-wise comparisons of the efficiency of alternative governments.

108. As reported by Lyonnais economists, the Austrian state railways were known to be much more profitable than their Hungarian counterparts. This shows that it is not enough to know the purpose of a given public project in order to assess its quality.

109. The chronological boundaries are obviously somewhat arbitrary. While the Baring crisis is emphasised here as a watershed, other timings could be considered. In particular, 1873-89 is clearly a period during which both criteria were used in combination.

110. If trade and taxation are constant fractions of national income, they should display a fixed proportion for each given country across time and thus give very similar results when fixed effects are introduced in the regression. Moreover, if as suggested by Rodrik (1998) there is a tight positive association between government size (tax revenues as a share of GDP) and openness (trade as a share of GDP) then the two variables should be perfect substitutes in all regressions. Note that the empirical sample used here did not uncover the relation discussed by Rodrik.

111. Strictly speaking, the trade test performed here uses the annuity on the public debt (interest service), not the capitalisation of this annuity at a uniform rate of 5 per cent as suggested by *Fenn's Compendium*. It is clear, however, that the two measures are essentially substitutes.

112. This is the last pre-crisis year for which *Fenn's Compendium* provides figures for the trade test.

113. Note that Spain, which was the most recent experience of default in the 1880s, displayed when it collapsed a tax test of about 0.47 (comparable to Portugal in 1888) but a trade test standing at 25 (*Fenn's Compendium*, 1889, p. xvii). In that case, the trade test rang the emergency signal.

114. This conclusion may help to reconcile recent seemingly conflicting conclusions in the literature. While Triner (2001) argues that contagion spread from Argentina to Brazil, Mauro *et al*. (2002) maintain there was none. They reach this conclusion by emphasising that investors of the time were able to focus on "fundamentals". This claim conflicts with contemporary accounts, which stressed the "reverberation" of the Argentine crisis (see Conant, 1896, and Flandreau, 2003*c*). On the other hand, the word "reverberation" suggests that the transmission of the crisis went through the perceptions of the money centre (see Calvo, 1999, for a discussion of the potential role of money centres in transmitting financial instability). The analysis in this study suggests that if a crisis leads to some re-scaling of the "fundamentals", then the conclusion of Mauro *et al*. (2002) need not be taken as evidence against "contagion".

115. This conclusion fits squarely with the findings of a vast literature that has documented both the effect of recent financial crises on ratings and the reverse impact of ratings on crises. See, for example, Cantor and Packer (1996), Eichengreen and Mody (1998), Kamin and von Kleist (1999), Reinhart (2002), Kräussl (1999) and Reisen and von Maltzan (1999).

116. This obviously contrasts with the logic of financial integration as it has been achieved historically in *national* contexts. There, institutions and financial technology have been shown to play an essential role. See, for example, Davis (1980).

117. See, for example, O'Rourke and Williamson (1999) and Clemens and Williamson (2002) for characteristic illustrations.

118. For the conventional view, see Bordo and Rockoff (1996), Sussman and Yafeh (1999), Obstfeld and Taylor (2003*a*, 2003*b*) and Eichengreen *et al*. (2003).

119. This finding was emphasised by Bordo and Flandreau (2003).

120. On the so-called "original sin", see Eichengreen *et al*. (2003). On its historical aspects, see Flandreau and Sussman (2003).

121. This occurred quite apart from formal procedures whereby bondholders formally prevented defaulting governments from getting access to capital markets (Flandreau, 2003*c*).

122. These conclusions clearly contrast with the conventional emphasis (see, for example, O'Rourke and Williamson, 1999) on trade openness as the main source of pre-1914 convergence. This monograph has shown that pre-1914 financial convergence had origins much different from what has been argued so far.

Technical Appendix

The Background Model

Consider one capital-poor country i, defining as "capital-poor" a nation that has a large growth potential and thus needs to accumulate capital. In view of consumption smoothing, capital accumulation is better done *via* capital imports than through domestic saving. In other words, this country has savings $S_{i,0}$ that typically fall short of investment needs. It also has a demand schedule for capital, $D(i)$, that is a decreasing function of the yield premium r_i-r_{uk}. (The yield premium is measured here as the interest rate differential with the capital-rich country — for simplicity, the United Kingdom). Country i faces a supply of funds $S(i, \delta_0)$ which increases with r_i-r_{uk}. The important point is that S shifts with changes of parameter δ_0, which represents the risk of lending to country i. This risk is determined by market perceptions of the quality of the policies that country i follows.

Now look first at the left-hand side of Figure A.1. Thanks to the foreign capital inflow, domestic investment equals $I_{i,0}$, and the current account deficit, CC (i.e. the net capital inflow) equals $I_{i,0}$ - $S_{i,0}$, where $S_{i,0}$ is domestic saving. Domestic shocks on domestic saving will have no impact on domestic investment, because any fall in saving will be offset by capital inflows. As a result, there will be no correlation between $I_{i,0}$ and $S_{i,0}$. Suppose now that perceptions of the risk of lending to country i increase from δ_0 to δ_1. As the right-hand side of the figure depicts, the capital supply schedule shifts to the left as foreign investors become more reluctant to invest in country i. As the equilibrium yield premium rises, the supply of foreign capital evaporates. There is a level of risk where the country becomes deprived of foreign capital. In the example shown, the increase in risk forces the current account into balance and shuts down capital inflows, so that $I_{i,1} = S_{i,1}$. If the perceived risk is larger than δ_1, the correlation between domestic savings and investment will be perfect (equal to one), and the Feldstein-Horioka coefficients will point to a situation of financial "dis-integration". Therefore, the analysis predicts that there should be a relation between integration coefficients and risk premiums. This explains Figure 1 in the text.

Figure A.1. **Financial Openness and the Yield Premium**
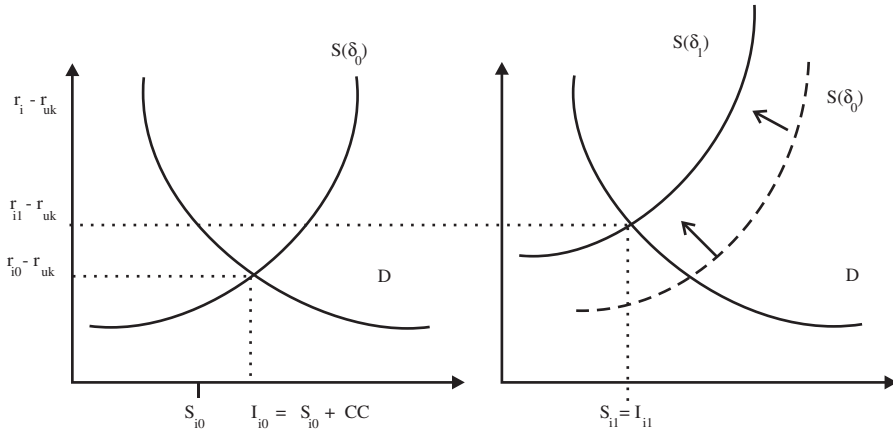
Detailed Results: Alternative Specifications

The text reported summary results for the most complete model, with all effects included. The tables below show outcomes for both the interest-spread model and the default probability model with more limited combinations of the explanatory variables. They highlight the decline in explanatory power of the gold-adherence dummy as more variables enter and especially the impact of taking crises into account. (Note that since the capital-rich countries were always on gold one cannot include a gold dummy for them.) They also accent the effect of the political crisis variables on the effect and significance of exchange depreciation. Finally, while not always significant, the trade-openness variable works in different ways for different groups of countries. Openness seems to be good for capital-rich countries, but less so for capital-poor ones. This makes much sense in view of the discussion in Section IX.

Table A.1. **Fixed Effects, All Countries, 1880-1913**
Interest-Rate Spread Model

	1	2	3	4	5
1. Structural factors:					
- Interest service/Revenue	-	8.849 (10.91)	8.665 (9.99)	8.715 (9.73)	7.751 (8.50)
- Reserves/Banknotes	-	-	-	0.414 (-1.41)	-0.286 (-0.96)
- Exports/Population	-	-	-	0.782 (2.02)	0.601 (1.59)
- Deficit/Revenue	-	-	-	0.710 (3.08)	0.725 (3.16)
- Exch.-rate volatility	-	-	-	2.208 (2.76)	0.997 (1.14)
2. Reputation factors:					
- Default	-	4.994 (22.31)	4.999 (21.91)	5.010 (22.24)	4.836 (21.66)
- Memory	-	0.882 (3.32)	0.849 (3.12)	0.893 (3.26)	0.703 (2.56)
3. Political variables:					
- Franchise	-	-	-0.827 (-0.66)	-2.424 (-1.71)	-2.427 (-1.77)
- Political crises	-	-	-	-	F=3.797 (*)
4. Gold	-1.546 (-7.03)	-	-0.034 (-0.25)	0.280 (1.57)	0.056 (0.32)
SBIC	927.991	669.375	675.286	675.383	696.069
Log L.	-875.514	-610.724	-610.461	-598.210	-563.332
Adjusted R^2	0.493	0.831	0.831	0.838	0.854

Number of observations: 480. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over simple pooling. (*) F-test significant at 5 per cent.
The Schwartz Bayesian Information Criteria (SBIC) is a model selection test, which has the asymptotic property of picking up the true model, if the true model is one of the alternatives being tested.

Table A.2. **Fixed Effects, Capital-Rich Countries, 1880-1913**
Interest-Rate Spread Model

	1	2	3	4	5
1.Structural factors:					
- Interest service/Revenue	-	5.200 (8.61)	4.231 (6.61)	3.885 (5.61)	4.144 (6.18)
- Reserves/Banknotes	-	-	-	0.182 (1.05)	0.223 (1.34)
- Exports/Population	-	-	-	-0.131 (-1.12)	-0.160 (-1.41)
- Deficit/Revenue	-	-	-	0.248 (1.29)	0.319 (1.71)
- Exch.-rate volatility	-	-	-	2.502 (1.69)	2.825 (1.97)
2.Reputation factors:					
- Default	-	-	-	-	-
- Memory	-	-	-	-	-
3.Political variables:					
- Franchise	-	-	-1.305 (-3.79)	-0.916 (-2.29)	-0.839 (-2.17)
- Political crises	-	-	-	-	F=4.15 (*)
4. Gold	-	-	-	-	-
SBIC	-	-2.37208	-6.91986	0.243620	-5.92347
Log L.	-	26.8041	34.0666	37.7618	46.6436
Adjusted R^2	-	0.520	0.547	0.554	0.585

Number of observations: 228. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over simple pooling. (*) F-test significant at 5 per cent. Here the F-Test coincides with a T-test. The Boer War was the only common factor.

	1	2	3	4	5
1.Structural factors:					
- Interest service/Revenue	-	9.308 (7.96)	9.037 (7.12)	8.776 (6.52)	7.677 (5.35)
- Reserves/Banknotes.	-	-	-	-0.518 (-1.14)	-0.402 (-0.83)
- Exports/Population	-	-	-	2.575 (2.38)	2.279 (1.95)
- Deficit/Revenue	-	-	-	0.723 (2.20)	0.747 (2.21)
- Exch.-rate volatility	-	-	-	2.391 (2.17)	1.310 (1.05)
2.Reputation factors:					
- Default	-	4.944 (16.10)	4.982 (15.79)	5.087 (16.20)	4.917 (15.48)
- Memory	-	0.966 (2.62)	0.913 (2.40)	0.872 (2.26)	0.667 (1.62)
3.Political variables:					
- Franchise	-	-	-3.994 (-0.80)	-5.295 (-1.07)	-7.232 (-1.39)
- Political crises	-	-	-	-	F=1.889 (*)
4. Gold	-1.546 (-5.13)	-	0.012 (0.06)	0.302 (1.19)	0.099 (0.38)
SBIC	564.056	427.741	432.928	435.307	466.732
Log L.	-539.174	-397.329	-396.987	-388.307	-369.967
Adjusted R^2	0.310	0.774	0.773	0.784	0.798

Number of observations: 252. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over simple pooling. (*) F-test significant at 5 per cent.

Table A.4. **Fixed Effects, All Countries, 1880-1913**
Default Probability Model

	1	2	3	4	5
1. Structural factors:					
- Interest service/Revenue	-	1.066 (14.88)	0.920 (12.42)	0.907 (11.71)	0.847 (10.60)
- Reserves/Banknotes	-	-	-	0.003 (0.13)	0.014 (0.53)
- Exports/Population	-	-	-	0.035 (1.07)	0.016 (0.48)
- Deficit/Revenue	-	-	-	0.018 (0.94)	0.001 (0.07)
- Exch.-rate volatility	-	-	-	0.253 (3.71)	0.143 (1.89)
2. Reputation factors:					
- Default	-	0.174 (8.87)	0.171 (8.87)	0.174 (9.03)	0.164 (8.49)
- Memory	-	0.173 (7.39)	0.146 (6.32)	0.158 (6.74)	0.134 (5.61)
3. Political variables:					
- Franchise	-	-	-0.467 (-4.41)	-0.538 (-4.45)	-0.548 (-4.64)
- Political crises	-	-	-	-	F=3.088 (*)
4. Gold	-0.137 (-9.25)	-	-0.042 (-3.59)	-0.026 (-1.68)	-0.040 (-2.61)
SBIC	-364.201	-495.618	-506.080	-501.763	-475.022
Log L.	416.607	554.190	570.817	578.831	607.579
Adjusted R^2	0.703	0.832	0.843	0.847	0.859

Number of observations: 476. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over simple pooling. (*) F-test significant at 5 per cent.

Table A.5. **Fixed Effects, Capital-Rich Countries, 1880-1913**
Default Probability Model

	1	2	3	4	5
1. Structural factors:					
- Interest service/Revenue	-	1.238 (6.63)	0.866 (4.37)	0.756 (3.51)	0.889 (4.31)
- Reserves/Banknotes	-	-	-	0.068 (1.42)	0.080 (1.76)
- Exports/Population	-	-	-	-0.025 (-0.76)	-0.032 (-1.02)
- Deficit/Revenue	-	-	-	0.071 (1.34)	0.095 (1.86)
- Exch.-rate volatility	-	-	-	0.708 (1.71)	0.801 (2.04)
2. Reputation factors:					
- Default	-	-	-	-	-
- Memory	-	-	-	-	-
3. Political variables:					
- Franchise		-	-0.425 (-4.39)	-0.330 (-2.97)	-0.302 (-2.85)
- Political crises	-	-	-	-	F=4.83 (*)
4. Gold	-	-	-	-	-
SBIC	-	-286.809	-293.755	-286.948	-296.099
Log L.	-	311.162	320.813	324.830	336.686
Adjusted R^2	-	0.423	0.468	0.477	0.527

Number of observations: 224. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over simple pooling. (*) F-test significant at 5 per cent. Here the F-test coincides with a T-test. The Boer War was the only common factor.

Table A.6. **Fixed Effects, Capital-Poor Countries, 1880-1913**
Default Probability Model

	1	2	3	4	5
1. Structural factors:					
- Interest service/Revenue	-	1.048 (12.10)	0.906 (9.95)	0.851 (8.79)	0.741 (7.19)
- Reserves/Banknotes	-	-	-	-0.021 (-0.63)	-0.021 (-0.60)
- Exports/Population	-	-	-	0.156 (2.00)	0.134 (1.60)
- Deficit/Revenue	-	-	-	0.009 (0.38)	-0.015 (-0.61)
- Exch.-rate volatility	-	-	-	0.267 (3.37)	0.163 (1.82)
2. Reputation factors:					
- Default	-	0.176 (7.73)	0.175 (7.71)	0.185 (8.20)	0.178 (7.78)
- Memory	-	0.169 (6.20)	0.143 (5.24)	0.146 (5.26)	0.110 (3.70)
3. Political variables:					
- Franchise	-	-	-0.872 (-2.45)	-1.030 (-2.91)	-1.301 (-3.48)
- Political crises	-	-	-	-	F=1.928 (*)
4. Gold	-0.137 (-7.54)	-	-0.039 (-2.84)	-0.018 (-0.97)	-0.028 (-1.54)
SBIC	-144.104	-228.052	-231.013	-227.854	-196.779
Log L.	168.986	258.464	266.954	274.854	293.544
Adjusted R^2	0.420	0.712	0.729	0.741	0.758

Number of observations: 252. Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). In all cases, F-tests choose Fixed Effects over versus pooling. (*) F-test significant at 5 per cent.

Sub-Periods and Stability Tests (Tax Test)

The tables above report regression results for the entire sample and sub-samples for the full period 1880-1913. Those below give the regression outputs for two sub-periods — 1880-95 and 1895-1913. As remarked by Flandreau *et al.* (1998), 1895 marks a turning point for price trends, with sustained deflation before that year followed by sustained inflation after. The results are fairly stable across periods. If anything, they point to a general *increase* in the debt-burden sensitivity coefficients in the second period. For the complete model, they rise to 7.29 from 5.32 for all countries, to 2.6 from 1.05 for the capital-rich and to 6.760 from 5.415 for the capital-poor. This is consistent with the notion that stability in 1900-13 had nothing to do with markets becoming kinder. Similar conclusions hold for the default probability model. The other parameter estimates are generally stable with again a tendency to become larger or more significant during the second period (fixed effects, on the other hand, do play a weaker role across time). This is consistent with evidence for a consolidation of beliefs around the tax-test model. That the test works best after the Baring crisis supports the observation (Flandreau, 2003*d*) that markets learned from the experience. The tables below report the complete-form model with and without political events. As one can see, they matter a lot. They often capture part of the effect associated with gold adherence, which illustrates the point that countries on gold were countries with comparatively few problems. Note finally the instability of the gold-adherence parameters, which turn out to have the wrong sign in the second period (interest-spread model).

Table A.7. **Interest-Rate Spread Model, All Countries**

	1880-1895		1895-1913	
1. Structural factors:				
- Interest service/Revenue	5.246 (4.27)	5.325 (4.15)	11.616 (7.41)	7.291 (4.73)
- Reserves/Banknotes	-0.297 (-0.45)	-0.315 (-0.47)	-1.239 (-3.04)	-0.900 (-2.21)
- Exports/Population	-1.362 (-1.99)	-1.483 (-2.15)	0.774 (1.38)	0.688 (1.40)
- Deficit/Revenues	1.405 (3.54)	1.496 (3.72)	0.290 (1.08)	0.153 (0.63)
- Exch.-rate volatility	2.132 (2.46)	1.613 (1.60)	4.554 (2.95)	3.421 (2.22)
2. Reputation factors:				
- Default	5.149 (16.13)	5.130 (15.50)	3.569 (8.97)	3.237 (9.28)
- Memory	2.717 (2.15)	2.990 (2.03)	0.120 (0.25)	-0.239 (-0.54)
3. Political variables:				
- Franchise	2.364 (0.96)	2.520 (1.02)	-3.230 (-1.20)	-2.792 (-1.17)
- Political crises	-	F=0.805	-	F=8.474 (*)
4. Gold	-0.444 (-1.66)	-0.509 (-1.77)	0.678 (2.36)	0.227 (0.88)
SBIC	295.620	308.962	374.152	358.001
No. of observations	215	215	265	265
Adjusted R^2	0.895	0.894	0.826	0.876

(*): Significant at 5 per cent.

Table A.8. **Interest-Rate Spread Model, Capital-Rich Countries**

	1880-1895		1895-1913	
1. Structural factors:				
- Interest service/Revenue	1.056 (0.91)	1.056 (0.91)	2.912 (2.87)	2.631 (2.85)
- Reserves/Banknotes	-0.051 (-0.23)	-0.051 (-0.23)	0.413 (1.75)	0.444 (2.08)
- Exports/Population	-0.768 (-4.88)	-0.768 (-4.88)	0.144 (0.92)	0.200 (1.41)
- Deficit/Revenue	-0.105 (-0.34)	-0.105 (-0.34)	0.141 (0.73)	0.242 (1.37)
- Exch.-rate volatility	1.417 (1.20)	1.417 (1.20)	5.587 (1.49)	5.735 (1.69)
2. Reputation factors:				
- Default	-	-	-	-
- Memory	-	-	-	-
3. Political variables:				
- Franchise	0.405 (0.78)	0.004 (0.78)	-4.118 (-5.63)	-2.897 (-4.11)
- Political crises	-	(a)	-	F=5.17(*)
4. Gold	-	-	-	-
SBIC	-22.7498	-22.7498	-10.6806	-21.7955
No. of observations	96	96	132	132
Adjusted R^2	0.699	0.699	0.579	0.654

(*): Significant at 5 per cent. (a): No crises in the period.

Table A.9. **Interest-Rate Spread Model, Capital-Poor Countries**

	1880-1895		1895-1913	
1. Structural factors:				
- Interest service/Revenue	5.239 (3.05)	5.415 (2.99)	12.603 (5.17)	6.760 (2.59)
- Reserves/Banknotes	-0.474 (-0.40)	-0.550 (-0.45)	-1.593 (-2.50)	-1.466 (-2.10)
- Exports/Population	-2.909 (-1.34)	-3.837 (-1.70)	2.408 (1.63)	2.228 (1.48)
- Deficit/Revenue	1.480 (2.62)	1.545 (2.69)	0.286 (0.72)	-0.010 (-0.03)
- Exch.-rate volatility	1.909 (1.61)	1.090 (0.78)	3.881 (1.78)	2.681 (1.19)
2. Reputation factors:				
- Default	5.021 (11.49)	4.954 (10.83)	3.554 (6.20)	3.227 (6.13)
- Memory	5.521 (2.36)	6.099 (2.37)	0.243 (0.34)	-0.508 (-0.73)
3. Political variables:				
- Franchise	25.893 (2.02)	29.191 (2.20)	2.422 (0.34)	-1.976 (-0.30)
- Political crises	-	F=0.680	-	F=3.970 (*)
4. Gold	-0.519 (-1.41)	-0.652 (-1.62)	0.759 (1.88)	0.226 (0.60)
SBIC	199.967	211.829	235.373	240.150
No. of observations	119	119	133	133
Adjusted R^2	0.853	0.850	0.777	0.833

(*): Significant at 5 per cent.

Table A.10. **Default Probability Model, All Countries**

	1880-1895		1895-1913	
1.Structural factors:				
- Interest service/Revenue	0.073 (1.01)	0.078 (1.04)	1.144 (8.58)	0.951 (6.56)
- Reserves/Banknotes	0.024 (0.64)	0.018 (0.47)	-0.025 (-0.72)	-0.029 (-0.76)
- Exports/Population	-0.133 (-3.31)	-0.139 (-3.46)	0.060 (1.29)	0.061 (1.36)
- Deficit/Revenue	0.004 (1.17)	0.007 (0.32)	0.026 (1.16)	0.008 (0.34)
- Exch.-rate volatility	0.211 (4.15)	0.176 (2.99)	0.427 (3.32)	0.239 (1.69)
2.Reputation factors:				
- Default	0.221 (11.77)	0.216 (11.21)	0.128 (3.84)	0.111 (3.47)
- Memory	0.058 (0.78)	0.119 (1.39)	0.202 (4.94)	0.137 (3.36)
3.Political variables:				
- Franchise	0.328 (2.28)	0.335 (2.33)	-1.340 (-5.99)	-1.079 (-4.95)
- Political crises	-	F=1.222 (*)	-	F=3.953 (*)
4. Gold	-0.040 (-2.57)	-0.044 (-2.61)	-0.039 (-1.64)	-0.057 (-2.42)
SBIC	-314.159	-302.224	-279.777	-270.673
No. of observations	215	215	261	261
Adjusted R^2	0.938	0.938	0.868	0.887

(*): Significant at 5 per cent.

Table A.11. **Default Probability Model, Capital-Rich Countries**

	1880-1895		1895-1913	
1. Structural factors:				
- Interest service/Revenue	0.138 (0.48)	0.138 (0.48)	0.657 (1.84)	0.659 (2.02)
- Reserves/Banknotes	0.006 (0.11)	0.006 (0.11)	0.109 (1.52)	0.123 (1.87)
- Exports/Population	-0.151 (-3.84)	-0.151 (-3.84)	0.038 (0.81)	0.057 (1.30)
- Deficit/Revenue	-0.033 (-0.43)	-0.033 (-0.43)	0.042 (0.72)	0.072 (1.34)
- Exch.-rate volatility	0.336 (1.14)	0.336 (1.14)	2.409 (2.06)	2.440 (2.28)
2. Reputation factors:				
- Default	-	-	-	-
- Memory	-	-	-	-
3. Political variables:				
- Franchise	0.218 (1.69)	0.218 (1.69)	-1.467 (-6.66)	-1.113 (-5.18)
- Political crises	-	(a)	-	F=4.80 (*)
4. Gold	-	-	-	-
SBIC	-155.570	-155.570	-164.175	-173.609
No. of observations	96	96	128	128
Adjusted R^2	0.647	0.647	0.517	0.595

(*): Significant at 5 per cent. (a): No crises in the period.

Table A.12. **Default Probability Model, Capital-Poor Countries**

	1880-1895		1895-1913	
1. Structural factors:				
- Interest service/Revenue	0.105 (1.31)	0.117 (1.41)	1.211 (7.29)	0.942 (4.87)
- Reserves/Banknotes.	0.023 (0.41)	0.009 (0.17)	-0.054 -1.25)	-0.084 (-1.62)
- Exports/Population	-0.004 (-0.04)	-0.050 (-0.48)	0.163 (1.61)	0.153 (1.37)
- Deficit/Revenue.	0.023 (0.87)	0.024 (0.92)	0.023 (0.87)	-0.008 (-0.27)
- Exch.-rate volatility	0.172 (3.11)	0.120 (1.86)	0.364 (2.45)	0.148 (0.89)
2. Rep. factors:				
- Default	0.208 (10.20)	0.201 (9.52)	0.126 (3.24)	0.109 (2.80)
- Memory	0.324 (2.96)	0.391 (3.29)	0.209 (4.33)	0.117 (2.28)
3. Political variables:				
- Franchise	2.296 (0.83)	2.459 (4.03)	-0.747 (-1.54)	-0.744 (-1.50)
- Political crises	-	F=1.154	-	F=2.134 (*)
4. Gold	-0.046 (-2.66)	-0.052 (-2.80)	-0.033 (-1.21)	-0.055 (-1.96)
SBIC	-164.584	-154.392	-121.833	-105.904
No. of observations	119	119	133	133
Adjusted R^2	0.873	0.874	0.813	0.834

(*): Significant at 5 per cent.

Alternative Estimates: Pooling

This section reports estimators of both models' parameters without country controls. While the country controls can be shown to be superior in terms of standard F-tests, "pooling" results nonetheless highlight some interesting features of the data. The results pointed to the statistical superiority of the fixed-effects model because they capture the influence of country-specific characteristics that were on investors' minds but which the research might have overlooked.

The most important result here is the reduced effect of the debt burden for capital-rich countries. In some more parsimonious regressions (not reported here) that did not control for other factors, the slope was even sometimes negative. This arises because some countries with virtually negligible debt burdens (e.g. the Scandinavian countries) nonetheless faced slightly higher interest rates than countries such as the UK, France, or Germany. This resulted from the lesser liquidity of their debt instruments. When country controls are added, as reported in the main text, one gets closer to the "true" relation between debt burdens and interest spreads. This suggests that the negative or insignificant coefficients for the debt burden occasionally reported in the literature (Obstfeld and Taylor, 2003b) are spurious. They result from mis-specification of the model or limitations of sample. Only results for the entire period are reported here. They compare to the last columns in Tables A1 and A3.

Table A.13. **Pooling Estimates: Full Model (1880-1913)**

	Interest Spread			Default Probability		
	All Countries	Capital-Rich	Capital-Poor	All Countries	Capital-Rich	Capital-Poor
1. Structural factors:						
- Int. service/Revenue	4.370 (9.59)	0.858 (3.16)	7.775 (7.65)	0.448 (11.33)	0.239 (3.42)	0.680 (9.55)
- Reserves/Banknotes	-0.219 (-0.96)	0.098 (0.74)	0.459 (1.16)	0.008 (0.41)	0.045 (1.32)	0.035 (1.26)
- Exports/Population	-0.352 (-4.14)	-0.251 (-7.29)	0.113 (0.35)	-0.060 (-8.12)	-0.063 (-7.14)	0.049 (2.13)
- Deficit/Revenue	0.053 (0.23)	0.311 (1.69)	0.273 (0.81)	-0.057 (-2.85)	0.088 (1.86)	-0.044 (-1.85)
- Exch.-rate volatility	1.613 (1.96)	2.862 (1.76)	1.354 (1.14)	0.361 (5.06)	0.836 (1.99)	0.120 (2.41)
2. Reputation factors:						
- Default	5.555 (25.68)	-	5.166 (16.81)	0.232 (12.38)	-	0.195 (9.07)
- Memory	0.735 (3.67)	-	1.166 (3.73)	0.124 (7.12)	-	0.129 (5.90)
3. Political variables:						
- Franchise	-3.405 (-4.52)	-2.366 (-9.95)	-8.369 (-2.29)	-0.709 (-10.55)	-0.556 (-8.89)	-1.577 (-6.16)
- Political crises	F=5.157 (*)	F=2.92 (*)	F=2.367 (*)	F=4.318 (*)	F=3.78 (*)	F=2.496 (*)
4. Gold	-0.079 (-0.50)	-	-0.203 (-0.90)	-0.031 (-2.30)	-	-0.051 (-3.21)
Constant term	0.853 (3.86)	0.878 (8.65)	-0.450 (-0.98)	0.262 (13.62)	0.225 (8.58)	0.189 (5.87)
SBIC	705.465	8.81764	468.569	-463.384	-294.996	-201.211
No. of observations	480	228	252	476	224	252
Adjusted R^2	0.822	0.460	0.769	0.826	0.453	0.736

(*) Significant at 5 per cent.

The Trade Test and the Tax Test: Within and Pooling Estimates (Default Probability Model)

The next four tables report within (fixed-effects) and pooling (no fixed effects) estimates comparing the tax test and the trade test. Their overall performances in the entire sample are very similar, but the country sub-groups yield contrasting results. The trade test performs significantly better for developed European countries, while the tax test works best for Southern and Eastern European nations as well as Latin American countries. This echoes the findings obtained with country controls, where the trade test yielded a lower sensitivity of interest spreads to the debt burden for capital-poor than for capital-rich countries. It fits nicely with the view developed in the text that the trade test was a good way to gauge developed countries while the tax test was to be preferred for emerging markets. Note that the first wave of capital exports after 1850 mostly concerned Western European nations while later waves brought financing to Eastern Europe and Latin America. This suggests two successive criteria to assess debt sustainability. The trade test likely corresponds better to the 1850s and 1860s and was mostly directed at assessing European nations. Then the tax test gradually came to predominate, especially to judge the prospects for the governments of emerging countries.

Table A.14. **Default Probability Model, Fixed Effects, All Countries**

	1880-1913		1880-1895		1895-1913	
	Trade Test	Tax Test	Trade Test	Tax Test	Trade Test	Tax Test
1.Structural factors:						
- Debt burden	0.705 (12.47)	0.845 (10.60)	0.103 (1.71)	0.090 (1.18)	0.961 (8.60)	0.953 (6.56)
- Reserves/Banknotes	-0.001 (-0.06)	0.014 (0.53)	-0.004 (-0.11)	0.001 (0.03)	0.030 (0.80)	-0.025 (-0.68)
- Exports/Population	-	-	-	-	-	-
- Deficit/Revenue	-0.070 (-3.75)	0.001 (0.07)	-0.003 (-0.13)	0.012 (0.48)	-0.040 (-1.91)	0.008 (0.35)
- Exch.-rate volatility	0.267 (3.72)	0.140 (1.87)	0.169 (2.84)	0.166 (2.75)	0.643 (4.98)	0.241 (1.70)
2.Reputation factors:						
- Default	0.134 (6.98)	0.164 (8.49)	0.206 (9.85)	0.214 (10.81)	0.090 (2.98)	0.107 (3.36)
- Memory	0.052 (2.68)	0.134 (5.61)	0.099 (1.13)	0.128 (1.45)	0.114 (3.21)	0.134 (3.29)
3.Political variables:						
- Franchise	-0.657 (-6.73)	-0.521 (-4.99)	0.215 (1.49)	0.230 (1.59)	-1.021 (-5.00)	-1.044 (-4.81)
- Political crises	F=4.050 (*)	F=3.150 (*)	F=1.100	F=1.004	F=4.937 (*)	F=3.943 (*)
4. Gold	-0.044 (-3.04)	-0.040 (-2.60)	-0.038 (-2.26)	-0.039 (-2.26)	-0.054 (-2.45)	-0.056 (-2.35)
SBIC	-496.087	-477.976	-299.043	-298.161	-286.719	-272.370
No. of observations	476	476	215	215	261	261
Adjusted R^2	0.869	0.859	0.935	0.935	0.898	0.886

(*): Significant at 5 per cent.

Table A.15. **Default Probability Model, Fixed Effects, Capital-Rich Countries**

	1880-1913		1880-1895		1895-1913	
	Trade Test	Tax Test	Trade Test	Tax Test	Trade Test	Tax Test
1.Structural factors:						
- Debt burden	1.073 (6.17)	0.952 (4.83)	0.441 (1.62)	0.005 (0.01)	1.153 (3.23)	0.573 (1.79)
- Reserves/Banknotes	0.106 (2.46)	0.080 (1.75)	-0.051 (-0.90)	-0.018 (-0.30)	0.102 (1.61)	0.115 (1.75)
- Exports/Population	-	-	-	-	-	-
- Deficit/Revenue	0.062 (1.28)	0.095 (1.87)	0.059 (-0.76)	-0.078 (-0.95)	0.042 (0.81)	0.066 (1.23)
- Exch.-rate volatility	0.722 (1.89)	0.790 (2.01)	0.116 (0.37)	0.182 (0.58)	2.109 (2.04)	2.289 (2.15)
2.Reputation factors:						
- Default	-	-	-	-	-	-
- Memory	-	-	-	-	-	-
3.Political variables:						
- Franchise	-0.455 (-5.31)	-0.351 (-3.74)	0.065 (0.49)	0.096 (0.71)	-1.023 (-4.90)	-1.085 (-5.06)
- Political crises	F=4.61(*)	F=4.79(*)	(a)	(a)	F=4.54(*)	F=4.69(*)
4. Gold	-	-	-	-	-	-
SBIC	-305.081	-298.248	-151.486	-150.011	-178.908	-175.079
No. of observations	224	224	96	96	128	128
Adjusted R^2	0.555	0.527	0.602	0.589	0.616	0.592

(*): Significant at 5 per cent. (a): No crises in the period.

Table A.16. **Default Probability Model, Fixed Effects, Capital-Poor Countries**

	1880-1913		1880-1895		1895-1913	
	Trade Test	Tax Test	Trade Test	Tax Test	Trade Test	Tax Test
1.Structural factors:						
- Debt burden	0.634 (9.33)	0.743 (7.18)	0.069 (1.08)	0.126 (1.55)	0.902 (6.33)	0.966 (4.99)
- Reserves/Banknotes	-0.042 (-1.35)	-0.015 (-0.44)	0.0002 (0.03)	0.010 (0.18)	-0.002 (-0.05)	-0.064 (-1.28)
- Exports/Population	-	-	-	-	-	-
- Deficit/Revenue	-0.084 (-3.72)	-0.013 (-0.54)	0.013(0.47)	0.027 (1.06)	-0.055 (-2.09)	-0.007 (-0.24)
- Exch.-rate volatility	0.249 (3.00)	0.149 (1.66)	0.131 (2.06)	0.118 (1.84)	0.575 (3.74)	0.158 (0.94)
2.Reputation factors:						
- Default	0.142 (6.42)	0.174 (7.62)	0.201 (9.07)	0.200 (9.54)	0.086 (2.43)	0.096 (2.53)
- Memory	0.037 (1.67)	0.112 (3.76)	0.354 (2.99)	0.393 (3.33)	0.091 (2.07)	0.116 (2.24)
3.Political variables:						
- Franchise	-1.389 (-4.03)	-1.317 (-3.51)	2.310 (3.80)	2.432 (4.02)	-0.849 (-1.85)	-0.797 (-1.61)
- Political crises	F=2.993 (*)	F=2.010 (*)	F=1.098	F=1.125	F=3.018 (*)	F=2.195 (*)
4. Gold	-0.027 (-1.56)	-0.027 (-1.44)	-0.048 (-2.60)	-0.051 (-2.78)	-0.054 (-2.10)	-0.050 (-1.80)
SBIC	-213.674	-198.074	-155.898	-156.637	-114.561	-107.143
No. of observations	252	252	119	119	133	133
Adjusted R^2	0.785	0.756	0.874	0.875	0.850	0.833

(*): Significant at 5 per cent.

A.17. **Default Probability Model, Pooling (1880-1913)**

	All Countries		Capital-Rich		Capital-Poor	
	Trade Test	Tax Test	Trade Test	Tax Test	Trade Test	Tax Test
1. Structural factors:						
- Debt burden	0.288 (12.69)	0.500 (11.96)	0.455 (5.50)	-0.036 (-0.56)	0.208 (6.13)	0.650 (9.24)
- Reserves/Banknotes	-0.004 (-0.18)	0.052 (2.53)	0.072 (2.07)	0.192 (6.30)	-0.071 (-2.61)	0.022 (0.82)
- Exports/Population	-	-	-	-	-	-
- Deficit/Revenue	-0.100 (-4.79)	-0.054 (-2.54)	0.038 (0.76)	0.105 (1.99)	-0.105 (-4.14)	-0.052 (-2.23)
- Exch.-rate volatility	0.549 (7.15)	0.339 (4.44)	0.920 (2.10)	0.989 (2.12)	0.383 (4.16)	0.246 (3.04)
2. Reputation factors:						
- Default	0.210 (10.46)	0.226 (11.28)	-	-	0.220 (9.37)	0.202 (9.37)
- Memory	0.118 (6.48)	0.136 (7.31)	-	-	0.085 (3.82)	0.136 (6.24)
3. Political variables:						
- Franchise	-0.750 (-10.84)	-0.838 (-12.00)	-0.742 (-10.02)	-0.504 (-7.31)	-1.170 (-4.29)	-1.591 (-6.17)
- Political crises	F=5.462 (*)	F=3.924 (*)	F=3.58(*)	F=3.04(*)	F=4.309 (*)	F=2.536 (*)
4. Gold	-0.059 (-4.33)	-0.071 (-5.18)	-	-	-0.040 (-2.45)	-0.039 (-2.62)
Constant term	0.282 (17.60)	0.222 (11.18)	0.157 (6.94)	0.098 (4.59)	0.356 (14.89)	0.209 (6.73)
SBIC	-440.969	-433.812	-288.468	-273.999	-180.332	-201.439
No. of observations	476	476	224	224	252	252
Adjusted R^2	0.807	0.801	0.409	0.327	0.683	0.732

(*): Significant at 5 per cent.

Robustness Tests: Endogeneity and Auto-correlation

GMM estimates

Possible Problems. The presence of endogeneity problems constitutes one potential flaw in the estimates in Sections VI and VII of the main text. For instance, if debt is permanently re-contracted, higher borrowing rates result in larger debt burdens, but this increases the probability of default and thus the interest rate. If this were the case, then the estimates of the elasticity of the interest-rate spreads (or default probabilities) to the interest burden would be biased upward[1]. This could arise in a context of credit rationing *à la* Stiglitz and Weiss (1981)[2]. In their model of permanent debt re-contracting, the non-linearity of interest rate spreads in terms of credit rating results because an increased interest rate raises the interest-service burden, which in turn increases the likelihood of default and thus the interest rate. This result, however, depends heavily on the time horizon of the debt contract. In the world under study, the debt burden was a weighted average of past interest rates corresponding to an extended period. This kind of endogeneity therefore is not a serious problem because the long maturity of public debts in the period implies that the (marginal) borrowing premium had only a marginal effect on the (average) current debt burden. A typical loan would represent only between (at most) 5 per cent and 10 per cent of the outstanding debt, often much less, so that its effect on the debt burden would have to be divided by 10 or 20. In other words, a feedback did exist, but it was very small and can safely be ignored.

More important, the null hypothesis is that people looked at the debt burden as a straight determinant of the probability of default. Sections VI and VII tested whether this theory of the pricing of risk by investors is correct. That investors were themselves right or wrong to adhere to such views is another question on which this study has little to say. In addition, standard procedures to handle endogeneity require making specific assumptions on the kind of endogeneity that needs to be corrected. For instance, the so-called Instrumental Variable technique requires finding variables with specific properties in view of the problems at hand. Yet without evidence on contemporary concerns regarding this problem it is not clear how one should proceed. In the end there is no reason to superimpose another reasoning on that of the time.

For those who would want to see more, however, and because the results reported here would benefit from additional evidence, several robustness tests were performed. This section seeks to replicate the estimation performed earlier, using an alternative estimation technique known as the Generalised Method of Moments (GMM). GMM estimates have the considerable advantage that they correct for a variety of potential problems (including endogeneity) without requiring the use of extra variables. They achieve this by making intensive use of the information contained in the variables already in the model. The "instruments" used are combinations of the basic explanatory variables themselves. In that respect, GMM may be thought of as just another estimation technique. We do not know that people had in mind some specific least-squares

technique. We know only that they thought that some variables influenced creditworthiness and that there are reasons to believe that this should be reflected in the prices of bonds. In other words, to remain agnostic about the precise estimation technique, as one logically should, it seems natural to try alternative estimates, just to make sure. This should provide everybody with comfort.

Technical Treatment. If feedbacks from the marginal borrowing rate to the debt burden do matter, neither OLS nor GLS panel techniques provide consistent estimates, but GMM estimators do. Defining the relevant GMM procedure depends strongly on the type of problem faced. Alternative model specifications give rise to alternative sets of orthogonality restrictions on which estimations may be based[3]. Increasing the number of conditions normally induces an improvement in the precision of the estimators. On the other hand, this can make the size of the problem somewhat time-consuming for conventional software packages. The question becomes one of striking a balance between efficiency and practicality (Mátyás and Sevestre, 1996).

This study relies on a technique suggested by Arellano and Bond (1991). They propose obtaining efficient estimators by working with the model in first differences. Their application of GMM points to using lagged values of the explanatory variables in levels as instruments, but this widely used linear GMM has been found to display a large finite sample bias and poor precision in simulation studies (Alonso-Borrego and Arellano, 1999). This occurs because lagged levels of the explanatory variables provide weak instruments for first differences in this case[4]. Blundell and Bond (1998) consider an alternative estimator. They take lagged differences of the variables as instruments and work with equations in levels. Mátyás and Sevestre (1996) show that this specification has the further advantage of controlling for serial correlation in the residuals. In the present case, the estimators obtained from the equation in levels, where the instruments are first-difference variables, were found to be efficient[5].

The results presented in Table A.18 rely on these two alternative procedures: Arellano-Bond and the model in levels. Estimates are reported for the model's most comprehensive form. Each column corresponds to alternative estimation techniques, with the column indicating the procedure that has been followed in each case[6]. The results confirm earlier findings. The most robust variables turn out to be the classic debt burden, debt default and memory variables. The elasticity parameters for other variables appear less stable, with the effect of gold, for instance, jumping around somewhat (it is positive in some equations, negative in others and often not significant). This generally confirms the earlier interpretations and shows that the main results and conclusions are unaffected by the precise estimation technique. The extent of the endogeneity problem, if it does exist, must be quite limited.

Table A.18. **GMM Estimates, Fixed Effects, All Countries**

	Model I: Interest-Rate Spreads		Model II: Default Probability	
	Model in levels	Arellano-Bond	Model in levels	Arellano-Bond
1. Structural factors:				
- Interest service/Tax revenue	8.824 (14.71)	7.193 (23.55)	0.786 (10.65)	0.883 (12.67)
- Reserves/Banknotes	-0.354 (-1.57)	-0.685 (-3.07)	0.024 (0.93)	-0.075 (-2.64)
- Exports/Population	1.052 (6.46)	0.496 (2.95)	0.075 (4.53)	0.053 (3.07)
- Deficit/Revenue	0.887 (6.83)	0.514 (8.77)	0.021 (2.08)	0.012 (3.36)
- Exch.-rate volatility	1.204 (9.23)	0.905 (2.02)	0.164 (4.51)	0.134 (2.47)
2. Reputation factors:				
- Default	4.780 (31.67)	2.766 (26.15)	0.135 (10.26)	0.084 (10.42)
- Memory ($\theta= 0.1$)	0.584 (3.21)	1.056 (3.17)	0.124 (7.87)	0.131 (2.08)
3. Political variables:				
- Franchise	-3.487 (-3.13)	-4.320 (-2.12)	-0.314 (-2.82)	0.427 (1.35)
4. Gold:	0.423 (2.06)	0.274 (1.24)	-0.065 (-2.51)	-0.027 (-1.85)
No. of observations	464	464	460	460

Standard Errors computed from heteroscedasticity-consistent matrix (Robust-White). Instruments used in GMM: lag 1 and 2 instruments. The χ^2 test, in connection with GMM, led to the choice of the appropriate matrix of instruments (described by a lag order which, as can be seen, always corresponds to weak exogeneity of the instruments). See the explanatory endnote 5.

Instrumental Variable (IV) Estimations

The tables below present the results from using the standard IV technique to tackle endogeneity. This technique amounts to looking for a set of instrumental variables whose number must at least equal the number of regressors in the model and which must satisfy two conditions — they must be uncorrelated with the disturbances, at least asymptotically, and they must be asymptotically correlated with the explanatory variables. The problems lie in the determination of the instrumental variables. As argued in the main text it is not clear what the instruments should be, given the perceptions of the time. The following merely employs some conventional recipes that apply to the most usual situations. Two alternative lists of instruments have been considered. The first (List 1) comprises a constant term, a time trend, the lagged burden of interest service for each country, populations, the rates of growth of populations and lagged degrees of openness (exports divided by GDPs). The second (List 2) comprises a time trend, the lagged burden of interest service for each country, the rates of growth of populations and three lagged explanatory variables.

Table A.19. **Interest-Rate Spread Model, All Countries, (Fixed Effects)**

	Benchmark [a]	Instrumented List 1	Instrumented List 2
1. Structural factors:			
- Interest service/Tax revenue	8.172 (8.68)	6.780 (5.79)	7.185 (6.50)
- Reserves/Banknotes	-0.226 (-0.74)	-0.415 (-1.13)	-0.347 (-0.95)
- Exports/Reserves	0.772 (1.94)	0.664 (1.26)	0.657 (1.22)
- Deficit/Revenue	0.766 (3.31)	-0.140 (-0.29)	0.011 (0.03)
- Exch.-rate volatility	1.147 (1.29)	0.896 (0.69)	0.345 (0.27)
2. Reputation factors:			
- Default	4.793 (21.07)	5.123 (22.52)	5.067 (22.08)
- Memory	0.758 (2.66)	0.314 (1.08)	0.377 (1.26)
3. Political variables:			
- Franchise	-2.485 (-1.76)	-3.014 (-1.91)	-2.841 (-1.79)
- Political crises	F=3.706 (*)	F=4.672 (*)	F=4.442 (*)
4. Gold adherence:	0.060 (0.33)	0.071 (0.39)	0.032 (0.17)
SBIC	677.625	695.401	693.832
Adjusted R^2	0.856	0.845	0.846

Number of observations: 464. (*) significant at 5 per cent.

a) The benchmark is obtained with direct ordinary least square techniques as in Table A.1 column 5, but with the same data as for the instrumented regressions above. Since instrumental variable regressions require dropping observations, the benchmark estimates do not exactly coincide with the results in Table A.1 column 5, but are very close to them.

Table A.20. **Interest-Rate Spread Model, Capital-Rich Countries (Fixed Effects)**

	Benchmark [a]	Instrumented List 1	Instrumented List 2
1. Structural factors:			
- Interest service/Tax revenue	4.111 (6.03)	5.319 (6.82)	5.963 (7.48)
- Reserves/Banknotes	0.233 (1.34)	0.080 (0.33)	-0.006 (-0.02)
- Exports/Reserves	-0.153 (-1.29)	-0.172 (-1.14)	-0.056 (-0.36)
- Deficit/Revenue	0.305 (1.61)	0.407 (1.42)	0.572 (2.00)
- Exch.-rate volatility	2.772 (1.91)	9.979 (3.12)	9.663 (3.13)
2. Reputation factors:			
- Default	-	-	-
- Memory	-	-	-
3. Political variables:			
- Franchise	-0.874 (-2.18)	-0.532 (-1.36)	-0.744 (-1.74)
- Political crises	F=2.76(*)	F=4.33(*)	F=2.97(*)
4. Gold adherence:	-	-	-
SBIC	-2.21268	-16.2957	-18.9290
Adjusted R^2	0.581	0.632	0.640

Number of observations: 220. (*) significant at 5 per cent.

a) The benchmark is obtained with direct ordinary least square techniques as in Table A.2 column 5, but with the same data as for the instrumented regressions above. Since instrumental variable regressions require dropping observations, the benchmark estimates do not exactly coincide with the results in Table A.2 column 5, but are very close to them.

Table A.21. **Interest-Rate Spread Model, Capital-Poor Countries (Fixed Effects)**

	Benchmark [a]	Instrumented List 1	Instrumented List 2
1. Structural factors:			
- Interest service/Tax revenue	8.361 (5.66)	5.255 (2.69)	6.342 (3.55)
- Reserves/Banknotes	-0.277 (-0.57)	-0.783 (-1.33)	-0.591 (-1.02)
- Exports/Reserves	3.219 (2.57)	4.255 (2.09)	3.474 (1.66)
- Deficit/Revenue	0.807 (2.38)	-0.549 (-0.72)	-0.187 (-0.29)
- Exch.-rate volatility	1.617 (1.27)	2.360 (1.19)	1.481 (0.75)
2. Reputation factors:			
- Default	4.885 (15.14)	5.189 (16.16)	5.147 (15.75)
- Memory	0.803 (1.88)	0.145 (0.33)	0.308 (0.68)
3. Political variables:			
- Franchise	-5.900 (-1.10)	-9.043 (-1.61)	-7.331 (-1.31)
- Political crises	F=1.836 (*)	F=2.352 (*)	F=2.181 (*)
4. Gold adherence:	0.054 (0.21)	0.103 (0.39)	0.062 (0.23)
SBIC	453.538	464.466	464.814
Adjusted R^2	0.804	0.786	0.785

Number of observations: 244. (*) significant at 5 per cent.

a) The benchmark is obtained with direct ordinary least square techniques as in Table A.3 column 5, but with the same data as for the instrumented regressions above. Since instrumental variable regressions require dropping observations, the benchmark estimates do not exactly coincide with the results in Table A.3 column 5, but are very close to them.

Dealing with Auto-correlation

Owing to the high persistence of the debt burden variables for the reasons discussed above, the explanatory variables do exhibit auto-correlation, as do yield premiums. In this context, tests suggest auto-correlation in the residuals. Earlier results are nonetheless robust to such phenomena. This can be seen from a variety of perspectives. First, because the regression output from GMM estimates on first differences (*à la* Arellano-Bond) barely differed from earlier results, the potential nuisance of auto-correlation problems is limited. Moreover, there are two other ways to deal with this and show that the results remain robust.

Random effects. The basic assumption in the random effects model is that the regression disturbance is composed of two independent components. First, each observation is affected by a shock that is independent and identically distributed across countries and time. Second, cross-sectional units (countries) are affected by a disturbance whose correlation remains unchanged over time. This structure enables controlling for auto-correlation when the usual assumption of a geometrically decaying influence of past disturbances is doubtful. As the three tables below show, the results for both models using this approach resemble closely those reported in previous tables.

Table A.22. All Countries (Random Effects)

	Interest-Rate Spread Model			Default Probability Model		
	1880-1913	1880-1895	1895-1913	1880-1913	1880-1895	1895-1913
1. Structural factors:						
- Interest service/Revenue	6.414 (9.35)	5.080 (5.30)	5.258 (5.00)	0.680 (11.30)	0.228 (3.85)	0.624 (5.96)
- Reserves/Banknotes	-0.301 (-1.09)	-0.335 (-0.62)	-0.536 (-1.59)	0.007 (0.28)	-0.066 (-2.01)	0.0009 (0.03)
- Exports/Population	-0.131 (-0.73)	-0.774 (-2.67)	-0.026 (-0.14)	-0.037 (-2.34)	-0.119 (-6.11)	0.010 (0.49)
- Deficit/Revenue.	0.567 (2.52)	1.138 (3.01)	0.080 (0.34)	-0.014 (-0.72)	-0.015 (-0.69)	-0.007 (-0.31)
- Exch.-rate volatility	1.193 (1.41)	1.761 (1.83)	4.450 (3.04)	0.195 (2.67)	0.182 (3.20)	0.397 (2.93)
2. Reputation factors:						
- Default	4.989 (23.17)	5.415 (18.27)	3.740 (11.64)	0.182 (9.76)	0.209 (11.84)	0.148 (4.95)
- Memory	0.569 (2.47)	1.441 (1.82)	0.085 (0.25)	0.113 (5.63)	0.158 (3.06)	0.111 (3.37)
3. Political variables:						
- Franchise	-2.340 (-2.14)	0.238 (0.12)	-4.968 (-3.10)	-0.594 (-6.23)	0.101 (0.84)	-1.054 (-6.62)
- Political crises	F=6.03 (*)	F=2.946 (*)	F=3.673 (*)	F=5.181 (*)	F=3.092 (*)	F=3.188 (*)
4. Gold:	0.028 (0.16)	-0.340 (-1.29)	0.193 (0.80)	-0.037 (-2.54)	-0.045 (-2.87)	-0.052 (-2.33)
Constant	0.253 (0.81)	1.134 (2.53)	0.502 (1.04)	0.202 (7.35)	0.398 (14.23)	0.207 (4.35)
Hausman test	$\chi^2(15)$=26.642 (*)	$\chi^2(11)$=19.468(*)	$\chi^2(16)$=29.945(*)	$\chi^2(15)$=30.421 (*)	$\chi^2(11)$=37.832(*)	$\chi^2(15)$=34.599(*)
No. of observations	480	215	265	476	215	261
Adjusted R^2	0.805	0.827	0.799	0.801	0.853	0.779

(*): Significant at 5 per cent. The Hausman test for Random Effects *versus* Fixed Effects generally chooses Fixed Effects.

Table A.23. **Capital-Rich Countries (Random Effects)**

	Interest-Rate Spread Model			Default Probability Model		
	1880-1913	1880-1895	1895-1913	1880-1913	1880-1895	1895-1913
1.Structural factors:						
- Interest service/Revenue	2.042 (4.66)	0.426 (0.67)	1.297 (1.97)	0.352 (3.33)	-0.075 (-0.51)	0.373 (1.96)
- Reserves/Banknotes	0.211 (1.35)	-0.176 (-0.96)	0.360 (1.79)	0.071 (1.72)	-0.015 (-0.33)	0.099 (1.65)
- Exports/Population	-0.261 (-4.15)	-0.448 (-5.04)	-0.043 (-0.56)	-0.062 (-4.28)	-0.080 (-3.89)	-0.017 (-0.82)
- Deficit/Revenue	0.237 (1.31)	-0.101 (-0.36)	0.182 (1.049)	0.076 (1.55)	-0.032 (-0.47)	0.061 (1.18)
- Exch.-rate volatility	2.940 (2.05)	1.061 (0.91)	4.647 (1.38)	0.846 (2.15)	0.259 (0.89)	2.228 (2.10)
2.Reputation factors:						
- Default	-	-	-	-	-	-
- Memory	-	-	-	-	-	-
3.Political variables:						
- Franchise	-1.433 (-4.64)	-0.005 (-1.04)	-2.889 (-5.15)	-0.441 (-5.65)	0.002 (0.02)	-0.921 (-5.74)
- Political crises	F=3.85 (*)	(a)	F= 5.21 (*)	F=4.43 (*)	(a)	F=5.08 (*)
4. Gold:	-	-	-	-	-	-
Constant	0.551 (3.89)	1.253 (7.73)	0.418 (2.22)	0.176 (4.99)	0.313 (8.09)	0.141 (2.64)
Hausman test	$\chi^2(7)$=25.516 (*)	$\chi^2(7)$=25.516 (*)	$\chi^2(7)$=14.228 (*)	$\chi^2(7)$=17.200 (*)	$\chi^2(6)$=13.019 (*)	$\chi^2(7)$=13.681
No. of observations	228	96	132	224	96	128
Adjusted R^2	0.297	0.415	0.315	0.420	0.429	0.345

(*): Significant at 5 per cent. (a): No crises in the period. The Hausman test for Random Effects *versus* Fixed Effects generally chooses Fixed Effects.

Table A.24. **Capital-Poor Countries (Random Effects)**

	Interest Rate Spread Model			Default Probability Model		
	1880-1913	1880-1895	1895-1913	1880-1913	1880-1895	1895-1913
1.Structural factors:						
- Interest service/Revenue	7.806 (6.55)	6.162 (3.80)	5.466 (2.39)	0.704 (8.59)	0.166 (2.14)	0.627 (3.67)
- Reserves/Banknotes	-0.063 (-0.14)	-0.316 (-0.29)	-0.637 (-1.10)	0.005 (0.15)	0.015 (0.28)	-0.011 (-0.23)
- Exports/Population	0.517 (0.94)	-1.40 (-1.49)	0.687 (1.10)	0.060 (1.74)	-0.001 (-0.02)	0.081 (1.67)
- Deficit/Revenue	0.684 (2.07)	0.995 (1.82)	-0.034 (-0.09)	-0.023 (-0.98)	0.004 (0.14)	-0.026 (-0.93)
- Exch.-rate volatility	1.081 (0.91)	1.749 (1.30)	3.648 (1.72)	0.173 (2.06)	0.155 (2.48)	0.335 (2.12)
2.Reputation factors:						
- Default	4.914 (16.17)	5.330 (12.55)	3.597 (7.52)	0.183 (8.46)	0.215 (10.75)	0.139 (3.89)
- Memory	0.799 (2.22)	1.492 (1.64)	-0.065 (-0.10)	0.112 (4.49)	0.164 (3.02)	0.103 (2.21)
3.Political variables:						
- Franchise	-7.493 (-1.73)	14.313 (1.79)	-10.156 (-1.85)	-1.472 (-4.94)	1.656 (4.00)	-1.690 (-4.08)
- Political crises	F=2.376 (*)	F=3.122 (*)	F=1.981 (*)	F=2.871 (*)	F=2.507 (*)	F=2.001 (*)
4. Gold:	0.0004 (0.002)	-0.553 (-1.45)	0.112 (0.30)	-0.037 (-2.16)	-0.043 (-2.38)	-0.059 (-2.14)
Constant	-0.325 (-0.56)	0.534 (0.69)	0.523 (0.50)	0.190 (4.89)	0.356 (8.85)	0.204 (2.58)
Hausman test	$\chi^2(7)$=11.410	$\chi^2(8)$=14.781	$\chi^2(7)$=14.626 (*)	$\chi^2(7)$=10.008	$\chi^2(7)$=17.930 (*)	$\chi^2(7)$=19.498 (*)
No. of observations	252	119	133	252	119	133
Adjusted R^2	0.759	0.796	0.748	0.730	0.724	0.726

(*): Significant at 5 per cent.

Kmenta-type error structure. The second way to deal with auto-correlation is to rely on the so-called Kmenta-type error structure (Kmenta, 1986). This alternative specification is superior to the crude AR1 structure because it allows for different auto-regressive components across equations and for heteroscedastic disturbances. It is based on the auto-correlation of time series and the heteroscedasticity of cross-sections. Therefore, pooled time series of cross-sections should be both auto-correlated time-wise and cross-sectionally heteroscedastic (Kmenta, 1986). Economists use pooling techniques, error components and Kmenta-type error structures, although they differ in the assumptions imposed on the disturbances. The usual error components model has homoscedastic disturbances, whereas the Kmenta technique has heteroscedastic ones. Both techniques allow for serial correlation, but in the usual error-components model this serial correlation is constant across time, whereas it decays over time with the Kmenta technique. The advantage of both methods resides in the gains from pooling a larger data set and more variation to explain the underlying economic relationship. A test for choosing among the two alternatives should be based on the conditional moments of the data. These approaches may lead to a better formulation of a model for pooled time series of cross-section data[7].

The results (Table A.25 below) do suggest some auto-correlation, although it varies substantially across countries. Note that no systematic pattern is visible among sub-groups of countries. While the estimated debt burden coefficient is sometimes slightly reduced (from 0.847 to 0.679 in the default probability model) its significance and effect remain very large. Moreover, the other conclusions outlined earlier still hold.

Table A.25. **Kmenta's Model, 1880-1913**

	Pooling		Fixed Effects	
	Interest-Rate Spread Model	Default Probability Model	Interest-Rate Spread Model	Default Probability Model
1. Structural factors:				
- Interest service/Revenue	3.448 (6.67)	0.490 (5.67)	6.590 (7.86)	0.679 (5.63)
- Reserves/Banknotes	-0.170 (-2.57)	-0.008 (-0.61)	-0.023 (-0.11)	0.004 (0.16)
- Exports/Population	-0.182 (-1.65)	-0.048 (-3.19)	-0.965 (-3.15)	-0.046 (-0.72)
- Deficit/Revenue	-0.039 (-0.34)	0.003 (0.15)	-0.200 (-1.03)	-0.018 (-1.08)
- Exch.-rate volatility	0.612 (3.46)	0.074 (1.93)	0.918 (2.43)	0.082 (1.05)
2. Reputation factors:				
- Default	3.602 (0.26)	0.132 (1.27)	1.385 (2.04)	0.093 (1.99)
- Memory	1.165 (0.10)	0.127 (1.28)	1.411 (2.23)	0.144 (2.67)
3. Political variables:				
- Franchise	-5.496 (-4.74)	-1.101 (-6.78)	-0.423 (-1.60)	-0.392 (-2.81)
- Political crises	F= 4.12 (*)	F=3.47 (*)	F=2.98 (*)	F=3.71 (*)
4. Gold:	0.199 (3.00)	0.005 (0.44)	-0.080 (-4.54)	-0.030 (-3.51)
Constant	0.865 (6.57)	0.260 (11.20)	-	-
No. of observations	480	476	480	476
Adjusted R^2	0.877	0.905	0.891	0.871

(*): Significant at 5 per cent.

Note: Compare Pooling with Table A.13 (columns "all countries") and Fixed Effects with the last columns of Tables A.1 and A.4.

Political Variables

The following table reports the parameter estimates for political variables. Political variables are introduced as dummies taking a value of one for a given time and country. For each event, the time and country concerned are indicated in the table. The results correspond to regression output when political variables are added (column 5 in Tables A.1 and A.4).

A number of the political crises had large and significant effects. Unsurprisingly, they corresponded to the main political events of the time. Wars increased premiums, especially for the defeated (Spain against the United States, Russia against Japan). The victors occasionally benefited (e.g. the Balkan wars for Greece). Revolts and coups deteriorate credit (Brazil in 1893, Russia in 1906). Transition to greater democracy improves it (Portugal, 1910). The effects of the Boer War, which targeted all countries (because they affected Britain and thus all yields measured against Britain's) had the effect of deteriorating borrowing terms (marginally, but in the default probability model significantly). This may be understood as a kind of flight to quality, where the increased borrowing needs of one prominent supplier of capital make access to credit in the rest of the world more costly.

Table A.26. **Political Variables, Fixed Effects, All Countries, 1880-1913**

	Date of Event	Country Affected	Model I (Spreads)	Model I (Spreads)	Model II (Default Probability)	Model II (Default Probability)
1.Structural factors:						
- Interest service/Revenue			7.751 (8.50)	7.393 (8.46)	0.847 (10.60)	0.858 (11.37)
- Reserves/Banknotes			-0.286 (-0.96)	-	0.014 (0.53)	-
- Exports/Population			0.601 (1.59)	-	0.016 (0.48)	-
- Deficit/Revenue			0.725 (3.16)	-	0.001 (0.07)	-
- Exchange-rate volatility			0.997 (1.14)	-	0.143 (1.89)	-
2.Reputation factors:						
- Default			4.836 (21.66)	4.865 (21.70)	0.164 (8.49)	0.163 (8.49)
- Memory			0.703 (2.56)	0.684 (2.51)	0.134 (5.61)	0.127 (5.46)
3.Political variables:						
- Franchise			-2.427 (-1.77)	-1.386 (-1.16)	-0.548 (-4.64)	-0.521 (-5.11)
- Political crises						
Bosnia	1908	Austria-H	0.414 (0.49)	0.335 (0.39)	0.050 (0.70)	0.053 (0.73)
Balkan Wars	1912-1913	Austria-H	0.159 (0.19)	0.155 (0.18)	-0.014 (-0.19)	-0.013 (-0.18)
Greek-Turkish War	1897	Greece	5.532 (6.41)	5.418 (6.21)	0.013 (0.17)	0.009 (0.12)
Balkan Wars	1912-1913	Greece	-0.848 (-1.29)	-1.473 (-2.38)	-0.125 (-2.20)	-0.116 (-2.18)
Italy: Turkish Crisis	1911-1912	Italy	-0.005 (-0.01)	-0.154 (-0.25)	-0.115 (-2.17)	-0.112 (-2.13)
Portuguese Rev	1910	Portugal	-1.055 (-1.25)	-1.006 (-1.18)	-0.121 (-1.66)	-0.118 (-1.64)
Cuba uprising	1895-1898	Spain	0.465 (0.91)	0.592 (1.16)	0.100 (2.28)	0.108 (2.46)
Spanish-US War	1898	Spain	2.851 (2.94)	3.128 (3.26)	0.104 (1.24)	0.136 (1.67)
Russo-Japanese War	1904-1905	Russia	0.899 (1.46)	0.559 (0.91)	0.077 (1.45)	0.079 (1.51)
Russian crisis	1906	Russia	1.250 (1.49)	1.104 (1.30)	0.146 (0.02)	0.147 (2.04)
Boer War (a)	1899-1902	All	0.128 (1.11)	0.169 (1.46)	0.048 (4.80)	0.050 (5.04)
Social Revolts I	1893	Argentina	-0.482 (-0.56)	-0.336 (-0.39)	0.065 (0.87)	0.068 (0.92)
May's Agreement	1902	Argentina	0.478 (0.55)	0.517 (0.60)	-0.009 (-0.12)	-0.023 (-0.31)
Social Revolts II	1905	Argentina	0.149 (0.17)	0.138 (0.16)	-0.004 (-0.05)	-0.007 (-0.10)
Slavery	1888	Brazil	-0.242 (-0.29)	-0.156 (-0.18)	-0.007 (-0.09)	-0.017 (-0.23)
Republic	1889	Brazil	-0.052 (-0.06)	-0.072 (0.08)	0.047 (0.64)	0.043 (0.59)
Coup	1891	Brazil	0.815 (0.90)	1.366 (1.60)	0.070 (0.89)	0.126 (1.74)
Military Rebellion	1893	Brazil	1.623 (1.88)	1.927 (2.27)	0.130 (1.75)	0.163 (2.25)
4. Gold:			0.056 (0.32)	-0.097 (-0.70)	-0.040 (-2.61)	-0.044 (-3.75)
SBIC			696.069	691.558	-475.022	-480.247
No. of observations			480	480	476	476
Adjusted R^2			0.854	0.850	0.859	0.859

Not shown are the country-specific constants. Numbers in parentheses are heteroscedasticity-consistent Student t statistics. Corresponding standard errors are computed from a heteroscedasticity-consistent matrix (Robust-White). (a) Affects benchmark with effect on all spreads.

Notes

1. *S*, the burden of interest service, is equal to rD, where r is the apparent interest rate on the public debt and D is the nominal debt. If all the debt were short term, then r would also equal i, the actual rate on the public debt, and one would have *i-i** as *l.h.v.* and iD as *r.h.v.*, which would raise substantial problems. Because most debts were long term, however, the relation between the i and the r is that between the marginal cost of borrowing *(i)* and the average cost of borrowing *(r)* which have no reason to be related to one another.

2. Such was the motivation for non-linearities provided in Flandreau *et al.* (1998). It explains why they used IV estimation then.

3. The analysis adopts here the framework of Arellano and Bover (1995) who formulate the matrices of instruments as block-diagonal matrices with as many blocks as the total number of time periods. This transformation leads to simple expressions of the estimators in terms of the vectors of instruments corresponding to individual time periods, and it is computationally convenient.

4. Blundell and Bond (1998) and Blundell, Bond and Windmeijer (2000) have characterised this weak instruments problem for the first-differenced GMM estimator. Blundell and Bond demonstrate that the *levels* restrictions suggested by Arellano and Bover (1995) remain informative in cases where the first-difference instruments become weak.

5. The list of potential instruments in the GMM estimation is X1885 to X1912, where X1885 is the vector of cross-section data for the year 1885. A lag-0 instrument matrix means that the set of instruments used in the first GMM equation is X1885. Correspondingly, the matrix will be X1885 to X1886 for the second equation, etc. A lag-1-and-greater instrument matrix means that the set of instruments used in the second GMM equation is X1885, etc. Strong exogeneity means that all instruments are used for all equations. Otherwise, there is weak exogeneity. The authors tested for strong exogeneity of the X's, as well as for weak exogeneity of lag order 0-and-greater (the extreme case), 1, 2, 3, etc. with the appropriate chi-squared statistics, and report the resulting efficient estimation.

6. The political crisis variable was excluded from the regression to keep matters simple.

7. The performance of these methods has been compared using Monte Carlo experiments. Baltagi (1986) shows that, when N is large and T is small, the error-components procedure is more robust to serial correlation and cross-sectional heteroscedasticity than the Kmenta technique, because in the Kmenta case one is estimating a lot of auxiliary parameters with a short time series. But if T is large and N is small, the Kmenta technique is expected to perform better (Mátyás and Sevestre, 1996). This is more or less the case here.

Statistical Appendix
The Making of Global Finance: A Database

This Appendix presents the database, whose main contribution — in addition to its broader scope compared with existing sources — is the fruit of an extensive effort to correct official numbers for a number of flaws that contemporaries widely understood. This database thus provides a closer approximation of the economic variables in contemporary observers' information sets. It was deliberately constructed by hand and controlled against primary sources, including government documents of course, but also official archives (most notably of central banks) and private bank archives.

The database comprises four parts. Part I contains fiscal and monetary variables. It is the newest and made the most extensive use of primary sources. Part II documents the macroeconomics: national income, prices, population, trade, etc. Its main contribution is convenience of access, because several of its sources are not published. It also adds new material, such as continuous population series taken from contemporary sources. A word is in order on the difference between the GDP numbers reported here and those of Maddison (Maddison, 1991, 2001). Maddison's numbers are all converted in Geary-Khamis 1990 international dollars and are thus most convenient for inter-temporal comparisons. For those looking for more focused cross-section comparisons with fewer price-index distortion effects, the numbers reported here might be used as an alternative.

Part III contains financial series constructed using information from the financial press. The long-term interest rates reported are yields on government gold bonds. Their spreads with respect to "riskless" bonds (whatever these are taken to be) measure the "pure" default risk[1]. Owing to numerous idiosyncrasies, alternative sources like *Global Financial Statistics*, which have been used elsewhere, are quite difficult to rely upon and in many cases wholly inappropriate. The reason is that to construct "clean" series for yields on government bonds, one must find representative bonds whose prices are not biased by the existence of options — the most common ones being conversion options whereby bonds could be repurchased at par and reissued at lower rates. Conversion options were especially popular among low-credibility countries, which, by including such clauses, could purchase at low prices the right to renegotiate interest rates on their long-term debt. With the decline of interest rates, conversions were very prevalent at the turn of the century. It thus became necessary to use at every date a bond whose conversion risk was limited or to face substantial problems with the data[2]. As a result, bond-price data had to be gathered, controlled and constructed following the procedures described briefly below[3].

Part III also contains an exchange-rate matrix, which enables one conveniently to transform any series from the "national unit" (in which data are listed) to another national unit at any given time. Whenever this makes sense, series are given in millions of national units. The exchange-rate matrix then describes how many francs were needed to buy one unit of a national currency. The national units were set as follows: Argentina: paper peso; Austria-Hungary: florin[4]; Belgium: Belgian franc; Brazil: milreis[5]; Denmark: kroner; France: French franc; Germany: mark; Greece: drachma; Italy: lira; Netherlands: Dutch florin; Norway: kroner; Portugal: milreis[6]; Spain: peseta; Sweden: kronor; Switzerland: Swiss franc; Russia: rouble; and United Kingdom: pound. Finally, Part III also contains a matrix for exchange-rate regimes and a series for short-term interest rates.

Part IV contains political variables. It reports both a list of significant political events per year and per country and a matrix measuring the progress of democracy, measured as the proportion of the enfranchised population.

Part I. Money and Finance

Data on public revenues and expenses, interest payments and public debts may seem, superficially, relatively easy to gather, which should permit researchers to place much of the data-collection burden upon research assistants. This strategy would be very inappropriate. The task requires that senior researchers get personally involved or be prepared to bear the consequences. Economists working on 19th century public finance in a comparative perspective typically rely on published sources, among which Mitchell (1993) and to a lesser extent Liesner (1989) stand as references. While representing formidable statistical efforts, these sources remain inadequate in several respects. First, they only document *some* public numbers (Mitchell, for instance, does not document the debt burden). Second, they do so for only some countries. Finally, their strategy of straight reliance on official sources raises numerous problems.

Before the creation of the League of Nations in the inter-war period, no international statistical office existed. Some contemporary compilations exist (e.g. the various editions of *Fenn's Compendium*; Courtois, 1883; or Neymarck, 1887). These compilations typically are not continuous. Although helpful to provide material for cross-section analysis, they are inadequate for systematic panel studies of the kind presented in this monograph. Other sources include annual retrospectives such as Macmillan's *Statesman's Year Book*, which began in 1866 and contains among other things figures on public finance, the public debt, the exchange rate and population. One great advantage is that it also commented on the state of public finance and was thus concerned with the accuracy and comparability of international results. The country reports in *The Economist's* supplement, *The Investors' Monthly Manual*, constitute a useful intermediary source. Finally, the publications of the *Société Internationale de Statistique* represent a welcome if embryonic attempt to provide a systematic international reference source[7].

Going through these series enabled the present authors to accumulate much expertise on the pitfalls of public accounts. A systematic, year-by-year investigation of the *Statesman's Year Book* showed that investors knew that accounting practices varied a lot from country to country and that they must have "mentally" corrected returns to account for possible problems. For instance, some countries had rather idiosyncratic treatments of what constituted revenue and expenditure. Russia treated government borrowing as part of "exceptional government income", which also included other, non-borrowed exceptional revenues. From the way these data were reported it is in fact possible to rebuild an accurate picture of public accounts, but this requires some work and precludes simple use of aggregate revenue figures. In other cases, such as in Scandinavia, some governments recorded in a separate capital account *some* of the public borrowing that served to finance infrastructure. Another problem involved the estimation of public debt for countries experiencing currency depreciation. The confusion came from an inappropriate use of monetary units. Such countries sometimes worked a kind of dual accounting system. Gold units (or sometimes former silver units) were placed alongside paper units; apples and oranges were then added together. Finally, cases occurred where official institutions' books in countries with inconvertible currencies were kept in gold units, with gold used as a pure accounting currency. While perfectly "correct", such records require extra care in use. The accounts of the Austro-Hungarian National Bank provide an illustration.

The investigation of the *Statesman's Year Book* was a defining moment in the research project. It helped to identify problems and obtain a clearer picture of what was needed to construct a more satisfying database. When a later phase of the project called for a return to double-check the *Statesman's* figures, they were found generally reliable and at least always consistent. Nevertheless, despite Macmillan's repeated efforts at keeping accurate updates, the *Statesman's Year Book* was not dedicated primarily to facilitating the work of late 20th century economists. Editorial staff and format changed over time. When they could not obtain some specific figure for some given year, the *Statesman*'s researchers just reported the previous year's figure for the record. This problem is not isolated. Problems in the timing of government debt figures and of data for deficits also complicated the task, as fiscal years did not always coincide with the frequency of public-debt estimates.

One major contribution of the present database is the use of a source that enables circumventing most of the problems discussed above. The authors were fortunate to be able to work with the archives of the *Service des études financières* (Economic Unit) of the Crédit Lyonnais, kindly communicated to us by Roger Nougaret. Back in the 19th century, the Crédit Lyonnais had an active and abundantly staffed research department (Flandreau, 2003*d*). Lyonnais economists, for obvious reasons, had concerns very close to the authors'. They had a primary interest in ensuring a certain degree of consistency for debt figures and public accounts across countries. Moreover, the bank's standing in the Paris and international markets put it in a position to double-check its sources. Because continental nations had to shop in Paris, London or Berlin when they needed capital, there was no way new debt issues could go unnoticed by

the Lyonnais people. The primary database source was thus a number of Lyonnais spreadsheets displaying annual (fiscal-year) data on public debts, interest payments, revenues, expenditure, population, average exchange rates, etc. In most cases these spreadsheets allowed the researchers to follow the construction of public-debt numbers and shed an extra, consistent light on questions that had surfaced in work with the *Statesman's Year Book*. Of course, archival work is never simple. Spreadsheets were sometimes missing or insufficiently referenced, and so on. Yet both the job and the results were quite satisfying. The authors are persuaded that the database provided here has the required level of national accuracy and international consistency. The following paragraphs give a number of brief indications regarding the way the data were constructed. The database tables are collected at the end of this Appendix.

Interest Service (Table DB.1.)

Like most of the public finance numbers reported here, figures for the interest service on the public debt were constructed by first elaborating a framework using the *Statesman's Year Book* and a number of official sources, then finalising the series with the help of Crédit Lyonnais archives[8]. Interest service is defined as the amount paid in each year on the public debt account, with amortisation generally subtracted. Amortisation is a reduction of the debt and should be accounted for as a reduction of the deficit.

Many obstacles complicate the construction of reliable fiscal numbers for the dual Austro-Hungarian monarchy (see Eddie, 1982, p. 28 for a discussion). The existence of two levels of government magnified the problems. The strategy was to construct a fiscal entity that aggregated both levels of government and thus served to eliminate double accounting. The interest service contains the service of both the common debt and debts owed independently by each part of the monarchy. Both parts of the monarchy supported the interest burden for the common public debt (issued before 1867), with Hungary making transfers to Austrian budgets for its share.

For Germany, an entity was identified that combines both the imperial (federal) and state levels. This entity comprises the Imperial government, Prussia, Württemberg, Baden, Bavaria, Saxony and Hamburg. For Argentina, the sources are Cortes Conde (1989) and Crédit Lyonnais. A correction was made for 1889 to rectify a blatant problem in the recorded numbers, which show a discontinuity with exchange-rate movements despite the naturally tight correlation of both series throughout the period. (Details are available on request.) Other sources were as follows:

— Belgium, Denmark, the Netherlands, Sweden and Switzerland: *Statesman's Year Book* and the Crédit Lyonnais;

— Brazil: Crédit Lyonnais;

— France: INSEE (1966);

— Germany: Gerloff (1911) for Imperial, Prussia, Württemberg, Baden, (pre-1911), and *Statesman's Year Book* for Bavaria, Saxony, Hamburg and post 1911;

— Greece: Lazaretou (1993);

— Italy: *Statesman's Year Book* and Crédit Lyonnais, plus a variety of official national sources (national budgets, etc.)[9];

— Norway, Portugal and Russia: Crédit Lyonnais;

— Spain: Carreras (1989); and

— United Kingdom: Mitchell (1990).

"Virtual" Service (Table DB.2)

Renegotiations or moratoria created a temporary suspension of the service. Since market participants assessed the debt burden on the basis of what was owed rather than what was paid, estimates of the resulting "virtual burden" are provided here. In practice, calling A_s the actual service, V_s the additional service that ought to have been made and T government revenue, we have:

Debt burden = $(A_s + V_s)/T$

The table reports V_s. Five defaulters are in the sample. For Spain, where the reduction in service took the form of a forced conversion, the figures reported represent the difference between the service as it stood in 1879 (what ought to have been paid after 1880) and the amount actually paid. For Greece, Portugal, Brazil and Argentina, where the suspension took the form of a (possibly reduced) paper payment of gold obligations, the virtual service was simulated as the difference between the "gold" service that bondholders should have received given the depreciated exchange rate and the "paper" service that was actually achieved. Table B.1 below gives some information on the renegotiations in the five countries.

Table B.1. **External Debt Renegotiations**

	Debt Problem: Date	Negotiation Period	Settlement	Reduction in Service[a]
Argentina	1890	1890-1894	1891-1894: first arrangement 1893-1898: Romero	None
Brazil	1897	1897	1898: with Rothschild	None
Greece	1893, March (date when funding procedure was suspended)	Dec 1893-March 1898	1898 : with Bondholders	<68% reduction (plus improvement of exchange rate[b])
Portugal	1892	1892-1902	1902 : with Bondholders	≈70%
Spain	1876 (Salaverria)	1876-1882	1882: Camacho	≈35%[c]

Notes: a) Reduction on service of external debt once final settlement occurred. Losses for domestic bondholders could be different.

b) According to Herbault (1901), the 6 per cent 1887 loan was reduced to 1.72 per cent, the 5 per cent 1893 loan was reduced to 1.6 per cent and the 4 per cent 1889 *rentes* were reduced to 1.28 per cent. Improvement in the exchange rate was in part secured to increase the basic rate. Effective rates rose to between 1.7 per cent and 2.5 per cent, thus bringing the actual loss to about 50 per cent.

c) According to Carreras (1989), the nominal value of the external debt in 1883 was 50 per cent of that in 1882, at the same time as the former 3 per cent coupon was converted into a 4 per cent coupon. The loss in income for foreign bondholders was accordingly 35 per cent.

Source: Reports of the Council of Foreign Bondholders, various issues.

Share of Debt Service in Gold (Table DB.3)

This table is provided for the record only. On the basis of the breakdown of public debt in gold and paper reported in Crédit Lyonnais archives, some crude measures could be constructed of the fractions of debt that were denominated or serviced in gold. Several serious problems exist, however, and scholars must be cautioned against a naïve use of the resulting series. In fact, the quality of the series depends on the use to which it is put, as can be seen from the Italian case. Most of the Italian debt (the so-called *Rendita* 5 per cent) was payable in paper in Italy and in gold abroad. If one privileges geography, one can work out a series that gives the places where (and thus the currencies with which) the public debt was being serviced, relying on the series by Zamagni (1997). On the other hand Tattara (2003) persuasively argues that a debt with a gold coupon option should be treated as a gold debt, but no clean breakdown exists of the proportion of the debt that included this option. No series is available for Sweden and Norway. The structure of German debt is only for federal (Imperial) debt.

Government Revenue (Table DB.4)

The same remarks and sources as for Table DB.1 apply here. Revenues for Austria-Hungary were constructed by sorting out transfers among budgets, thus preventing double accounting. German numbers are sum of Imperial and state revenues. Italian numbers were controlled against official sources given chronological limitations in the Lyonnais tables. For Argentina and Brazil the source was Mitchell (1993).

Government Revenue: Germany (Table DB.5)

A by-product of the identification of an "aggregate" German State was the separate construction of individual series for various governments. The numbers are reported here for information. Sources were the same as described above.

Deficits (Table DB.6)

The same remarks and sources as for Table DB.1 apply here. The sources provided the basis for data on expenditures. These deficit tables record differences between revenues from Table DB.4 and expenditures.

Nominal Public Debts (Table DB.7)

Reliable data for public debts exist for only a handful of countries. Having checked these data against other sources, the authors concluded that there were a number of rather safe references that could be used without serious worries. They included

Mitchell (1990) for England, Carreras (1989) for Spain, Gerloff (1911) for Germany, Zamagni (1997) for Italy and INSEE (1966) for France. The rest of the table was constructed from a variety of sources, with the Lyonnais archives as a final judge. The debt figures reported are inclusive; they combine both short-term and long-term debt ("floating" and "funded" debt in the vocabulary of the time). The series for Portugal presented many difficulties. The gold, paper and floating debt had to be combined. Moreover, unlike Mata (1993), the treatment sought to deduct from the public debt the government buy-outs that become very substantial in the later period. The Lyonnais archives enable this by documenting the amount of government bonds deposited by the Portuguese Treasury at the central bank as collateral for the short-term credits the bank granted to the treasury[10]. For Argentina the source is Goldsmith (1924). For Brazil the sources were the *Brazilian Yearbook* (1908) and Villanova Villela and Suzigan (1973).

Public Debts: Germany (Table DB.8)

See the comments for Table DB.5 (revenues).

Customs Revenue (Share of Government Revenue) (Table DB.9)

The same remarks and sources as for Table DB.1 apply here. Customs revenues from official sources were generally carefully documented in the *Statesman's Year Book*. Special care was in order for Austria-Hungary. Customs revenues, recorded mostly in common accounts, were divided by consolidated revenues obtained through the procedure described above for Table DB.1. Mitchell (1993) served as the source for Argentina and Brazil.

Central Bank Reserves (Table DB.10)

Reserves refer whenever possible to both specie and foreign exchange reserves. In some cases, however, the foreign exchange component (foreign bills) could not be identified, because it was aggregated with other items (such as domestic bills). In those cases a narrow definition of reserves had to apply. Sources are as follows:

— Austria-Hungary, *Metallschatz* from annual *Bilanzen* (archives of the Austrian National Bank, Vienna);

— Argentina: Cortes Conde (1989) and Della Paolera (1988);

— Belgium: data kindly communicated by the National Bank of Belgium;

— Brazil: Pelaez and Suzigan (1976);

— Denmark, Germany, Norway and the United Kingdom: *The Economist*;

— France: *L'Economiste Français*;

— Greece: Lazaretou (1993);

— Italy: Tattara (1999) from de Mattia (1967);

— Netherlands: Soetbeer (1889) before 1889, *The Economist* afterwards;

— Portugal: before 1890, from archives of Bank of Portugal, data kindly communicated by Jaime Reis, and after 1890, balance sheets of the Bank of Portugal from the Bank's archives, *caixa*, the amounts recorded under "metal";

— Russia: gold and reserves (excluding silver, copper and bronze) before 1905, Crédit Lyonnais, 1905-14, *The Economist*;

— Spain, Carreras (1989) series 1152, *Sector Exterior* (gold + silver + foreign exchange);

— Sweden: Sveriges Riksbank (1931), Part V, pp. 60-71;

— Switzerland: Before 1907, from *Crédit Lyonnais*, gold reserve of banks of issue (36 banks), and after 1907, *The Economist*, ("Swiss central bank reserves"); and

— United Kingdom: *The Economist*.

Central Bank Note Circulation (Table DB.11)

Generally, the same sources as for reserves were used. For Italy, the series is net of notes held as reserves in other banks of issue. For Portugal, the series collected is called *Emissao de Notas do Banco de Portugal*, for Spain *Billetes en circulacion*. For Switzerland before 1907 the source is Crédit Lyonnais and the series is net of notes held as reserves in banks of issue. For the United Kingdom, the data were worked out from series in *The Economist* by constructing the net circulation (issue department minus reserves of banking department). For Argentina, Mitchell (1993) was used, and for Brazil, Pelaez and Suzigan (1976).

Part II. Macroeconomic Series.

National Product (Nominal GDP) (Table DB.12)

In the recent past, substantial efforts have been devoted to extending our knowledge of European national accounts well beyond the pioneering works on "core" countries. This has ensured the availability of reliable data for virtually every country in the sample. The references are as follows:

— Argentina: Della Paolera (1988);

— Austria-Hungary: Schulze (1997) which revises and improves on Komlos (1987)[11];

— Brazil: Mitchell (1993);

— France: Lévy-Leboyer and Bourguignon (1985);

— Germany: Hoffmann (1965);

— Greece: Kostelenos (1995);

— Spain: Prados de la Escosura (1995);

— Portugal: Nunes *et al.* (1989), but see also Lains and Reis (1991);

— United Kingdom: Mitchell (1990),

— Russia: Gregory (1982);

— Netherlands: Smits *et al.* (1997);

— Sweden: Johansson (1967);

— Denmark and Norway: Mitchell (1993); and

— Belgium and Switzerland: a series was reconstructed on the basis of end-of period estimates and indications for real GDP growth given in Maddison (1991). Elements on Swiss prices are found in Ritzmann-Blickenstorfer (1996).

Prices (Table DB.13)

General price levels. Because the goal was to have a series that would serve to transform the nominal GDP numbers described above into real GDP numbers, the sources were the same as described above. 1913 = 100.

Nominal Exports (Table DB.14)

Mitchell (1993) is the main source, except for the Netherlands, for which the figures are flawed[12]. The series for Dutch exports used here is from Smits *et al.* (1997).

Population (Table DB.15)

The data come from the *Statesman's Year Book* except in the following cases: Lyonnais returns for the Austro-Hungarian Empire, Mitchell (1993) for Argentina, IBGE (1986) for Brazil, Kostelenos (1995) for Greece, Mata (1993) for Portugal and Gregory (1994) for Russia.

Part III. Financial Series:

Yields on Government Bonds (Table DB.16)

The classic source on long-term interest rates is Homer and Sylla (1991). For the purposes here, however, this source is incomplete. Moreover, some problems with extracting the appropriate yield information from bond prices, discussed below, suggest

using primary sources. This database uses the Paris quote (from the *Cours Authentiques* as listed in the newspaper *Le Rentier)* and the London quote (from *The Economist*). Quarterly figures were collected as the basis for constructing annual interest rates. The selection of representative bonds used the information provided in the *Annuaire Officiel des Agents de Changes*. Data availability as well as conversions imposed changes in reference bonds. Klovland (1994) has outlined problems with the direct use of British yields. The problem he identifies is quite pervasive, however, and implies adjustments in many series. Italian bonds provide the typical example[13].

Outline of the methodology: Italian Bonds. The Italian 5 per cent *rendita* — the Italian benchmark bond — got converted in 1906. Because the conversion had been considered from the early 1900s (de Cecco, 1989) investors expected from then on that the Italian government would repurchase its bonds at par in the near future. The result was a flattening of the yield computed by the classic formula (yield = coupon/ price) at the net of tax return. Since the conversion was in sight, the price of the "5 per cent" remained "glued" at 100. As the net coupon was four francs (the five-franc coupon minus 20 per cent tax) the coupon-to-price ratio exhibits a constant yield of about 4 per cent. To solve this problem, one must use the little-known 3 per cent gold bond (the so-called *Vittorio Emmanuele*). This bond bore a lower coupon and was thus not liable to be converted. The chart below shows that the yields on it and the 5 per cent bond were almost the same as long as no conversion was in sight (i.e. around 1896-99). After 1900, however, the yield on the 3 per cent declined while the threat of an imminent conversion prevented any fall of the yield on the 5 per cent[14].

Figure B.1. **Convertible versus Inconvertible Bonds: Implications for Yields**
(quarterly data)

Source: Le Rentier.

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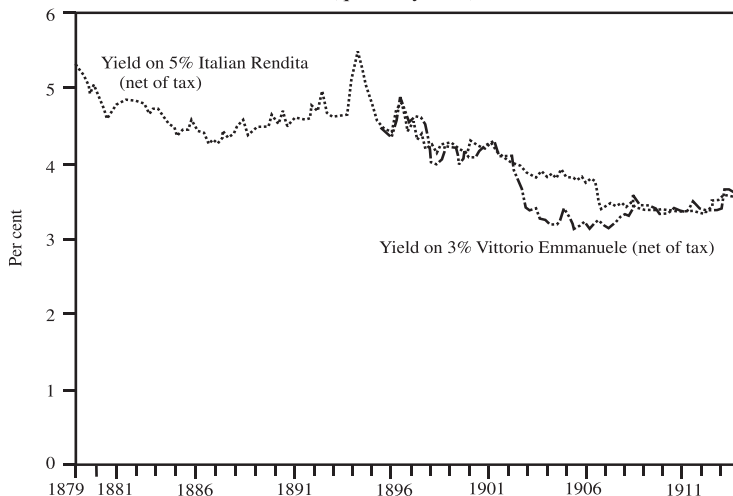
Since the *Rendita* was more liquid, it is nonetheless preferable to work with it rather than with the *Vittorio Emmanuele* whenever possible. The conversion of 1906 transformed the former 5 per cent into a bond that would now pay 4 per cent net of taxes in 1906, 3.75 per cent net of tax until December 1911 and 3.5 per cent afterwards. One can compute the present value and solve for the yield in the post-conversion period. The result (shown in Figure B.1) is that the two bonds again imply virtually identical yields, as arbitrage theory predicts. The series for Italian yields is then constructed (Figure B.2).

Figure B.2. **The "True" Italian Yields**
(annual data)
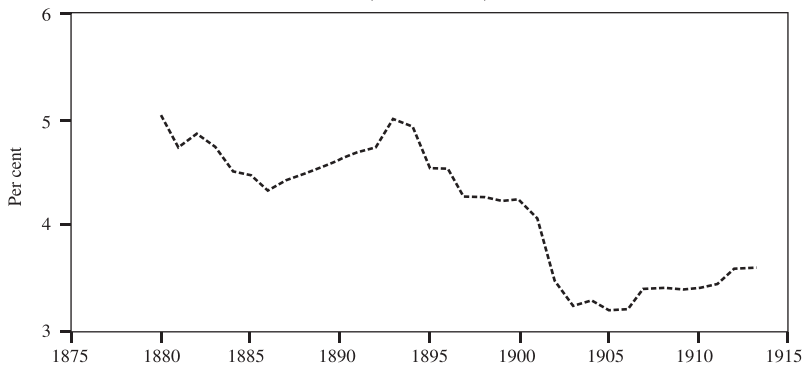
Source: Table DB.16.

Series used. To minimise the type of problems discussed above, bonds were carefully selected, as follows:

— Austria-Hungary: the 4 per cent gold Austrian bonds[15];

— Argentina: the 1871 6 per cent until 1884:09; then the 5 per cent 1884 for 1893:07-1897:07. The yield formula was adjusted for the Funding Loan, where there was a 60 per cent reduction of the coupon payments;

— Belgium, France, Germany and the Netherlands: yields from Homer and Sylla (1991);

— Brazil: the 5 per cent (gold) bonds until 1884:10, the 4.5 per cent 1883 afterwards;

— Denmark: the 1893 3 per cent;

— Greece: before 1898, the 5 per cent (gold) 1881 and the 5 per cent (gold) 1884 were combined. Between 1898 and 1904 the coupons on these bonds included fixed rates plus potential bonuses depending on exchange-rate recovery. The yield formula was computed assuming rational expectations on future exchange-rate changes. This way of computing provides a perfect adjustment on the subsequent series, the new 1904 gold bond, which was actively traded afterwards;

— Italy: the 5 per cent *Rendita* (net of tax) until 1900:12, the 3 per cent (net of tax) until 1907:1 and the converted 5 per cent (reduced interest, non-taxable) afterwards;

— Norway: the 3.5 per cent 1886 and the 3 per cent 1888 are the two main series;

— Portugal: the 3 per cent consol. This bond was initially payable in gold, but the mode of payment of the interest was modified in 1892 and 1902. Adjustment was made for the new coupon;

— Russia: the *Emprunt 4 per cent 1867*, known as *Chemin de Fer Nicolas*;

— Spain: until 1882, the 3 per cent *exterior* (gold), replaced in 1882 by a 4 per cent gold consol ;

— Sweden: the 4 per cent 1880, the 4 per cent 1878, the 3 per cent 1888 and the 3.5 per cent 1895 were combined;

— Switzerland: a combination of the 3 per cent 1890, the 3.5 per cent 1887 and the 3 per cent 1897; and

— United Kingdom: yields from Klovland (1994).

Short-Term Interest Rates (Table DB.17)

The table reports average annual rates of discount of the central banks or main discount banks. The sources were:

— Austria-Hungary, Belgium, Denmark, Germany, Norway, Portugal, Russia, Spain and Sweden: Roulleau (1914);

— Argentina: from data communicated by Andres Regalsky;

— France: archives of the Bank of France;

— Greece: from data communicated by Olga Christodoulaki;

— Italy: de Mattia (1978) in Spinelli and Frattianni (1991), p. 85;

— Netherlands and Switzerland: Homer and Sylla (1991); and

— United Kingdom: *The Economist*.

Exchange Rates (Table DB.18)

For all countries except Greece, the exchange-rate series were constructed on the basis of the monthly series in Schneider *et al.* (1991) and/or Schneider *et al.* (1997). The data are annual averages. The data for Greece come from an annual series reported in the archives of Crédit Lyonnais. For Argentina, Cortes Conde (1989) and Della Paolera (1988) also were used.

Exchange-Rate Volatility: An Index of Vulnerability (Table DB.19)

The formula used for exchange-rate volatility is intended to capture the vulnerability of public finances to an exchange-rate change. From this point of view, one needs to give more weight to exchange depreciation than to appreciation. The result is an asymmetric formula for annual vulnerability, computed on the basis of monthly exchange rates. It reads:

$$Vol \quad = \quad \frac{\sum_{t=1}^{12} Ln(X_t / X_{t-1})}{12} \times 10$$

with

$$Ln(X_t / X_{t-1}) = \begin{cases} Ln(X_t / X_{t-1}) & \text{if} \quad Ln(X_t / X_{t-1}) > 0 \\ \\ 0 & \text{if} \quad Ln(X_t / X_{t-1}) < 0 \end{cases}$$

The monthly series used for the raw data are those listed above, except for Greece where an annual series is used in Table DB.18. Applying the formula for Greece relied on a monthly drachma-French franc series kindly communicated by Olga Christodoulaki.

Years on Gold (Table DB.20)

This table reproduces and enlarges the table provided in Flandreau *et al.* (1998) with a few corrections. As explained in the main text, the discussion of the exact breakdown between years on gold and years off gold can be endless and is in any case not very useful.

Part IV. Political Variables

Enfranchised Population (Table DB.21)

This table is constructed from the Polity Database[16]. Data are listed as the fraction of the population that is enfranchised, i.e. 0.5=50 per cent.

Political Events (Table DB.22)

The list provided focuses on main political and diplomatic events.

Database Tables

Table DB.1. **Interest Service on Public Debt**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	7	189	48	-	9	890	162	14	491	28	6	15	152	315	10	3	29
1881	7	192	52	49	8	893	198	21	500	23	5	16	172	269	9	2	29
1882	9	205	55	48	8	940	209	22	553	29	5	16	174	222	10	2	30
1883	11	211	59	52	8	910	254	22	531	33	5	16	172	279	9	2	29
1884	11	239	62	51	8	937	283	24	533	32	5	16	180	275	10	2	29
1885	12	236	62	53	8	941	308	30	536	33	5	16	223	281	10	2	24
1886	14	241	67	66	8	951	315	33	536	34	5	17	226	283	10	2	28
1887	14	240	66	62	7	967	333	31	543	33	5	17	233	286	10	2	26
1888	18	248	63	51	7	979	352	37	556	36	4	18	238	286	10	2	25
1889	26	254	64	53	7	974	373	39	568	33	4	19	233	292	10	2	25
1890	34	255	66	59	7	988	432	30	576	34	4	19	226	289	11	3	24
1891	43	254	67	72	7	953	447	36	587	34	4	21	218	300	10	3	24
1892	33	263	69	89	7	984	459	34	596	31	4	15	216	298	10	3	24
1893	26	272	71	87	7	967	476	35	592	37	5	15	229	244	10	4	23
1894	36	281	72	102	7	946	482	22	582	34	5	15	245	321	11	4	23
1895	32	288	70	114	7	905	483	22	588	35	5	16	252	356	11	4	23
1896	36	294	67	133	7	900	484	22	600	32	6	17	243	360	10	4	24
1897	33	294	76	155	7	895	481	22	594	33	6	16	234	408	10	4	24
1898	42	289	77	148	6	892	468	28	590	33	6	17	249	405	10	4	24
1899	37	288	79	129	7	884	446	29	593	38	4	19	251	392	10	4	23
1900	41	289	80	85	7	880	491	33	594	35	7	18	242	408	11	4	20
1901	47	289	83	77	7	878	504	32	593	34	8	19	252	449	12	4	22
1902	52	294	85	80	8	873	526	37	589	34	8	18	265	406	12	4	27
1903	50	292	88	92	8	841	536	33	583	34	9	18	264	467	12	5	26
1904	50	291	92	128	8	884	567	36	579	34	9	18	273	398	12	6	25
1905	50	294	95	81	9	838	582	34	576	35	11	18	282	398	13	5	25
1906	48	300	98	91	8	861	603	34	559	36	12	18	332	403	13	6	23
1907	47	313	101	102	9	840	634	33	517	36	12	19	349	408	15	6	21
1908	47	318	105	87	8	841	673	33	492	36	15	20	373	405	17	6	22
1909	52	340	111	106	10	840	687	32	499	36	11	20	370	408	19	6	21
1910	58	359	114	95	11	831	812	31	508	36	11	19	384	408	19	7	20
1911	60	380	116	113	12	832	881	34	506	37	12	19	374	411	19	7	20
1912	65	375	124	118	11	829	781	37	507	38	12	19	369	412	22	7	20
1913	69	-	127	137	12	828	811	38	528	38	12	20	-	458	-	8	19

Table DB.2. **"Virtual" Service on Public Debt**
(millions of national units)

	Argentina	Brazil	Greece	Portugal	Spain
1880	0	-	0	0	63
1881	0	0	0	0	106
1882	0	0	0	0	107
1883	0	0	0	0	0
1884	0	0	0	0	0
1885	0	0	0	0	0
1886	0	0	0	0	0
1887	0	0	0	0	0
1888	0	0	0	0	0
1889	0	0	0	0	0
1890	0	0	0	0	0
1891	11	0	0	0	0
1892	10	0	0	6	0
1893	16	0	23	8	0
1894	15	0	37	8	0
1895	16	0	38	7	0
1896	1	0	36	6	0
1897	3	0	35	8	0
1898	0	55	0	9	0
1899	0	51	0	7	0
1900	0	8	0	7	0
1901	0	0	0	7	0
1902	0	0	0	5	0
1903	0	0	0	0	0
1904	0	0	0	0	0
1905	0	0	0	0	0
1906	0	0	0	0	0
1907	0	0	0	0	0
1908	0	0	0	0	0
1909	0	0	0	0	0
1910	0	0	0	0	0
1911	0	0	0	0	0
1912	0	0	0	0	0
1913	0	0	0	0	0

Table DB.3. **Percentage of Public Debt Serviced in Gold**

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy*	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	57	21	0	-	7	0	0	-	41	0	n.a.	43	-	47	n.a.	n.a.	0
1881	67	23	0	45	7	0	0	-	33	0	n.a.	47	-	48	n.a.	n.a.	0
1882	68	21	0	45	7	0	0	-	32	0	n.a.	46	-	61	n.a.	n.a.	0
1883	64	22	0	48	7	0	0	-	29	0	n.a.	50	-	39	n.a.	n.a.	0
1884	67	22	0	48	7	0	0	-	24	0	n.a.	55	45	43	n.a.	n.a.	0
1885	51	21	0	50	7	0	0	43	28	0	n.a.	51	46	43	n.a.	n.a.	0
1886	55	21	0	52	7	0	0	44	32	0	n.a.	54	48	43	n.a.	n.a.	0
1887	76	24	0	46	7	0	0	64	33	0	n.a.	56	50	43	n.a.	n.a.	0
1888	69	24	0	42	6	0	0	74	40	0	n.a.	56	50	43	n.a.	n.a.	0
1889	50	24	0	45	6	0	0	74	39		n.a.	56	48	42	n.a.	n.a.	0
1890	73	23	0	56	6	0	0	78	39	0	n.a.	61	45	41	n.a.	n.a.	0
1891	98	23	0	75	6	0	0	79	48	0	n.a.	64	45	41	n.a.	n.a.	0
1892	96	23	0	85	5	0	0	82	48	0	n.a.	33	49	38	n.a.	n.a.	0
1893	97	25	0	82	5	0	0	61	50	0	n.a.	29	48	38	n.a.	n.a.	0
1894	96	23	0	84	30	0	0	67	38	0	n.a.	28	49	37	n.a.	n.a.	0
1895	91	24	0	83	33	0	0	69	29	0	n.a.	28	51	37	n.a.	n.a.	0
1896	89	24	0	83	34	0	0	72	28	0	n.a.	31	53	33	n.a.	n.a.	0
1897	89	24	0	83	66	0	0	70	27	0	n.a.	31	53	31	n.a.	n.a.	0
1898	90	24	0	75	67	0	0	71	27	0	n.a.	29	53	23	n.a.	n.a.	0
1899	79	23	0	75	67	0	0	72	25	0	n.a.	28	50	20	n.a.	n.a.	0
1900	74	23	0	75	69	0	0	74	24	0	n.a.	27	50	15	n.a.	n.a.	0
1901	83	22	0	70	72	0	0	76	22	0	n.a.	25	52	12	n.a.	n.a.	0
1902	74	21	0	62	72	0	0	75	21	0	n.a.	40	53	11	n.a.	n.a.	0
1903	78	20	0	90	72	0	0	77	17	0	n.a.	38	51	9	n.a.	n.a.	0
1904	73	20	0	60	72	0	0	77	15	0	n.a.	34	51	9	n.a.	n.a.	0
1905	69	20	0	85	72	0	0	75	14	0	n.a.	33	51	9	n.a.	n.a.	0
1906	66	20	0	52	68	0	0	72	14	0	n.a.	32	57	9	n.a.	n.a.	0
1907	63	19	0	74	66	0	0	67	12	0	n.a.	34	52	9	n.a.	n.a.	0
1908	63	19	0	60	65	0	0	66	11	0	n.a.	32	51	9	n.a.	n.a.	0
1909	64	19	0	59	73	0	0	67	12	0	n.a.	31	56	9	n.a.	n.a.	0
1910	61	21	0	64	76	0	0	65	12	0	n.a.	30	55	11	n.a.	n.a.	0
1911	64	21	0	55	77	0	0	62	12	0	n.a.	30	55	11	n.a.	n.a.	0
1912	67	20	0	52	76	0	0	64	14	0	n.a.	31	56	11	n.a.	n.a.	0
1913:	67	25	0	52	76	0	0	71	19	0	n.a.	30	56	11	n.a.	n.a.	0

* Percentage serviced abroad.

Table DB.4. **Government Revenue**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	20	661	279	120	52	3531	1720	38	1236	116	-	26	732	792	-	43	82
1881	21	713	290	128	53	3785	1956	42	1321	111	40	28	738	787	101	43	84
1882	27	757	297	130	54	3644	2243	51	1354	116	43	30	791	780	100	44	87
1883	31	794	300	130	57	3653	2345	59	1336	112	41	29	751	802	104	50	86
1884	38	806	350	133	57	3449	2387	61	1299	133	45	31	758	793	104	48	88
1885	37	838	333	122	54	3320	2503	59	1410	116	44	32	776	816	106	48	90
1886	42	825	371	127	55	3169	2626	62	1447	123	43	35	792	887	104	61	91
1887	51	845	341	146	54	3244	3049	83	1431	119	45	38	843	803	97	60	90
1888	52	848	347	151	56	3268	3276	90	1442	124	45	39	903	852	110	60	90
1889	73	906	387	161	57	3271	3740	84	1507	125	51	39	948	800	116	61	95
1890	73	985	378	195	57	3376	3892	80	1576	166	52	41	969	740	122	68	97
1891	74	1025	402	229	57	3364	4083	86	1506	130	51	38	927	779	118	69	99
1892	110	1050	414	228	56	3370	3994	95	1447	132	53	43	1003	707	117	76	98
1893	123	1136	398	260	58	3366	4042	93	1448	127	54	46	1055	749	120	78	98
1894	121	1152	405	265	59	3458	4263	100	1466	133	55	49	1227	755	135	84	102
1895	132	1211	396	308	64	3416	4239	94	1518	132	59	52	1262	766	143	81	109
1896	124	1218	481	346	65	3436	4700	95	1535	134	66	50	1386	822	145	87	112
1897	151	1308	500	303	69	3528	4924	86	1527	136	77	49	1427	804	163	92	116
1898	136	1320	680	324	71	3620	5257	103	1548	144	85	51	1595	842	173	95	118
1899	166	1321	483	321	70	3657	5520	110	1566	148	67	54	1674	972	190	100	130
1900	151	1384	543	308	68	3815	5881	112	1589	155	88	55	1708	995	192	101	140
1901	151	1367	636	305	67	3634	6249	115	1620	153	90	53	1806	1023	185	102	153
1902	156	1403	628	344	77	3582	6205	114	1651	161	88	56	1910	1021	192	107	161
1903	172	1436	632	415	80	3668	6673	115	1675	166	90	58	2164	1039	228	113	151
1904	199	1489	529	443	98	3739	6261	116	1686	164	87	60	2021	1000	235	115	153
1905	212	1524	706	401	88	3766	6859	122	1772	176	95	61	2029	1010	245	130	154
1906	232	1634	676	432	107	3837	7301	126	1814	182	103	64	2279	1097	253	135	155
1907	246	1829	708	536	99	3968	7578	123	1797	184	111	71	2350	1080	282	147	157
1908	263	1927	699	441	93	3966	7769	123	1821	183	140	70	2430	1072	286	149	152
1909	285	2129	795	450	82	4141	8920	117	1917	191	120	73	2540	1066	290	157	132
1910	308	2275	815	525	91	4274	8820	130	2045	188	128	70	2805	1050	315	155	204
1911	316	2422	738	564	101	4689	9167	138	2152	206	138	66	2954	1131	398	99	185
1912	363	2526	778	615	124	4857	8961	131	2249	213	151	84	3108	1131	351	103	189
1913	370	-	808	654	125	5092	19768	129	2502	227	167	72	-	1505	-	101	198

Table DB.5. **Government Revenue: Germany**
(millions of marks)

Year	Federal	Prussia	Württemberg	Baden	Bavaria	Saxony	Hamburg	Total Revenue
1880	530	799	38	34	225	65	30	1 721
1881	634	913	52	39	222	65	31	1 956
1882	602	1 214	52	41	229	72	34	2 243
1883	567	1 297	3	41	277	72	35	2 292
1884	594	1 350	54	41	242	71	36	2 387
1885	615	1 442	54	42	242	71	38	2 503
1886	672	1 474	55	43	241	102	38	2 626
1887	949	1 614	56	45	241	102	40	3 049
1888	996	1 741	56	48	282	112	42	3 276
1889	1 206	1 960	60	48	306	112	47	3 740
1890	1 253	2 061	61	62	280	124	52	3 892
1891	1 414	2 078	65	66	280	124	55	4 083
1892	1 137	2 209	66	69	306	149	58	3 994
1893	1 290	2 101	65	70	306	149	61	4 042
1894	1 344	2 241	67	76	328	143	64	4 263
1895	1 294	2 261	71	77	328	143	66	4 239
1896	1 655	2 326	71	79	345	151	72	4 700
1897	1 733	2 466	74	82	345	151	73	4 924
1898	1 857	2 596	75	84	379	189	77	5 257
1899	1 973	2 726	81	86	379	189	84	5 520
1900	2 097	2 885	82	89	433	205	89	5 881
1901	2 416	2 919	90	91	433	205	96	6 249
1902	2 177	3 059	91	100	455	223	101	6 205
1903	2 442	3 256	90	99	455	223	109	6 673
1904	2 071	3 269	91	95	442	207	109	6 284
1905	2 473	3 400	83	161	442	207	120	6 886
1906	2 455	3 867	84	171	484	166	108	7 334
1907	2 601	4 054	91	99	484	166	118	7 612
1908	2 540	4 151	92	112	566	187	154	7 804
1909	3 416	4 408	100	116	564	187	177	8 969
1910	3 041	4 530	104	129	647	218	200	8 869
1911	3 012	4 903	108	115	647	218	207	9 209
1912	3 496	4 085	112	112	720	267	222	9 015
1913	14 253	4 241	119	115	720	267	226	19 942
1914	13 806	5 505	122	115	745	199	186	20 678

Table DB.6. **Deficits**

(millions of national units; a positive number is a surplus)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	-13	-93	5	-30	-22	166	-23	-50	21	2	-	-8	-81	-58	-	1	1
1881	-9	-270	3	-11	4	169	20	-60	43	-12	-8	-6	-97	-1	4	1	1
1882	-31	-76	-14	-9	3	-43	72	-6	-19	-13	-5	-2	38	-31	8	0	0
1883	-14	-50	-25	-23	6	-62	98	-9	-52	-26	-1	-6	-20	-45	4	0	1
1884	-18	-467	-12	-21	10	-90	43	-31	-77	0	-1	-8	-13	-28	5	1	-1
1885	-19	-40	-18	-36	4	-147	39	-63	-48	-6	0	-10	-47	-82	3	2	-3
1886	-12	-29	22	-27	-3	-125	43	-68	-98	-1	-1	-9	-50	-15	-11	3	1
1887	-14	-78	-5	-5	-6	-17	170	-24	-246	-4	-1	-4	10	-10	7	3	3
1888	-24	-70	-9	4	-4	47	129	-19	-391	-3	-2	-14	67	-122	-12	1	3
1889	-34	-114	14	-25	-5	24	264	-85	-277	0	-1	-13	91	-67	10	0	4
1890	-22	-19	-39	-26	-9	91	29	-62	-87	-1	-2	-14	1	-50	10	1	3
1891	-63	-312	0	8	-8	106	266	-37	-93	-1	-3	-15	-64	-54	-1	-4	3
1892	-27	-64	8	-51	-7	-10	-57	-13	-78	-20	-8	-6	-87	-19	-6	-10	2
1893	-7	-100	3	-41	-4	-85	102	1	-94	-9	-10	0	50	75	-3	-8	0
1894	-22	-91	3	-108	-3	-22	107	15	-108	1	-9	-1	121	6	0	0	1
1895	-35	30	-15	-37	-2	-18	118	2	-74	-1	-14	-1	54	-26	23	5	4
1896	-106	3	43	-23	-1	-9	169	4	-51	1	-14	-11	111	40	16	8	3
1897	-28	8	-12	-76	-7	4	111	-51	-6	-6	-6	-7	32	-54	26	4	4
1898	-175	-14	-14	-456	-5	92	134	-209	21	-6	-14	-4	4	8	31	1	0
1899	-8	-7	-87	-67	-7	68	190	5	30	-2	-14	-6	74	134	-2	2	-14
1900	-8	-4	-31	-173	-11	68	87	2	43	1	-22	-3	-40	52	-9	-2	-53
1901	-12	-49	32	-66	-10	-122	288	1	57	0	-16	-6	16	38	-13	-4	-53
1902	-47	-68	12	46	-1	-117	26	-10	71	-2	-17	-4	-199	71	-7	1	-33
1903	-11	-92	4	52	0	71	302	-1	70	1	-12	-8	124	23	16	2	-4
1904	4	-105	0	-20	-2	100	150	0	63	-12	-8	-2	-680	54	-25	0	4
1905	-110	-76	80	26	3	59	469	6	-177	2	-6	-6	-974	72	16	13	7
1906	-38	-6	-97	9	-7	-15	307	4	-245	3	-7	-4	-404	103	-36	5	11
1907	-7	-328	-60	14	5	88	-60	-9	-80	1	2	-6	-116	65	-32	-1	13
1908	11	-152	-71	-70	-15	-55	-49	-11	-156	-11	-1	-5	-125	56	-61	-4	7
1909	-107	-701	9	-68	-46	-45	47	-20	-194	-6	-7	-8	-24	-51	-11	-28	-25
1910	-103	-56	-14	-99	-33	-48	-94	-11	-175	-19	4	-2	261	-6	15	-5	36
1911	-101	4	-73	-118	-21	141	29	-43	-341	-3	-1	-7	213	6	3	0	11
1912	-41	-105	-118	-174	3	114	-136	-77	-615	-11	-15	0	136	-62	-99	1	5
1913	-33	-	-121	-109	2	25	4	-133	-357	-11	-17	-3	-	-71	-	-5	6

Table DB.7. **Nominal Public Debt**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	104	4 613	1 423	614	203	24 279	4 292	-	9 999	942	114	376	5 500	13 741	222	34	765
1881	116	4 974	1 439	611	202	25 303	5 158	-	10 774	941	115	407	5 780	13 586	227	35	760
1882	124	5 181	1 554	615	201	25 102	5 451	-	12 028	999	114	413	5 600	11 221	225	37	754
1883	128	5 272	1 763	647	200	26 418	5 917	-	12 133	1 004	112	448	5 700	7 454	229	34	746
1884	125	5 455	1 767	652	198	27 354	6 642	315	11 559	1 019	114	489	5 191	6 908	231	33	740
1885	157	5 554	1 772	678	195	28 255	7 290	281	11 626	1 081	113	513	5 070	6 877	247	36	742
1886	163	5 670	1 902	706	196	28 741	7 481	284	11 646	1 079	117	511	5 159	6 867	247	37	736
1887	192	5 993	1 916	708	194	29 433	7 656	441	11 680	1 098	115	547	5 663	6 823	246	34	705
1888	411	5 959	1 928	662	191	29 892	8 137	618	12 157	1 095	126	569	5 545	6 787	268	31	698
1889	527	6 127	1 973	693	189	30 055	8 327	616	12 612	1 093	124	576	5 290	6 883	262	55	689
1890	932	6 358	2 003	869	187	30 096	92 90	738	12 640	1 089	126	630	5 097	6 887	262	71	684
1891	1 386	6 698	2 062	1 087	186	30 481	10 154	816	12 945	1 112	135	720	5 298	6 920	267	61	677
1892	1 401	6 702	2 128	1 702	184	30 612	10 748	849	13 150	1 106	135	704	5 696	7 176	276	64	671
1893	1 390	6 893	2 170	1 488	183	31 035	11 083	969	13 179	1 122	174	712	5 916	7 228	281	65	667
1894	1 413	6 861	2 205	1 673	209	31 065	11 445	1 088	13 038	1 116	155	706	6 592	7 284	295	85	659
1895	1 384	6 952	2 227	2 103	200	31 094	11 628	1 152	13 275	1 104	171	719	6 615	7 400	290	84	652
1896	1 246	6 848	2 309	2 100	197	30 235	11 808	1 190	13 414	1 111	195	800	6 735	7 977	291	81	645
1897	1 276	6 860	2 370	2 192	209	30 100	11 920	1 143	13 409	1 095	195	840	6 341	8 378	289	84	639
1898	1 171	6 862	2 604	1 975	206	29 948	11 984	1 099	13 676	1 107	213	794	6 165	10 596	285	84	635
1899	1 235	6 943	2 607	1 956	208	30 055	12 260	1 140	13 712	1 149	241	801	6 225	11 449	319	90	639
1900	1 033	7 227	2 651	1 701	218	30 097	12 388	1 207	13 921	1 145	243	805	6 211	12 729	339	92	704
1901	1 032	7 210	2 778	1 801	247	30 344	12 888	1 264	13 911	1 159	276	771	6 431	13 363	351	88	765
1902	988	7 218	2 879	1 822	245	30 346	13 542	1 266	13 803	1 140	275	647	6 644	13 337	348	90	798
1903	968	7 233	2 989	1 935	243	30 375	13 813	1 274	13 684	1 152	283	659	6 636	12 744	347	119	795
1904	968	7 328	3 117	1 888	242	30 460	14 329	1 219	13 919	1 133	322	631	7 066	12 638	386	102	797
1905	873	7 388	3 221	1 640	240	30 702	14 532	1 099	13 978	1 106	359	643	7 841	12 523	383	103	789
1906	862	7 485	3 286	1 611	252	30 348	15 108	979	14 361	1 145	353	642	8 626	12 533	423	101	779
1907	950	7 676	3 365	1 689	256	30 162	16 066	874	14 613	1 140	348	675	8 725	12 475	464	99	762
1908	906	7 724	3 437	1 767	254	30 375	16 629	849	14 726	1 134	347	665	8 851	12 390	515	102	754
1909	1 021	7 744	3 581	1 802	302	32 864	18 501	840	14 946	1 128	351	661	9 039	12 471	526	126	763
1910	1 028	9 026	3 703	1 915	336	32 558	19 416	792	15 157	1 122	386	669	9 030	10 480	537	123	733
1911	1 195	9 153	3 734	1 967	352	32 720	19 577	759	15 545	1 117	384	684	8 958	10 420	537	120	718
1912	1 207	9 335	3 739	1 952	357	32 881	19 605	829	15 467	1 163	381	687	8 858	10 350	606	118	711
1913	1 237	9 516	3 743	2 147	358	32 889	20 189	959	16 382	1 156	366	-	9 888	10 372	602	117	706

Table DB.8. **German Debts**
(millions of marks)

Year	Federal	Prussia	Württemberg	Baden	Bavaria	Saxony	Hamburg	Total debt
1880	218	1 395	406	329	1 136	669	139	6 172
1881	267	1 995	411	328	1 341	673	143	7 039
1882	319	2 228	418	326	1 355	663	142	7 333
1883	348	2 640	422	327	1 369	664	147	7 800
1884	373	3 345	422	327	1 369	655	152	8 527
1885	410	3 941	421	331	1 369	645	173	9 175
1886	440	4 072	422	334	1 369	650	194	9 367
1887	486	4 182	423	334	1 369	644	218	9 543
1888	721	4 425	421	334	1 350	650	236	10 025
1889	883	4 457	426	330	1 342	653	236	10 216
1890	1 117	5 204	423	328	1 338	647	233	11 180
1891	1 317	5 834	429	330	1 333	631	280	12 045
1892	1 685	6 061	439	330	1 328	625	280	12 640
1893	1 740	6 243	447	327	1 352	647	327	12 976
1894	1 915	6 371	461	333	1 370	669	326	13 339
1895	2 081	6 353	464	336	1 388	681	325	13 523
1896	2 125	6 476	468	335	1 368	693	325	13 686
1897	2 141	6 498	474	329	1 418	716	344	13 817
1898	2 182	6 485	480	325	1 415	752	345	13 882
1899	2 297	6 505	486	333	1 435	829	375	14 159
1900	2 298	6 591	483	355	1 362	877	422	14 288
1901	2 395	6 602	499	377	1 600	980	435	14 789
1902	2 813	6 720	524	397	1 665	961	462	15 444
1903	2 813	6 889	521	410	1 730	961	489	15 716
1904	3 103	7 035	530	419	1 784	951	507	16 233
1905	3 203	7 208	537	429	1 701	941	513	16 437
1906	3 543	7 373	551	435	1 754	920	532	17 014
1907	4 003	7 764	546	455	1 794	917	587	17 973
1908	4 253	7 963	586	491	1 794	896	645	18 536
1909	4 893	8 770	584	520	2 165	919	649	20 409
1910	4 844	9 421	606	533	2 411	878	723	21 326
1911	4 814	9 531	600	543	2 462	878	749	21 488
1912	4 823	9 428	633	555	2 513	878	774	21 516
1913	4 802	9 901	651	568	2 533	890	842	22 100

Table DB.9. **Customs Revenues**
(percentage of government revenue)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	60	1	8	-	41	9	10	29	10	5	56	38	15	16	33	74	23
1881	70	0	8	53	43	10	9	29	12	5	46	38	13	11	34	74	23
1882	63	2	8	56	44	10	8	29	12	5	46	38	13	18	36	83	23
1883	64	2	8	56	44	10	8	29	13	5	49	29	14	16	39	80	23
1884	62	2	7	58	45	10	9	29	6	5	46	40	14	15	39	81	23
1885	63	1	8	54	46	10	9	29	14	5	43	39	12	16	38	78	22
1886	66	2	8	56	45	11	9	29	13	5	45	41	14	15	38	79	22
1887	69	1	8	56	47	11	8	29	14	5	48	43	13	17	40	81	22
1888	70	4	8	59	48	12	9	29	14	4	48	37	16	14	41	79	22
1889	74	4	8	56	46	11	9	29	13	4	44	37	15	17	43	80	21
1890	69	4	7	52	46	11	9	29	15	5	46	38	15	18	42	79	21
1891	65	3	7	46	48	11	9	29	14	5	45	33	14	18	39	82	20
1892	73	4	7	49	44	12	9	29	13	5	43	26	14	18	39	84	20
1893	74	4	7	51	44	13	8	29	13	5	40	33	16	20	37	83	20
1894	68	4	7	51	43	13	9	29	12	5	39	30	16	17	35	84	20
1895	71	4	8	52	45	11	9	29	12	6	40	35	14	15	34	84	19
1896	69	4	10	76	45	12	9	29	12	7	40	29	13	15	35	84	19
1897	54	5	9	75	46	12	9	30	12	7	42	26	14	12	31	86	19
1898	55	5	8	68	47	13	9	30	13	7	43	24	14	12	35	86	18
1899	54	4	9	62	48	12	8	30	13	7	45	30	13	16	38	82	18
1900	48	5	9	54	49	11	8	31	12	7	44	30	12	18	38	81	19
1901	48	4	9	53	48	11	8	31	11	8	4	27	12	17	35	79	20
1902	43	4	8	54	47	10	8	31	10	8	42	26	12	15	37	81	22
1903	53	4	9	46	47	11	8	31	10	9	40	30	12	15	33	80	23
1904	49	4	9	45	40	11	8	31	9	8	41	28	11	14	34	82	24
1905	50	5	9	56	43	11	9	31	9	9	40	28	11	17	32	82	23
1906	52	5	9	57	38	12	8	31	10	9	39	27	11	17	32	81	21
1907	52	4	9	54	44	13	8	31	12	9	40	23	11	16	29	83	20
1908	52	4	9	54	4	12	7	31	11	9	41	24	12	15	29	82	19
1909	53	3	9	52	35	13	7	31	11	9	40	22	11	15	31	81	23
1910	56	5	9	55	35	14	7	31	10	9	42	23	11	16	27	84	16
1911	56	5	9	56	32	16	8	31	11	9	41	24	11	16	25	82	18
1912	52	4	9	57	32	14	8	31	10	10	41	20	11	16	26	84	17
1913	54	-	-	53	28	15	-	31	11	10	36	31	10	17	26	85	17

Table DB.10. **Central Bank Reserves**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	3	187	154	9	43	1 787	539	21	178	140	34	2	176	236	28	-	24
1881	6	200	140	7	48	1 817	531	13	138	107	30	3	172	226	26	-	20
1882	8	193	154	6	45	2 056	566	13	159	97	33	2	171	125	19	-	20
1883	14	199	168	6	45	1 963	576	14	320	116	35	2	198	111	20	57	22
1884	7	206	176	7	45	2 049	538	18	371	120	34	2	202	168	25	64	21
1885	7	209	183	7	44	2 243	634	26	337	142	29	2	273	152	23	66	20
1886	26	217	178	6	45	2 385	688	9	345	175	30	3	283	238	27	67	19
1887	2	224	170	5	48	2 310	781	9	378	148	40	4	251	310	24	76	20
1888	7	233	150	9	50	2 251	863	10	435	152	45	6	273	222	29	74	19
1889	2	241	176	10	48	2 521	776	12	437	134	47	5	308	129	27	76	18
1890	2	244	178	12	50	2 372	782	8	409	105	39	4	416	89	22	81	23
1891	0	245	195	28	52	2 592	925	12	442	120	35	4	450	127	24	85	22
1892	2	289	209	22	52	2 979	861	10	447	124	39	7	534	139	27	89	24
1893	3	278	209	19	54	2 974	832	9	446	130	32	9	407	183	28	89	25
1894	3	307	230	34	54	3 312	1 047	9	510	133	33	11	416	285	38	92	33
1895	3	377	209	40	57	3 185	898	9	502	127	37	12	512	266	39	94	44
1896	2	448	204	31	60	3 143	855	9	511	114	35	13	668	260	40	96	34
1897	2	505	223	24	60	3 159	888	14	461	165	48	13	1 159	266	39	100	30
1898	2	490	212	26	59	3 030	814	11	476	84	44	14	999	200	44	104	29
1899	4	509	217	22	65	3 031	743	15	466	118	43	14	876	367	42	107	29
1900	2	609	245	21	67	3 447	806	17	457	127	36	13	734	395	43	109	29
1901	2	724	279	29	65	3 567	936	17	472	144	40	12	701	369	64	117	32
1902	0	733	284	42	64	3 650	869	21	491	136	34	11	765	394	70	114	29
1903	88	731	272	45	69	3 462	878	22	662	128	31	12	908	410	73	119	28
1904	126	754	283	61	75	3 761	1 014	28	687	142	37	11	978	419	74	131	30
1905	231	713	253	58	78	3 953	887	35	845	154	38	12	1 135	437	87	143	29
1906	271	727	269	25	84	3 704	736	41	974	137	46	11	1 144	455	95	155	29
1907	283	720	284	47	90	3 615	701	46	1 132	150	48	10	1 187	454	93	168	31
1908	344	768	344	60	77	4 371	1 059	45	1 151	152	48	9	1 193	458	94	180	31
1909	456	857	308	41	74	4 371	984	49	1 174	157	50	12	1 379	491	105	192	33
1910	490	835	377	53	73	4 106	1 002	91	1 198	150	55	11	1 376	505	107	204	33
1911	497	818	396	48	72	4 011	1 057	132	1 247	150	60	13	1 381	512	117	229	32
1912	574	754	437	35	73	3 896	1 038	216	1 287	170	62	16	1 513	592	123	216	30
1913	597	784	472	38	77	4 158	1 476	230	1 355	160	74	16	1 616	650	102	243	33

Table DB.11. **M1: Central Bank Note Circulation**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	30	657	340	216	60	2 305	730	51	1 527	191	39	5	1 085	243	39	106	26
1881	28	674	355	212	67	2 576	760	78	1 498	194	38	5	1 028	346	38	110	26
1882	33	721	356	212	64	2 732	756	88	1 506	195	41	4	973	334	37	107	26
1883	42	730	358	211	66	2 926	737	98	1 346	186	41	5	959	351	36	119	25
1884	48	731	358	210	64	2 928	762	80	1 342	186	39	5	899	383	38	133	25
1885	75	703	367	208	62	2 846	751	63	1 304	186	37	5	906	469	39	137	25
1886	89	716	379	213	61	2 789	879	95	1 316	198	39	6	941	527	42	139	24
1887	94	728	389	202	68	2 719	892	97	1 356	195	40	7	971	612	40	148	24
1888	130	763	376	205	69	2 676	983	89	1 342	193	44	10	973	720	44	150	24
1889	164	792	402	197	69	2 876	986	86	1 395	204	49	10	928	736	44	155	24
1890	248	816	405	199	68	3 060	993	92	1 397	208	50	9	907	734	45	172	25
1891	259	834	422	514	72	3 085	1 015	109	1 430	195	48	35	1 054	812	44	181	26
1892	282	822	428	561	72	3 151	1 021	116	1 453	189	45	50	1 074	884	44	174	26
1893	307	859	451	632	76	3 445	1 000	107	1 553	193	47	52	1 072	928	48	178	26
1894	299	811	470	712	73	3 476	1 080	103	1 576	200	48	53	1 047	910	52	181	26
1895	297	814	477	678	78	3 527	1 148	102	1 551	204	51	56	1 055	994	57	193	26
1896	295	813	493	713	80	3 607	1 094	100	1 552	200	53	59	1 067	1 031	63	200	27
1897	293	832	513	781	84	3 687	1 132	119	1 624	202	57	65	901	1 206	69	219	27
1898	295	859	545	778	87	3 694	1 168	116	1 666	203	63	70	662	1 444	71	224	27
1899	295	854	590	734	90	3 820	1 202	112	1 660	219	63	69	491	1 518	75	225	28
1900	292	872	632	670	92	4 034	1 201	125	1 586	214	66	68	555	1 592	72	236	30
1901	292	883	649	680	93	4 116	1 172	127	1 591	222	63	69	542	1 639	101	234	30
1902	293	823	676	676	96	4 162	1 270	127	1 608	222	63	69	554	1 623	137	239	30
1903	380	888	671	675	102	4 310	1 305	130	1 666	234	61	69	579	1 609	166	240	29
1904	408	876	694	674	104	4 283	1 342	123	1 708	236	60	68	856	1 599	173	241	28
1905	498	924	724	669	110	4 408	1 404	117	1 836	259	66	68	1 071	1 550	185	243	29
1906	527	991	770	702	116	4 659	1 481	114	2 032	277	69	69	1 134	1 525	202	242	29
1907	532	1 014	798	744	122	4 800	1 477	119	2 272	260	73	71	1 163	1 557	190	288	29
1908	581	1 057	807	724	122	4 853	1 588	119	2 277	266	73	70	1 118	1 643	201	278	30
1909	685	1 094	845	854	122	5 080	1 640	117	2 351	274	78	70	1 194	1 671	202	286	29
1910	716	1 188	905	925	126	5 198	1 625	119	2 455	281	84	78	1 200	1 715	206	297	29
1911	723	1 271	970	982	136	5 243	1 804	122	2 663	283	93	82	1 299	1 673	218	315	29
1912	800	1 408	1 035	1 004	140	5 323	1 939	149	2 696	299	99	85	1 443	1 863	228	339	29
1913	823	1 247	1 067	897	147	5 665	2 042	215	2 771	310	108	87	1 619	1 931	234	314	30

Table DB.12. **Nominal GDP**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	-	6 629	4 426	620	840	25 409	16 902	374	10 993	1 178	720	502	-	8 497	1 287	-	1 297
1881	-	6 902	4 531	580	839	26 494	17 330	412	9 878	1 163	739	524	-	9 110	1 349	-	1 222
1882	-	7 135	4 637	570	850	27 850	17 489	379	10 657	1 215	760	535	-	9 717	1 335	-	1 244
1883	-	7 164	4 608	690	868	27 243	18 014	382	10 031	1 229	750	532	-	9 947	1 384	-	1 315
1884	370	7 258	4 504	540	839	26 031	18 540	427	9 899	1 221	721	557	-	9 453	1 358	-	1 287
1885	480	6 980	4 217	630	820	25 100	18 731	522	10 585	1 113	679	578	6 286	9 386	1 343	-	1 228
1886	490	6 738	4 020	710	819	25 226	18 935	588	11 017	1 075	667	608	5 920	9 206	1 286	-	1 228
1887	530	7 206	4 174	660	827	25 144	19 280	497	10 197	1 135	659	623	7 217	8 782	1 231	-	1 262
1888	580	7 205	4 305	640	841	25 684	20 716	515	10 103	1 121	710	662	7 576	8 737	1 302	-	1 272
1889	820	7 127	4 567	660	892	27 426	22 749	543	10 278	1 217	770	681	6 803	8 235	1 385	-	1 330
1890	1 100	7 464	4 779	860	965	28 928	23 676	550	11 242	1 197	780	679	6 800	8 322	1 442	-	1 373
1891	1 530	7 770	4 786	1 570	1 008	29 331	22 624	566	11 794	1 221	802	681	6 574	8 612	1 516	-	1 399
1892	1 330	7 427	4 677	1 960	1 005	28 698	24 061	557	10 578	1 183	799	699	7 523	8 886	1 529	-	1 392
1893	1 310	7 662	4 631	2 310	1 000	28 151	24 357	600	10 740	1 137	809	703	7 973	9 068	1 527	-	1 357
1894	1 380	7 816	4 583	2 630	990	28 408	24 361	502	10 382	1 165	816	717	8 433	8 734	1 533	-	1 434
1895	1 660	8 325	4 450	2 790	1 039	27 166	25 254	596	10 804	1 181	832	763	7 725	8 731	1 633	-	1 439
1896	1 520	7 988	4 600	2 910	1 059	28 758	26 979	533	10 829	1 210	875	787	8 531	8 318	1 706	-	1 520
1897	1 480	7 891	4 684	3 190	1 097	30 420	28 714	599	10 549	1 241	919	782	9 172	9 169	1 837	-	1 506
1898	1 540	8 417	4 825	3 260	1 157	31 900	28 714	607	11 894	1 326	998	792	10 308	10 256	1 972	-	1 616
1899	1 450	8 873	5 311	3 130	1 217	32 571	31 761	598	11 934	1 393	1 065	806	11 163	9 971	2 131	2 531	1 750
1900	1 590	8 906	5 800	3 100	1 322	32 806	32 448	553	12 736	1 406	1 115	829	10 962	10 634	2 248	2 548	1 794
1901	1 510	8 712	5 785	2 700	1 372	30 938	31 617	615	13 145	1 492	1 101	811	11 390	11 240	2 186	2 592	1 913
1902	1 630	9 117	5 766	2 900	1 396	31 880	31 928	605	12 566	1 533	1 088	816	12 678	10 790	2 191	2 704	1 854
1903	1 750	9 482	5 826	2 900	1 462	33 891	34 402	655	13 697	1 508	1 081	843	11 952	11 659	2 372	2 896	1 842
1904	1 980	9 341	6 192	3 200	1 479	33 071	36 284	643	13 513	1 626	1 081	859	13 255	11 671	2 396	2 934	1 876
1905	2 450	10 635	6 518	2 700	1 558	33 215	38 878	670	14 227	1 695	1 105	864	12 603	11 559	2 485	3 104	1 936
1906	2 730	11 447	7 183	3 200	1 627	35 615	40 643	657	15 148	1 822	1 187	874	12 684	11 607	2 790	3 317	1 957
1907	2 860	12 019	7 366	3 700	1 739	38 741	42 976	742	17 028	1 856	1 265	903	13 470	12 632	2 981	3 674	1 997
1908	3 030	12 302	7 441	3 700	1 773	37 326	42 441	697	16 261	1 869	1 299	928	15 062	12 032	3 039	3 485	1 977
1909	3 460	12 733	7 107	4 200	1 828	40 101	44 358	756	17 657	1 904	1 316	941	16 130	12 347	3 061	3 640	2 011
1910	4 010	13 457	7 698	4 800	1 922	40 914	45 785	715	17 513	2 023	1 435	947	17 204	11 871	3 298	3 879	2 052
1911	4 060	14 165	7 961	5 500	2 051	45 089	48 106	937	19 369	2 304	1 530	906	16 957	12 616	3 375	4 145	2 163
1912	4 500	15 214	8 490	5 700	2 159	49 360	51 563	1 034	20 196	2 416	1 680	936	19 603	12 616	3 619	4 163	2 206
1913	4 550	15 039	8 602	5 700	2 301	49 571	52 440	1 483	21 025	2 505	1 857	950	20 266	13 517	3 930	4 328	2 354

Table DB.13. **Prices**

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	-	88.00	98.00	36.26	108.60	98.40	87.00	73.16	93.30	94.70	81.40	82.18	-	90.00	91.00	102.40	111.00
1881	-	86.80	99.00	33.92	107.60	97.80	85.00	70.84	87.26	94.60	82.30	84.16	-	90.60	89.00	96.92	109.00
1882	-	87.60	98.00	37.50	104.00	96.00	81.00	93.03	89.56	95.70	82.80	85.15	-	93.90	88.00	98.56	110.00
1883	-	86.70	96.00	48.42	102.80	99.00	80.00	95.63	83.91	92.00	81.40	81.19	-	89.50	85.00	92.79	108.00
1884	34.30	84.50	93.00	37.89	98.90	97.10	78.00	95.46	80.36	90.70	78.10	76.24	-	81.50	82.00	88.65	98.00
1885	41.96	80.50	86.00	41.45	97.10	94.70	75.00	83.38	84.67	88.50	73.50	74.26	79.53	80.50	78.00	83.46	92.00
1886	42.85	79.00	81.00	39.34	93.70	93.30	72.00	75.35	85.15	87.40	72.10	75.25	76.56	79.90	75.00	83.08	87.00
1887	41.39	76.90	81.00	33.08	91.80	90.70	73.00	98.42	76.41	89.10	70.20	74.26	78.36	77.00	72.00	83.94	85.00
1888	41.21	76.80	83.00	32.08	91.10	91.70	75.00	95.18	80.75	89.70	71.60	74.26	84.07	78.40	79.00	82.02	87.00
1889	49.70	78.30	84.00	31.58	92.70	91.90	82.00	99.09	85.44	89.50	74.00	79.21	79.78	79.70	79.00	86.83	89.00
1890	69.67	78.50	86.00	41.15	95.10	91.10	86.50	95.93	87.64	92.40	74.00	87.13	79.33	79.10	82.00	87.98	89.00
1891	108.92	80.40	86.00	75.12	97.40	92.70	86.00	99.06	85.25	92.00	77.20	85.15	83.04	78.00	82.00	85.87	92.00
1892	86.99	77.80	82.00	98.25	96.10	91.90	80.00	99.87	81.03	88.40	75.80	87.13	86.09	80.20	77.00	81.92	87.00
1893	81.62	77.50	80.00	110.53	93.70	90.40	77.00	110.70	75.96	89.20	74.40	88.12	79.18	78.10	74.00	81.54	85.00
1894	79.85	77.10	78.00	131.83	90.90	93.30	73.00	108.91	73.75	87.50	72.60	90.10	73.12	75.20	71.00	77.79	80.00
1895	95.42	78.40	74.00	146.84	91.80	90.90	72.00	84.49	77.59	87.50	72.10	86.14	71.75	79.50	70.00	76.73	78.00
1896	80.65	75.30	75.00	161.22	88.90	89.40	72.00	82.53	78.16	87.30	72.60	87.13	71.39	75.80	71.00	78.27	76.00
1897	83.98	77.20	75.00	197.52	84.20	87.00	76.00	93.92	76.63	86.00	72.60	92.08	77.45	82.40	72.00	80.67	77.00
1898	80.60	79.70	76.00	214.47	89.20	88.20	79.00	94.15	78.74	87.90	77.70	96.04	83.43	90.50	76.00	81.25	80.00
1899	69.79	79.70	82.00	205.92	87.90	89.40	83.00	92.19	80.75	89.80	80.00	94.06	83.86	92.10	81.00	84.13	79.00
1900	78.44	78.80	87.00	171.75	93.00	89.40	90.00	91.32	84.50	91.90	83.30	92.08	82.25	96.70	84.00	82.12	86.00
1901	68.68	77.80	86.00	135.34	95.90	89.90	83.00	95.12	84.10	91.10	82.30	91.09	82.13	96.90	82.00	81.06	83.00
1902	75.64	76.80	84.00	132.72	95.10	88.80	81.00	76.10	81.30	91.30	80.50	88.12	82.90	94.70	81.00	82.21	83.00
1903	71.10	77.00	83.00	127.19	94.50	88.50	82.00	85.87	80.60	92.90	79.50	91.09	82.78	97.70	81.00	85.58	83.00
1904	72.69	79.30	86.00	129.55	92.10	87.20	82.00	87.66	77.00	94.20	80.00	96.04	81.84	99.50	82.00	84.33	84.00
1905	79.41	86.10	88.00	98.00	93.90	86.80	86.00	94.05	80.30	93.70	80.90	95.05	86.05	100.00	83.00	86.83	84.00
1906	84.25	86.80	95.00	105.26	95.50	88.20	92.00	103.33	83.30	96.50	83.30	95.05	87.57	97.30	88.00	90.38	87.00
1907	86.43	88.10	96.00	118.02	94.40	89.40	97.00	101.29	89.80	97.00	86.50	95.05	96.80	101.40	92.00	97.69	91.00
1908	83.39	91.50	96.00	105.26	96.20	91.50	90.00	102.39	87.40	94.50	87.40	96.04	97.48	98.60	88.00	90.38	88.00
1909	90.72	94.10	90.00	107.83	97.00	91.20	91.00	103.21	88.10	95.10	87.40	97.03	97.03	97.30	89.00	92.12	89.00
1910	98.03	93.80	95.00	107.50	97.50	101.60	93.00	109.43	88.20	96.70	89.30	93.07	94.56	98.20	91.00	95.87	93.00
1911	97.51	99.50	96.00	105.26	97.30	92.50	94.00	99.51	95.30	100.60	92.10	98.02	99.01	94.70	94.00	100.19	94.00
1912	99.91	100.50	100.00	96.77	97.90	101.30	102.00	95.89	102.60	100.90	96.70	97.03	103.43	99.40	98.00	98.37	99.00
1913	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table DB.14. **Nominal Exports**
(millions of national units)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	70	676	1 217	231	177	3 468	2 923	60	1104	511	109	25	624	737	236	–	223
1881	63	732	1 303	210	162	3 561	3 030	70	1165	536	121	21	574	759	222	–	234
1882	60	782	1 326	197	161	3 574	3 224	76	1152	536	123	25	707	768	254	–	241
1883	60	750	1 343	217	167	3 452	3 259	83	1188	534	116	23	838	838	256	–	240
1884	69	692	1 338	226	150	3 232	3 190	74	1071	586	112	22	701	721	239	–	233
1885	116	672	1 200	195	133	3 088	2 854	76	951	639	102	23	695	766	246	666	213
1886	97	699	1 182	264	139	3 249	2 976	79	1028	665	103	26	726	623	228	667	213
1887	114	673	1 241	206	154	3 246	3 136	103	1002	662	107	21	690	760	247	671	222
1888	148	729	1 244	237	157	3 247	3 207	96	892	695	122	23	676	817	282	673	235
1889	219	766	1 459	259	173	3 704	3 167	108	951	677	133	23	828	851	302	695	249
1890	264	772	1 437	281	195	3 753	3 335	96	896	740	131	22	845	876	304	703	264
1891	386	787	1 519	439	209	3 570	3 176	107	877	748	130	21	742	962	323	672	247
1892	373	723	1 369	618	208	3 461	2 954	82	958	697	126	25	644	998	328	658	227
1893	306	806	1 356	667	198	3 236	3 092	88	964	720	136	23	615	906	328	646	218
1894	365	796	1 304	729	222	3 078	2 961	74	1027	690	132	24	754	904	298	621	216
1895	413	742	1 385	791	217	3 374	3 318	73	1038	728	137	27	707	915	311	663	226
1896	345	774	1 468	756	219	3 401	3 525	72	1052	744	148	26	807	1 244	340	688	240
1897	295	766	1 626	824	243	3 598	3 635	82	1092	775	168	27	902	1 349	358	693	234
1898	345	808	1 787	840	239	3 511	3 757	88	1204	783	159	31	826	1 314	345	724	233
1899	416	931	1 949	832	270	4 153	4 217	94	1431	911	159	29	1 025	1 088	358	796	255
1900	357	971	1 923	850	282	4 109	4 611	103	1338	933	173	31	716	1 222	391	836	291
1901	391	957	1 828	861	291	4 013	4 431	94	1374	953	165	28	762	1 159	353	837	280
1902	418	943	1 926	736	318	4 252	4 678	80	1464	1 007	181	28	860	1 138	392	874	283
1903	502	1 065	2 110	743	352	4 252	5 015	86	1483	1 030	193	31	1 001	1 192	441	889	291
1904	600	1 045	2 183	776	359	4 451	5 223	91	1564	1 132	193	31	1 006	1 253	415	891	301
1905	733	1 122	2 334	685	391	4 867	5 732	84	1694	1 048	218	29	1 077	1 279	450	969	330
1906	663	1 190	2 794	800	394	5 265	6 359	124	1894	1 277	246	31	1 095	1 334	504	1 071	376
1907	672	1 229	2 834	861	417	5 596	6 847	118	1938	1 526	229	30	1 053	1 344	525	1 153	426
1908	831	1 128	2 848	706	440	5 051	6 399	111	1718	1 731	219	28	998	1 166	482	1 038	377
1909	902	1 160	2 810	1 017	444	5 718	6 597	102	1855	1 629	243	31	1 428	1 138	473	1 098	378
1910	883	1 210	3 407	939	485	6 234	7 475	145	2065	1 674	283	36	1 449	1 255	493	1 196	430
1911	777	1 202	3 580	1 004	537	6 077	8 106	141	2190	1 804	298	34	1 591	1 396	664	1 257	454
1912	1 139	1 367	3 952	1 120	597	6 713	8 967	146	2383	2 057	336	34	1 519	1 509	760	1 358	487
1913	1 178	1 385	3 716	982	637	6 880	10 097	119	2497	2 097	393	35	1 520	1 552	817	1 376	525

Table DB.15. **Population**
(in thousands)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	2 460	38 300	5 497	11 690	1 976	37 450	45 095	1 695	28 690	4 043	1 919	4 632	-	16 859	4 572	2 839	34 623
1881	2 539	38 630	5 562	11 930	1 995	37 590	45 428	2 004	28 831	4 091	1 923	4 673	-	16 951	4 569	2 853	34 935
1882	2 621	38 750	5 628	12 176	2 013	37 730	45 719	2 026	29 061	4 140	1 920	4 715	-	17 043	4 576	2 863	35 206
1883	2 705	39 110	5 694	12 427	2 029	37 860	46 016	2 048	29 267	4 189	1 919	4 757	-	17 136	4 591	2 874	35 450
1884	2 792	39 460	5 761	12 683	2 051	38 010	46 396	2 071	29 528	4 239	1 929	4 799	-	17 230	4 624	2 885	35 724
1885	2 882	40 020	5 829	12 944	2 076	38 110	46 707	2 093	29 806	4 289	1 944	4 842	109 000	17 323	4 664	2 896	36 015
1886	2 975	40 450	5 872	13 211	2 102	38 230	47 134	2 116	30 020	4 340	1 958	4 885	111 000	17 418	4 700	2 917	36 313
1887	3 070	40 960	5 915	13 483	2 124	38 260	47 630	2 139	30 213	4 392	1 970	4 929	113 000	17 513	4 726	2 918	36 598
1888	3 169	41 330	5 959	13 761	2 143	38 290	48 168	2 163	30 408	4 444	1 977	4 973	115 000	17 600	4 742	2 929	36 881
1889	3 271	41 820	6 003	14 045	2 161	38 370	48 717	2 187	30 633	4 497	1 984	5 017	117 000	17 678	4 761	2 940	37 178
1890	3 376	42 040	6 048	14 334	2 179	38 380	49 241	2 220	30 866	4 545	1 997	5 062	118 000	17 757	4 780	2 951	37 485
1891	3 485	42 310	6 115	14 618	2 195	38 350	49 762	2 254	31 059	4 601	2 013	5 105	119 000	17 836	4 794	2 965	37 802
1892	3 597	42 530	6 182	14 907	2 210	38 360	50 266	2 289	31 261	4 658	2 026	5 138	120 000	17 916	4 805	3 002	38 134
1893	3 712	42 860	6 250	15 202	2 226	38 380	50 757	2 324	31 475	4 716	2 038	5 182	122 000	17 996	4 816	3 040	38 490
1894	3 832	43 120	6 319	15 503	2 248	38 420	51 339	2 360	31 686	4 774	2 057	5 220	123 000	18 076	4 849	3 077	38 859
1895	3 955	43 410	6 388	15 810	2 276	38 460	52 001	2 396	31 865	4 883	2 083	5 251	124 000	18 157	4 986	3 114	39 221
1896	4 103	43 740	6 442	16 123	2 306	38 520	52 753	2 433	32 042	4 893	2 112	5 275	125 000	18 238	4 941	3 151	39 599
1897	4 256	44 090	6 496	16 442	2 338	38 600	53 569	2 451	32 259	4 954	2 142	5 297	126 000	18 320	4 986	3 188	39 987
1898	4 415	45 250	6 552	16 768	2 371	38 800	54 406	2 468	32 469	5 015	2 174	5 331	128 000	18 402	5 036	3 226	40 381
1899	4 580	44 410	6 609	17 100	2 403	38 900	55 248	2 486	32 673	5 077	2 204	5 365	130 000	18 484	5 080	3 263	40 773
1900	4 751	46 621	6 666	17 438	2 432	38 900	56 046	2 504	32 861	5 142	2 230	5 407	133 000	18 566	5 117	3 300	41 155
1901	4 928	47 052	6 747	17 837	2 463	38 980	56 874	2 521	33 054	5 221	2 255	5 450	135 000	18 659	5 156	3 341	41 538
1902	5 113	47 484	6 848	18 245	2 491	39 050	57 767	2 539	33 315	5 305	2 275	5 497	137 000	18 788	5 187	3 384	41 893
1903	5 303	47 566	6 941	18 662	2 519	39 120	58 629	2 558	33 558	5 389	2 288	5 552	139 000	18 919	5 210	3 428	42 246
1904	5 502	48 648	7 030	19 088	2 546	39 190	59 475	2 576	33 812	5 471	2 297	5 613	141 000	19 050	5 241	3 472	42 611
1905	5 707	48 209	7 118	19 525	2 574	39 220	60 314	2 594	34 083	5 551	2 309	5 670	144 000	19 133	5 278	3 516	42 981
1906	5 920	48 611	7 200	19 971	2 603	39 270	61 153	2 613	34 340	5 632	2 319	5 720	146 000	19 316	5 316	3 560	43 361
1907	6 141	49 013	7 280	20 428	2 635	39 270	62 013	2 631	34 611	5 710	2 329	5 758	149 000	19 450	5 357	3 604	43 737
1908	6 371	49 414	7 352	20 895	2 668	39 370	62 863	2 649	34 893	5 786	2 346	5 800	153 000	19 585	5 404	3 647	44 124
1909	6 609	49 816	7 419	21 373	2 702	39 430	63 717	2 666	35 184	5 842	2 367	5 840	157 000	19 721	5 453	3 691	44 520
1910	6 856	50 218	7 438	21 861	2 737	39 540	64 568	2 684	35 519	5 902	2 384	5 883	161 000	19 858	5 449	3 735	44 916
1911	7 112	50 700	7 457	22 361	2 770	39 630	65 539	2 701	35 840	5 984	2 401	5 937	164 000	19 994	5 542	3 776	45 268
1912	7 377	51 102	7 530	22 873	2 802	39 670	66 146	2 719	36 063	6 068	2 423	6 004	168 000	20 128	5 583	3 819	45 436
1913	7 653	50 664	7 605	23 396	2 833	39 770	66 978	4 819	36 167	6 164	2 447	6 008	171 000	20 263	5 621	3 864	45 649

Table DB.16. **Yields on Government Bonds**

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	7.05	5.21	3.55	5.16	-	3.56	4.05	.	5.03	3.84	-	5.73	5.14	15.78	.	-	3.06
1881	6.26	4.89	3.51	4.99	-	3.54	3.96	.	4.74	3.72	-	5.67	5.05	11.95	3.97	-	2.93
1882	6.16	4.92	3.55	4.96	-	3.67	3.94	6.05	4.85	3.75	-	5.68	5.30	10.75	3.94	-	2.94
1883	6.05	4.71	3.62	4.98	-	3.83	3.92	6.06	4.74	3.84	-	5.64	5.11	6.64	3.96	-	2.85
1884	6.04	4.62	3.57	5.14	-	3.88	3.88	6.78	4.51	3.75	-	5.97	4.83	6.56	3.95	-	2.73
1885	6.04	4.48	3.37	5.35	-	3.79	3.81	7.89	4.48	3.60	-	6.64	4.76	6.90	3.89	-	2.86
1886	5,92	4.28	3.18	5.08	-	3.66	3.74	8.30	4.33	3.36	-	5.85	4.46	6.45	3.84	-	2.83
1887	5.44	4.41	3.24	4.80	-	3.78	3.70	7.17	4.42	3.38	3.58	5.23	4.68	5.93	3.77	-	2.75
1888	5.18	4.38	3.23	4.62	-	3.63	3.64	6.44	4.48	3.25	3.48	4.71	4.67	5.49	3.76	-	2.64
1889	5.23	4.25	3.20	4.70	-	3.51	3.60	5.38	4.55	2.99	3.34	4.48	4.31	5.28	3.84	-	2.65
1890	5.98	4.16	3.08	5.17	-	3.26	3.68	5.29	4.61	3.19	3.33	4.86	4.11	5.14	3.84	-	2.69
1891	11.74	4.13	3.04	6.05	-	3.18	3.71	5.89	4.67	3.15	3.45	7.07	4.10	5.47	3.84	-	2.70
1892	12.81	4.10	3.03	6.85	-	3.07	3.68	7.19	4.73	3.01	3.41	12.33	4.18	6.24	3.81	-	2.67
1893	9.60	4.08	2.96	6.67	-	3.10	3.65	11.33	4.99	2.96	3.42	13.98	4.04	6.14	3.78	3.11	2.62
1894	7.07	3.98	2.94	6.36	-	2.98	3.56	15.53	4.93	2.66	3.27	12.71	3.97	5.77	3.85	3.02	2.54
1895	6.53	3.87	2.98	5.81	3.02	2.96	3.36	15.27	4.53	2.69	3.08	11.50	3.94	5.72	3.67	2.94	2.41
1896	5.18	3.81	2.97	6.17	3.06	2.94	3.35	16.33	4.53	2.80	3.03	11.38	3.88	5.96	3.32	2.87	2.30
1897	6.14	3.80	2.96	6.68	3.05	2.90	3.36	17.86	4.26	2.84	3.01	13.47	3.87	6.17	3.36	2.93	2.26
1898	7.30	3.85	2.98	7.82	3.06	2.92	3.40	5.63	4.27	2.88	3.06	14.32	3.87	9.09	3.39	2.97	2.29
1899	6.78	3.94	3.05	7.28	3.26	2.98	3.55	5.33	4.24	3.14	3.32	12.07	3.92	6.39	3.47	3.00	2.38
1900	7.01	4.01	3.15	6.97	3.49	2.98	3.68	5.76	4.23	3.29	3.52	12.28	3.97	5.29	3.54	3.08	2.55
1901	6.30	3.91	3.08	6.39	3.34	2.96	3.65	5.70	4.06	3.24	3.35	11.54	3.94	5.53	3.21	2.97	2.69
1902	6.18	3.82	3.01	5.84	3.15	2.99	3.52	5.42	3.48	3.07	3.20	9.83	3.91	4.78	3.09	2.93	2.68
1903	5.44	3.86	3.01	5.49	3.17	3.06	3.53	5.35	3.23	3.11	3.19	8.30	3.92	4.45	3.06	2.98	2.79
1904	5.19	3.91	3.01	5.45	3.34	3.11	3.57	5.02	3.27	3.12	3.34	4.82	4.28	4.59	3.14	3.08	2.86
1905	4.97	3.95	3.01	4.90	3.24	3.03	3.57	4.28	3.19	3.16	3.42	4.33	4.62	4.34	3.20	2.96	2.81
1906	4.95	4.02	3.01	4.91	3.20	3.08	3.63	4.26	3.20	3.17	3.30	4.23	5.08	4.17	3.14	2.98	2.86
1907	5.01	4.07	3.07	5.31	3.40	3.16	3.75	4.34	3.37	3.31	3.47	4.49	5.09	4.27	3.30	3.13	3.00
1908	4.92	4.03	3.17	5.18	3.45	3.13	3.80	4.25	3.41	3.31	3.52	4.82	4.61	4.16	3.46	3.21	2.93
1909	4.89	3.97	3.15	4.96	3.35	3.07	3.70	4.18	3.39	3.27	3.42	4.75	4.43	4.09	3.38	3.21	3.02
1910	4.85	3.94	3.20	4.53	3.53	3.06	3.76	4.39	3.40	3.25	3.49	4.48	4.21	4.18	3.42	3.33	3.12
1911	4.90	3.99	3.34	4.59	3.62	3.14	3.79	4.44	3.43	3.52	3.59	4.50	4.17	4.18	3.46	3.44	3.19
1912	4.90	4.13	3.60	4.57	3.91	3.27	3.91	4.57	3.59	3.71	3.73	4.61	4.25	4.28	3.63	3.63	3.32
1913	4.97	4.38	3.90	4.90	3.93	3.44	4.09	4.66	3.60	3.50	3.96	4.72	4.37	4.40	3.75	-	3.43

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Table DB.17. **Short-Term Interest Rates**

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	6.25	4.00	3.30	n.a.	-	2.81	4.24	7.00	4.50	3.00	-	5.77	6.00	4.00	4.34	3.02	2.79
1881	-	4.00	4.07	n.a.	-	3.84	4.42	7.25	4.58	3.27	-	5.04	6.00	4.00	4.00	4.11	3.48
1882	-	4.20	4.37	n.a.	-	3.80	4.54	7.25	5.00	4.49	-	5.63	6.00	4.54	4.45	4.45	4.18
1883	-	4.12	3.56	n.a.	-	3.08	4.00	7.25	5.00	4.12	-	5.80	6.00	4.81	4.75	3.04	3.58
1884	-	4.00	3.27	n.a.	-	3.00	4.00	8.00	4.83	3.18	-	5.90	6.00	4.75	4.49	2.88	2.93
1885	-	4.00	3.24	n.a.	-	3.00	4.12	8.00	5.00	2.70	-	6.00	5.92	4.19	4.50	3.09	2.99
1886	8.13	4.00	2.76	n.a.	-	3.00	3.28	8.00	4.75	2.50	-	5.27	5.00	4.00	4.08	3.01	3.02
1887	8.46	4.12	3.05	n.a.	-	3.00	3.41	7.10	5.50	2.50	-	5.00	5.00	4.00	4.00	2.93	3.33
1888	9.15	4.17	3.27	n.a.	3.00	3.10	3.32	7.00	5.50	2.50	-	5.00	5.36	4.00	3.56	3.14	3.30
1889	9.58	4.18	3.54	n.a.	3.00	3.09	3.68	6.75	5.25	2.50	-	5.00	5.68	4.00	3.56	3.72	3.58
1890	9.33	4.48	3.18	n.a.	3.16	3.00	4.52	6.50	6.00	2.79	-	5.80	5.40	4.00	4.48	3.90	4.52
1891	-	4.40	3.00	n.a.	3.73	3.00	3.78	6.50	5.83	3.12	4.98	6.03	4.87	4.06	4.90	3.93	3.28
1892	-	4.02	2.69	n.a.	4.00	2.70	3.20	6.50	5.21	2.70	5.50	6.00	4.92	5.43	4.75	3.06	2.51
1893	-	4.24	2.82	n.a.	3.68	2.50	4.07	6.50	5.25	3.40	5.00	6.00	4.79	5.50	4.21	3.37	3.05
1894	-	4.08	3.00	n.a.	3.68	2.50	3.12	6.50	5.71	2.58	4.52	6.00	4.17	5.50	4.00	3.17	2.10
1895	-	4.30	2.61	n.a.	3.50	2.10	3.14	6.50	5.00	2.50	3.84	6.00	4.89	4.63	4.00	3.27	2.00
1896	-	4.09	2.84	n.a.	3.52	2.00	3.66	6.50	4.65	3.03	4.00	5.71	4.50	4.78	3.78	3.95	2.48
1897	-	4.00	3.00	n.a.	4.41	2.00	3.81	6.50	4.62	3.13	4.64	5.50	4.66	5.00	4.59	3.92	2.63
1898	-	4.16	3.03	n.a.	4.28	2.20	4.27	6.50	4.44	2.83	4.29	5.50	4.83	5.00	4.88	4.31	3.25
1899	-	5.03	3.91	n.a.	5.41	3.06	5.04	6.50	4.37	3.58	5.95	5.50	5.32	4.58	5.89	4.96	3.74
1900	-	4.58	4.09	n.a.	5.87	3.21	5.33	6.00	4.56	3.61	6.50	5.50	5.57	3.69	5.87	4.88	3.94
1901	7.06	4.08	3.28	n.a.	5.33	3.00	4.10	6.50	4.75	3.23	5.67	5.50	5.15	3.68	5.46	3.98	3.72
1902	6.71	3.55	3.00	n.a.	4.06	3.00	3.32	6.50	4.81	3.00	4.58	5.50	4.55	4.00	4.51	3.77	3.33
1903	5.29	3.50	3.17	n.a.	4.31	3.00	3.84	6.50	4.54	3.40	5.21	5.50	4.50	4.16	4.50	4.06	3.75
1904	4.33	3.50	3.00	n.a.	4.50	3.00	4.22	6.50	4.40	3.23	4.90	5.50	5.38	4.50	4.61	4.05	3.30
1905	4.67	3.70	3.17	n.a.	4.29	3.00	3.82	6.50	4.00	2.68	4.86	5.50	5.63	4.50	4.73	4.05	3.01
1906	5.55	4.33	3.84	n.a.	5.22	3.00	5.15	6.50	4.54	4.11	5.18	5.50	7.27	4.50	5.20	4.76	4.27
1907	6.52	4.90	4.94	n.a.	6.18	3.46	6.03	6.50	4.60	5.10	5.22	5.50	7.12	4.50	6.10	4.93	4.88
1908	6.78	4.25	3.57	n.a.	6.14	3.04	4.76	6.00	4.62	3.38	5.34	5.99	6.00	4.50	5.78	3.73	3.00
1909	6.29	4.00	3.11	n.a.	4.94	3.00	3.93	6.00	4.40	2.88	4.54	6.00	4.99	4.50	4.69	3.22	3.10
1910	6.37	4.19	4.12	n.a.	5.00	3.00	4.35	6.00	4.66	4.23	4.50	6.00	4.50	4.50	4.63	3.51	3.72
1911	7.00	4.40	4.16	n.a.	4.62	3.12	4.40	6.25	4.96	3.45	4.63	6.00	4.50	4.50	4.57	3.70	3.47
1912	7.62	5.15	4.41	n.a.	5.06	3.38	4.95	6.50	5.48	4.00	5.38	6.00	5.00	4.50	4.81	4.20	3.78
1913	7.68	5.95	5.00	n.a.	5.75	4.00	5.88	6.50	5.62	4.50	5.50	5.74	6.00	4.50	5.50	4.81	4.77

Table DB.18. Exchange Rates
(conversion matrix : French francs per national unit)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	4.34	2.11	1.00	2.35	1.37	1	1.22	0.98	0.91	2.07	1.37	5.54	2.59	1.02	1.37	1.00	25.28
1881	4.82	2.12	1.00	2.30	1.37	1	1.22	0.96	0.98	2.07	1.37	5.49	2.59	1.01	1.37	1.00	25.26
1882	5.20	2.09	1.00	2.25	1.37	1	1.22	0.92	0.97	2.06	1.37	5.41	2.48	0.98	1.37	1.00	25.20
1883	5.17	2.08	1.00	2.14	1.37	1	1.22	0.88	1.00	2.07	1.37	5.46	2.45	0.99	1.37	1.00	25.23
1884	4.84	2.05	1.00	2.14	1.37	1	1.22	0.96	1.00	2.06	1.37	5.46	2.49	0.99	1.37	1.00	25.19
1885	3.44	2.01	1.00	1.93	1.37	1	1.23	0.95	1.00	2.07	1.37	5.45	2.51	0.98	1.37	1.00	25.25
1886	3.59	1.98	1.00	2.16	1.37	1	1.22	0.88	1.00	2.07	1.37	5.52	2.43	0.98	1.37	1.00	25.22
1887	3.69	1.98	1.00	2.35	1.38	1	1.23	0.79	1.00	2.07	1.38	5.55	2.24	0.99	1.38	1.00	25.30
1888	3.40	2.01	1.00	2.66	1.38	1	1.23	0.79	0.99	2.08	1.38	5.55	2.31	0.99	1.38	1.00	25.31
1889	2.81	2.08	1.00	2.86	1.37	1	1.22	0.81	0.99	2.07	1.37	5.54	2.59	0.97	1.37	1.00	25.23
1890	1.93	2.14	1.00	2.38	1.37	1	1.22	0.81	0.99	2.07	1.37	5.50	2.83	0.96	1.37	1.00	25.23
1891	1.36	2.14	1.00	1.67	1.38	1	1.23	0.78	0.99	2.07	1.38	4.97	2.74	0.94	1.38	1.00	25.23
1892	1.53	2.09	1.00	1.24	1.37	1	1.22	0.70	0.97	2.06	1.37	4.24	2.46	0.87	1.37	1.00	25.17
1893	1.54	2.02	1.00	1.22	1.37	1	1.22	0.63	0.93	2.06	1.37	4.39	2.55	0.84	1.37	1.00	25.17
1894	1.40	2.00	1.00	1.04	1.37	1	1.22	0.57	0.90	2.06	1.37	4.27	2.65	0.84	1.37	1.00	25.16
1895	1.46	2.05	1.00	1.05	1.37	1	1.22	0.56	0.95	2.06	1.37	4.36	2.66	0.87	1.37	1.00	25.24
1896	1.70	2.07	1.00	0.95	1.37	1	1.22	0.58	0.93	2.06	1.37	4.24	2.62	0.83	1.37	1.00	25.18
1897	1.71	2.08	1.00	0.82	1.37	1	1.22	0.60	0.95	2.07	1.37	3.75	2.62	0.77	1.37	1.00	25.14
1898	1.95	2.08	1.00	0.75	1.37	1	1.22	0.68	0.93	2.06	1.37	3.45	2.63	0.64	1.37	1.00	25.25
1899	2.25	2.06	1.00	0.78	1.37	1	1.22	0.64	0.93	2.06	1.37	3.83	2.62	0.80	1.37	0.99	25.21
1900	2.18	2.05	1.00	0.96	1.36	1	1.22	0.61	0.94	2.06	1.36	3.86	2.62	0.77	1.36	0.99	25.14
1901	2.16	2.08	1.00	1.19	1.37	1	1.22	0.61	0.96	2.06	1.37	3.89	2.62	0.72	1.37	1.00	25.15
1902	2.16	2.08	1.00	1.26	1.37	1	1.22	0.62	0.99	2.05	1.37	4.28	2.62	0.74	1.37	1.00	25.14
1903	2.23	2.08	1.00	1.25	1.37	1	1.22	0.64	1.00	2.06	1.37	4.40	2.63	0.74	1.37	1.00	25.14
1904	2.22	2.08	1.00	1.27	1.37	1	1.22	0.73	1.00	2.06	1.37	4.52	2.63	0.72	1.37	1.00	25.15
1905	2.22	2.07	1.00	1.64	1.37	1	1.22	0.81	1.00	2.06	1.37	5.11	2.62	0.76	1.37	1.00	25.14
1906	2.22	2.07	1.00	1.70	1.37	1	1.22	0.91	1.00	2.06	1.37	5.35	2.57	0.89	1.36	1.00	25.15
1907	2.23	2.08	1.00	1.60	1.37	1	1.22	0.93	1.00	2.07	1.37	5.31	2.62	0.90	1.37	1.00	25.19
1908	2.22	2.10	1.00	1.59	1.38	1	1.23	0.93	1.00	2.08	1.38	4.80	2.64	0.89	1.38	1.00	25.15
1909	2.22	2.10	1.00	1.59	1.38	1	1.23	0.97	1.00	2.08	1.38	4.78	2.66	0.93	1.38	1.00	25.20
1910	2.22	2.10	1.00	1.69	1.38	1	1.23	1.00	1.00	2.08	1.38	5.10	2.66	0.93	1.38	1.00	25.23
1911	2.23	2.10	1.00	1.70	1.39	1	1.23	1.00	0.99	2.09	1.39	5.11	2.66	0.93	1.39	1.00	25.26
1912	2.23	2.09	1.00	1.70	1.38	1	1.23	1.00	0.99	2.09	1.38	5.01	2.65	0.93	1.38	1.00	25.24
1913	2.23	2.09	1.01	1.70	1.38	1	1.23	1.00	0.98	2.08	1.38	4.75	2.65	0.93	1.38	1.00	25.25

Table DB.19. **Exchange-Rate Volatility**

(Index numbers for volatility of each country's currency, measured against the UK Pound Sterling. See text of this Data Appendix for the index formula and a description.)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland
1880	-	0.0207	0.0074	0.4385	0.0060	0.0040	0.0079	0.0263	0.0867	0.0052	0.0070	0.0133	0.0564	0.0291	0.0085	0.0043
1881	-	0.0208	0.0102	0.2499	0.0080	0.0087	0.0040	0.0602	0.0509	0.0162	0.0088	0.0077	0.0774	0.0110	0.0082	0.0150
1882	-	0.0175	0.0134	0.3382	0.0090	0.0093	0.0086	0.1114	0.0497	0.0124	0.0088	0.0179	0.0142	0.0333	0.0088	0.0125
1883	0.0634	0.0052	0.0119	0.1091	0.0103	0.0066	0.0069	0.0659	0.0139	0.0110	0.0096	0.0077	0.0379	0.0082	0.0102	0.0106
1884	0.1050	0.0060	0.0217	0.4455	0.0078	0.0042	0.0040	0.0653	0.0059	0.0060	0.0074	0.0077	0.0727	0.0186	0.0070	0.0056
1885	0.6035	0.0149	0.0081	0.2543	0.0117	0.0083	0.0103	0.0402	0.0202	0.0120	0.0127	0.0085	0.0512	0.0183	0.0142	0.0121
1886	1.0525	0.0138	0.0032	0.8448	0.0066	0.0027	0.0033	0.0999	0.0062	0.0034	0.0065	0.0157	0.0112	0.0261	0.0065	0.0074
1887	0.4863	0.0260	0.0081	0.2033	0.0127	0.0087	0.0110	0.0822	0.0168	0.0093	0.0125	0.0057	0.0394	0.0138	0.0125	0.0168
1888	0.2395	0.0429	0.0068	0.5819	0.0075	0.0083	0.0057	0.0547	0.0304	0.0095	0.0071	0.0084	0.2342	0.0113	0.0082	0.0097
1889	1.5497	0.0425	0.0140	0.1951	0.0079	0.0132	0.0079	0.0457	0.0338	0.0091	0.0095	0.0049	0.0978	0.0115	0.0119	0.0096
1890	1.0754	0.0640	0.0087	0.5019	0.0105	0.0076	0.0110	0.0215	0.0194	0.0073	0.0111	0.0092	0.1677	0.0444	0.0118	0.0064
1891	0.7895	0.0445	0.0125	1.6402	0.0100	0.0113	0.0118	0.0553	0.0294	0.0171	0.0095	0.2371	0.2310	0.0892	0.0096	0.0181
1892	0.8227	0.0164	0.0021	0.8991	0.0068	0.0051	0.0039	0.1678	0.0600	0.0101	0.0060	0.1073	0.1272	0.0660	0.0053	0.0094
1893	0.4443	0.0481	0.0125	1.0139	0.0860	0.0089	0.0824	0.2604	0.0887	0.0128	0.0849	0.0778	0.0358	0.0689	0.0844	0.0169
1894	0.6054	0.0148	0.0008	1.0059	0.0019	0.0042	0.0017	0.1129	0.0184	0.0030	0.0012	0.0464	0.0103	0.0026	0.0013	0.0040
1895	0.4079	0.0086	0.0068	0.6290	0.0072	0.0057	0.0062	0.0221	0.0222	0.0074	0.0069	0.0451	0.0246	0.0955	0.0069	0.0092
1896	0.6291	0.0107	0.0044	0.6740	0.0069	0.0038	0.0045	0.0151	0.0542	0.0039	0.0069	0.0940	0.0124	0.1289	0.0071	0.0065
1897	0.4026	0.0085	0.0042	0.6704	0.0063	0.0055	0.0048	0.0857	0.0190	0.0044	0.0058	0.0947	0.0021	0.0688	0.0056	0.0088
1898	0.7808	0.0130	0.0176	1.2169	0.0131	0.0093	0.0112	0.0856	0.0419	0.0072	0.0127	0.2421	0.0104	0.3438	0.0123	0.0090
1899	0.4001	0.0067	0.0128	0.6333	0.0120	0.0081	0.0093	0.1136	0.0110	0.0093	0.0122	0.1072	0.0084	0.1617	0.0117	0.0125
1900	0.2381	0.0095	0.0359	1.5790	0.0027	0.0036	0.0054	0.1035	0.0175	0.0047	0.0033	0.0350	0.0105	0.0269	0.0033	0.0098
1901	0.3108	0.0034	0.0053	0.8290	0.0027	0.0059	0.0019	0.0685	0.0228	0.0078	0.0026	0.0336	0.0329	0.0259	0.0026	0.0081
1902	0.1475	0.0044	0.0023	1.3160	0.0077	0.0025	0.0043	0.0329	0.0086	0.0042	0.0081	0.0406	0.0042	0.0803	0.0081	0.0070
1903	0.0286	0.0030	0.0070	0.1839	0.0051	0.0061	0.0048	0.0516	0.0047	0.0043	0.0058	0.0200	0.0042	0.0538	0.0058	0.0058
1904	0.0451	0.0055	0.0047	0.1721	0.0039	0.0042	0.0053	0.0760	0.0126	0.0048	0.0070	0.0275	0.0147	0.0351	0.0070	0.0061
1905	0.0246	0.0069	0.0047	0.9617	0.0073	0.0038	0.0064	0.0171	0.0040	0.0067	0.0074	0.0215	0.0232	0.0599	0.0074	0.0055
1906	0.0651	0.0053	0.0070	0.4652	0.0106	0.0053	0.0079	0.0451	0.0070	0.0090	0.0105	0.0214	0.0234	0.1387	0.0098	0.0149
1907	0.0833	0.0128	0.0079	0.0743	0.0175	0.0066	0.0114	0.0423	0.0104	0.0107	0.0175	0.0956	0.0213	0.0296	0.0154	0.0148
1908	0.0700	0.0018	0.0011	0.0227	0.0021	0.0017	0.0027	0.0249	0.0023	0.0030	0.0021	0.1281	0.0042	0.0322	0.0021	0.0035
1909	0.1371	0.0091	0.0093	0.0610	0.0113	0.0082	0.0091	0.0096	0.0128	0.0102	0.0106	0.0403	0.0083	0.0295	0.0106	0.0155
1910	0.0506	0.0069	0.0079	0.6138	0.0046	0.0057	0.0060	0.0033	0.0430	0.0063	0.0046	0.0668	0.0231	0.0626	0.0053	0.0088
1911	0.0529	0.0092	0.0079	0.0671	0.0099	0.0198	0.0072	0.0099	0.0084	0.0047	0.0076	0.0387	0.0021	0.0101	0.0080	0.0055
1912	0.0255	0.0074	0.0062	0.0455	0.0078	0.0030	0.0057	0.0033	0.0077	0.0052	0.0081	0.0605	0.0104	0.0263	0.0086	0.0070
1913	0.0539	0.0051	0.0073	0.0547	0.0054	0.0055	0.0045	0.0000	0.0124	0.0081	0.0050	0.0707	0.0084	0.0225	0.0058	0.0096

Table DB.20. **Years on Gold**

Regime matrix: 1 = gold, gold exchange standard, or gold peg; 0 = floating exchange rate)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	0	0	1	0	1	1	1	0	0	1	1	1	0	0	1	1	1
1881	0	0	1	0	1	1	1	0	0	1	1	1	0	0	1	1	1
1882	0	0	1	0	1	1	1	0	0	1	1	1	0	0	1	1	1
1883	1	0	1	0	1	1	1	0	0	1	1	1	0	0	1	1	1
1884	1	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1885	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1886	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1887	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1888	0	0	1	1	1	1	1	0	1	1	1	1	0	0	1	1	1
1889	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1890	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1891	0	0	1	0	1	1	1	0	1	1	1	1	0	0	1	1	1
1892	0	0	1	0	1	1	1	0	0	1	1	0	0	0	1	1	1
1893	0	0	1	0	1	1	1	0	0	1	1	0	0	0	1	1	1
1894	0	0	1	0	1	1	1	0	0	1	1	0	0	0	1	1	1
1895	0	0	1	0	1	1	1	0	0	1	1	0	0	0	1	1	1
1896	0	1	1	0	1	1	1	0	0	1	1	0	0	0	1	1	1
1897	0	1	1	0	1	1	1	0	0	1	1	0	1	0	1	1	1
1898	0	1	1	0	1	1	1	0	0	1	1	0	1	0	1	1	1
1899	1	1	1	0	1	1	1	0	0	1	1	0	1	0	1	1	1
1900	1	1	1	0	1	1	1	0	0	1	1	0	1	0	1	1	1
1901	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1
1902	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1
1903	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1
1904	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1
1905	1	1	1	0	1	1	1	0	1	1	1	0	1	0	1	1	1
1906	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1907	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1908	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1909	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1910	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
1911	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
1912	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1
1913	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1

Table DB.21. **Enfranchised Percentage of Population**
(0.5 = 50 per cent)

Year	Argentina	Austria-Hungary	Belgium	Brazil	Denmark	France	Germany	Greece	Italy	Netherlands	Norway	Portugal	Russia	Spain	Sweden	Switzerland	United Kingdom
1880	0.020	0.004	0.015	0.000	0.037	0.215	0.065	0.050	0.013	0.020	0.011	0.020	0.000	0.020	0.006	0.100	0.028
1881	0.020	0.004	0.015	0.000	0.045	0.184	0.056	0.050	0.013	0.020	0.011	0.020	0.000	0.018	0.007	0.122	0.028
1882	0.020	0.004	0.015	0.000	0.045	0.184	0.056	0.050	0.042	0.020	0.019	0.020	0.000	0.018	0.007	0.122	0.028
1883	0.020	0.004	0.015	0.000	0.045	0.184	0.056	0.050	0.042	0.020	0.019	0.020	0.000	0.018	0.007	0.122	0.028
1884	0.020	0.004	0.019	0.000	0.035	0.204	0.061	0.050	0.042	0.020	0.047	0.020	0.000	0.017	0.009	0.127	0.028
1885	0.020	0.005	0.019	0.000	0.035	0.204	0.061	0.050	0.042	0.020	0.047	0.020	0.000	0.017	0.009	0.127	0.061
1886	0.020	0.005	0.013	0.000	0.035	0.204	0.061	0.050	0.048	0.020	0.047	0.020	0.000	0.017	0.009	0.127	0.034
1887	0.020	0.005	0.013	0.000	0.054	0.204	0.079	0.050	0.048	0.020	0.047	0.020	0.000	0.017	0.010	0.110	0.034
1888	0.020	0.005	0.018	0.000	0.054	0.204	0.079	0.050	0.048	0.053	0.045	0.020	0.000	0.017	0.010	0.110	0.034
1889	0.020	0.005	0.018	0.000	0.054	0.208	0.079	0.050	0.048	0.053	0.045	0.020	0.000	0.017	0.010	0.110	0.034
1890	0.020	0.005	0.013	0.000	0.053	0.208	0.073	0.050	0.049	0.053	0.045	0.020	0.000	0.017	0.011	0.123	0.034
1891	0.020	0.007	0.013	0.000	0.053	0.208	0.073	0.050	0.049	0.045	0.050	0.025	0.000	0.068	0.011	0.123	0.034
1892	0.020	0.007	0.017	0.000	0.053	0.208	0.073	0.050	0.053	0.045	0.050	0.025	0.000	0.068	0.011	0.123	0.057
1893	0.020	0.007	0.017	0.000	0.051	0.186	0.075	0.050	0.053	0.045	0.050	0.025	0.000	0.070	0.013	0.120	0.057
1894	0.020	0.007	0.202	0.021	0.051	0.186	0.075	0.050	0.053	0.035	0.079	0.025	0.000	0.070	0.013	0.120	0.057
1895	0.020	0.007	0.202	0.021	0.049	0.186	0.075	0.050	0.039	0.035	0.079	0.025	0.000	0.070	0.013	0.120	0.043
1896	0.020	0.007	0.195	0.021	0.049	0.186	0.075	0.050	0.039	0.035	0.079	0.025	0.000	0.070	0.014	0.117	0.043
1897	0.020	0.021	0.195	0.021	0.049	0.186	0.075	0.050	0.038	0.083	0.077	0.025	0.000	0.070	0.014	0.117	0.043
1898	0.020	0.021	0.208	0.026	0.047	0.202	0.071	0.050	0.038	0.083	0.077	0.025	0.000	0.070	0.014	0.117	0.043
1899	0.020	0.021	0.208	0.026	0.047	0.202	0.071	0.050	0.038	0.083	0.077	0.025	0.000	0.075	0.014	0.112	0.043
1900	0.020	0.021	0.207	0.026	0.047	0.202	0.071	0.050	0.039	0.083	0.105	0.025	0.000	0.075	0.014	0.112	0.037
1901	0.020	0.021	0.207	0.026	0.081	0.202	0.071	0.050	0.039	0.074	0.105	0.025	0.000	0.077	0.014	0.112	0.037
1902	0.020	0.021	0.207	0.033	0.081	0.202	0.071	0.050	0.039	0.074	0.105	0.025	0.000	0.077	0.018	0.121	0.037
1903	0.020	0.021	0.207	0.033	0.086	0.216	0.081	0.050	0.039	0.074	0.103	0.025	0.000	0.075	0.018	0.121	0.037
1904	0.020	0.021	0.204	0.033	0.086	0.216	0.081	0.050	0.046	0.074	0.103	0.025	0.000	0.075	0.018	0.121	0.037
1905	0.020	0.021	0.204	0.033	0.086	0.216	0.081	0.050	0.046	0.105	0.103	0.025	0.000	0.075	0.035	0.119	0.037
1906	0.020	0.021	0.207	0.014	0.115	0.224	0.081	0.050	0.046	0.105	0.115	0.025	0.000	0.075	0.041	0.119	0.058
1907	0.020	0.084	0.207	0.014	0.115	0.224	0.090	0.050	0.046	0.105	0.115	0.025	0.000	0.079	0.041	0.119	0.058
1908	0.020	0.084	0.209	0.014	0.115	0.224	0.090	0.050	0.046	0.105	0.115	0.025	0.000	0.079	0.057	0.110	0.058
1909	0.020	0.084	0.209	0.014	0.118	0.214	0.090	0.050	0.053	0.103	0.178	0.025	0.000	0.079	0.057	0.110	0.058
1910	0.028	0.084	0.215	0.025	0.127	0.214	0.090	0.050	0.053	0.103	0.178	0.025	0.000	0.063	0.057	0.10	0.055
1911	0.028	0.080	0.215	0.025	0.127	0.214	0.090	0.050	0.053	0.103	0.178	0.062	0.000	0.063	0.109	0.06	0.055
1912	0.028	0.080	0.221	0.025	0.127	0.214	0.092	0.050	0.053	0.103	0.202	0.062	0.000	0.063	0.109	0.06	0.055
1913	0.028	0.080	0.221	0.025	0.129	0.214	0.092	0.050	0.142	0.127	0.202	0.062	0.000	0.063	0.109	0.06	0.055

Table DB.22. **Political Events**

Argentina:
1880: Civil War
1893: Social Revolts I
1902: May Agreement (peace with Chile)
1905: Social Revolts II

Austria-Hungary:
1908: Bosnian Crisis
1912 and 1913: Balkans War

Brazil:
1888: Abolition of slavery
1889: Proclamation of Republic
1891: Military coup
1893: Military rebellion

Greece:
1897: Greco-Turkish War
1912 and 1913: Balkans War

Italy:
1911 and 1912: Italo-Turkish conflict

Portugal:
1910: Portuguese Revolution

Russia:
1904 and 1905: War against Japan
1906: Russian crisis (domestic unrest)

Spain:
1895, 96, 97, 98: Crisis in Cuba
1898: Spanish-American War

United Kingdom:
1899, 1900, 1901, 1902: Boer War

Notes

1. In addition, the gold bonds were generally (if not systematically; see the case of Italy) understood to be tax-free.

2. The data problem in Sussman and Yafeh (2000) discussed in the main text is an illustration of this sort of problem.

3. A companion problem is that the volatility of bonds with such options is affected by the very existence of these options. This is an additional challenge for studies that, in the vein of Bordo and Rockoff (1996), have sought to rely on the CAPM and thus on the volatility of alternative securities. Obviously the approach here, which focuses only on average yields, does circumvent this obstacle.

4. In 1901, Austria implemented a re-denomination of its currency from florin to crowns. Since this was a pure accounting change (the paper florin was worth 0.5 crown or Kroner), one can report the series in either florins or crowns. The authors opted for the florin.

5. For convenience, this study defines the "national unit" to be the milreis (rather than the contos or reis) and reports results in millions of milreis. The same procedure is used for Brazil. Of course, the Portuguese and Brazilian milreis did not necessarily coincide, despite their common past.

6. See note 5 above.

7. Alfred Neymarck was in charge of collecting data on sovereign debts. In several of this Society's meetings (it held congresses in all parts of the world including London, Paris and Chicago), Neymarck presented interesting papers on the topic. Yet while his contributions contain useful discussions of the methodological problems involved (see, for example, Neymarck, 1913) his figures were often reported with a five year frequency.

8. Apart from some well-maintained national series (such as those for France and the United Kingdom), all data required some cleaning up. One exception was the series for Greece, for which our numbers, corrected with the help of Lyonnais figures, always came very close to numbers provided by Lazaretou (1993). To keep matters simple, we thus follow those numbers whenever possible.

9. Among other things the Lyonnais tables used the *Relazione des Direttore Generale del Debito Pubblico alla Commissione di Vigilanza sul Rendiconto dell'Administrazione del Debito Pubblico*.

10. Calculations available upon request.

11. Komlos (1987) is the first source for modern estimates of national income in Austria and Hungary. Good (1994) tries an indirect method to assess the wealth of alternative parts of the monarchy. The other route is the hard one: two research projects conducted by Dr Schulze and Dr Kövler aim at estimating national accounts for both Austria and Hungary before WWI. The data used for Austria come from Schulze (1997), while those for Hungary come from private communications.

12. Mitchell (1993) reports Dutch exports as larger than Dutch GDP.

13. Some series (the Scandinavian ones, for instance) are susceptible of further improvement. The authors remain open to suggestions from other scholars working in the field.

14. It is important to control for taxes: 13.2 per cent until the beginning of 1894 for both bonds, 20 per cent until 1906 for the 5 per cent and until 1914 for the 3 per cent, when the former 5 per cent was no longer taxable.

15. For a discussion of Austro-Hungarian spreads, see Flandreau (2004).

16. http://weber.ucsd.edu/~kgledits/Polity.html

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