Identifying the Effects of an Exchange Rate Depreciation on Country Risk: Evidence from a Natural Experiment [*]

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Abstract

It is generally very difficult to measure the effect of a currency depreciation on sovereign risk given the endogenous properties of the exchange rate. History provides at least one natural experiment to test whether an exogenous exchange rate depreciation can lead to an increase in perceived sovereign risk. France's decision to suspend the free coinage of silver in 1876 played a paramount role in causing a large exogenous depreciation of the nominal exchange rates of *all* silver standard countries versus gold-backed currencies such as the British pound—the currency in which much of their debt was payable. France's decision to end bimetallism was exogenous from the viewpoint of countries on the silver standard. To deal with heterogeneity we implement a difference in differences estimator. Sovereign yield spreads for countries on the silver standard increased in proportion to standard debt sustainability ratios. For the average silver country, yield spreads on bonds payable in hard currency increased ten to fifteen percent more than non-silver countries in the wake of a depreciation of the same magnitude. This supports the idea that exchange rate depreciations can increase perceived sovereign risk in the face of foreign currency liabilities.

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I. Introduction

A currency mismatch occurs when a country's debt is denominated in a foreign currency while its revenue streams are largely in local currency. Currency mismatches make a country vulnerable. A sudden real exchange rate depreciation can abruptly reduce the ability to repay foreign currency debt. This deterioration of a country's "balance sheet" could easily increase default risk.[1]

Currency mismatches are in fact ubiquitous, and they are deemed by many to create financial fragility by accelerating the onset of a financial crisis or exacerbating the severity of financial crises. Balance sheet problems are at the heart of many explanations for the severity of the 1997 Asian financial crisis and have been analyzed in new micro-founded open-economy models such as that found in Céspedes, Chang and Velasco (2004).[2] Eichengreen, Hausmann, and Panizza (2005) discuss the impact of 'original sin' on various macroeconomic indicators.[3]

However, few, if any, papers have been able to empirically assess the precise links among currency depreciation, a country's balance sheet, and default risk given the endogeneity of the exchange rate.[4] There is typically a link between depreciation episodes and perceived policy problems or poor fundamentals that are hard to measure. Hence econometric studies of the issue make identification of the exchange rate channel difficult. Nevertheless the logic that exchange rates themselves matter independent of policy is quite evident.

Fortunately, history provides a natural experiment to isolate the effect on sovereign risk of an exogenous exchange rate depreciation unrelated to fundamentals. We focus on the accelerated depreciation of silver in early 1876 which was connected

[1] The literature on balance sheets in international finance builds off Bernanke and Gertler (1989) who analyzed collateral constraints, net worth and balance sheets in imperfect domestic capital markets and their role in accentuating economic fluctuations.

[2] They present a micro-founded open-economy model with nominal rigidities and balance sheet effects. Their theoretical analysis suggests that the impact of a surprise devaluation on economic activity depends on several crucial country-characteristics: the total level of indebtedness (relative to net worth), the degree of financial friction in an economy, the responsiveness of exports to devaluations and the importance of exports in total output.

[3] There are quite a number of theoretical and empirical studies on the origins of *original sin* or the reason why countries seem to issue most international debt in hard currency. Flandreau and Sussman (2004) and Eichengreen, Hausmann and Panizza (2003), for example, argue that liquidity is an important factor in explaining the existence of original sin. Bordo, Meissner, and Redish (2004) find that sound financial institutions, monetary regimes, and financial development are not sufficient conditions for a country to borrow in its own currency. They argue that large shocks such as the Great Depression, wars, and the emergence of a liquid global capital market in the second half of the nineteenth century were important factors in explaining how the United States and former British colonies overcame original sin. Eichengreen and Hausmann (2002) have also offered some solutions to the currency mismatch problem.

[4] Powell and Sturzenegger (2000) is an exception. Using a number of event studies, they find that the link between announcements about currency stability and sovereign risk varies from country to country. They suggest further investigation of the possibility that country characteristics and policies could influence the level of the impact.

to the anticipation of France's August 1876 decision to suspend the coinage of silver. France's move in August 1876 accelerated the trend depreciation of silver already underway since 1873. As shown in Figure 1, this decreased demand for silver (and increased demand for gold) led to an historically abrupt depreciation of silver.[5] We argue that France's decision and the depreciation of silver was exogenous for countries with silver-based commodity money systems. The French debate was watched closely by markets throughout early 1876, and French suspension of silver coinage became an increasingly sure thing up to August 1876. Between January 1876 and mid-1876 markets incorporated this information into their expectations perceiving the likelihood of an accelerated and sustained silver depreciation to be greater and greater with each passing week. These factors, combined with the fact that a large portion of countries' liabilities were denominated and payable in gold currency, suggest that the rapid decline of silver in early 1876 provides a unique historical experiment to study one of the key predictions of the theoretical literature on currency mismatches.

We use a new weekly database of sovereign debt prices collected from *The Economist*, and undertake a before and after comparison or event study using a difference in differences (DID) regression strategy. This approach eliminates pre-existing differences in risk between silver and non-silver countries and controls for market forces affecting all countries. We measure the impact of the suspension of silver coinage on sovereign yield spreads on hard currency debt for countries on a silver standard compared to non-silver countries. We find that sovereign spreads for the silver group increased following the expectation of suspension of silver coinage by France because their hard currency liabilities increased relative to their ability to pay for such liabilities. Our results are consistent with the idea that exchange rate fluctuations themselves can indeed lead markets to enforce higher default risk premia.

The rest of the paper proceeds as follows. Section II reviews different explanations for the French-cum-global demonetization of silver. This is followed by an historical discussion of important events in the market for gold and silver in the 1870s to motivate the event study. We then introduce the new database on sovereign spreads and analyze the effects of the suspension of silver coinage by France on sovereign default risk. Section IV concludes the paper with a discussion and the implications of our results.

[5] Oppers (1996) notes that by 1876 the gold-silver ratio had reached 20, but that for the prior 250 years the ratio had fluctuated between 14.14 and 16.25.

Section II. France's Departure from Bimetallism in 1876 as a Natural Experiment

At the end of the 1860s, the international monetary system was composed of roughly four categories of countries. The first group consisted of countries that followed the gold standard and included Great Britain, Portugal, Australasia, Canada, and many other members of the British Empire. The second group was composed of countries that operated a bimetallic system where the mint price of silver was fixed in terms of gold and either metal passed current as a means of payment. France and other countries in the Latin Monetary Union were the most important members of the bimetallic group. A third group consisted of countries on the silver standard, and the final group was countries with inconvertible paper money regimes. Many silver standard countries were located in Latin America including Mexico, Colombia, and Bolivia. India and China were two important members of the silver standard in the Far East.

By 1880, the makeup of the international monetary system had changed dramatically in a span of only ten years. Germany (1871), Holland (1875) and the United States (1879), three economically important countries, joined Britain as members of the gold standard. France and the rest of the Latin Monetary Union made the decision in 1878 but since France was a large player it had a choice independent of this widespread movement. In the end France opted for gold and the general move towards gold continued, albeit with some lapses, over the next 30 years

Flandreau (1996) argues that the worldwide movement towards gold was catalyzed by animosities arising from the Franco-Prussian War.[6] The five billion franc indemnity provided Germany with the financial capacity to adopt the gold standard. But France and the Latin Monetary Union were unwilling to support Germany's move and found a way to stymie the transition by refusing to purchase the large amount of silver Germany needed to trade for gold for its transition. France did this by limiting (but not totally suspending) the free coinage of silver from 1873. Flandreau (1996) also presents a formal model and econometric evidence that France was large enough to have "purchased" nearly all of Germany's silver at the 15.5:1 ratio and still had enough gold to maintain de facto bimetallism. Friedman (1990) and Oppers (1996) also reach similar conclusions. Under free coinage of gold and silver, the French system could have eliminated a divergence between market and mint ratios and would

[6] Kindelberger (1978) argues that silver discoveries which flooded the world silver market, as well as the decision by countries like Germany in 1872, Holland in 1875, and the US in 1873 to join the gold standard and/or decrease their monetary silver demands, were responsible for the fall in the gold price of silver and the destabilization of the bimetallic system.

not have fallen victim to "Gresham's law". Hence France itself was responsible for initiating the long-run fall in the value of silver beginning in 1873.

When France limited silver coinage in late 1873, silver's market value declined as supply outstripped demand. In the weeks after the announcement of limited silver coinage in late 1873, silver depreciated against gold by about two percent (see Flandreau, 1996, Figure 5).[7] The fact that the size of the 1873 depreciation was rather small implied that markets were factoring in a small (and temporary) limitation in coinage and did not envisage a complete suspension of bimetallism. Alternatively markets might have expected a total suspension, but they do not appear to have expected a large depreciation in the near future because of this. Otherwise silver would have depreciated immediately by a large amount. The record shows that the market expected "limping bimetallism" and a possible resumption. The non-committal "wait and see" policy of France continued for several years, and markets do not seem to have been overly pessimistic about silver's future prior to early 1876. However French policy became increasingly untenable as the limits on silver coinage failed to halt German sales, new silver discoveries came on line, and political fragmentation increased within France on the monetary question. In early 1876, as these pressures mounted and fed back on each other, the expectation of a change in French policy helped accelerate silver's depreciation.

The announcement of plans to discuss a change in policy in France and the heightened expectation of a permanent suspension of silver coinage, which we demonstrate happened between January 1876 and mid-1876, must have been responsible for silver's accelerated depreciation which began in late January. Since 1873, *The Economist* had expected that most European countries would eventually abandon silver and bimetallic standards. Our reading of the financial press of the time shows that it was obvious to market participants by early 1876 that if France abandoned bimetallism, thereby massively decreasing demand for silver, then silver's relative value against gold would keep falling.

To assess the market's view of the French silver question and to get a sense of the timing of expectations, we collected every major news article on the silver issue in *The Economist* (based in London) and the *Economiste Français* (based in Paris) from July 1, 1875 to August 12, 1876. We chose these outlets as London was the place of the principal silver market of the time and because the French newspaper could

[7] Intensified German sales in the summer of 1873 failed to shake silver from its long-run parity value Flandreau observes. Also the official French policy was a "wait and see" policy. There was still a chance that France would resume free silver purchases at the old mint parity. Informational problems aside, this could have also acted to mitigate the expectation that silver's value in terms of gold was doomed.

provide an insider's view on political events in France. An appendix of news articles (available in the working paper version) lists the date and provides a summary of each article.

We first observe that there are few important articles on silver's depreciation or factors affecting silver's value in 1875 in either magazine. Although in 1873 there was some recognition that lower French demand for silver would have an impact, we argued above that the limitation of coinage was most likely viewed as temporary and the real connections to silver's value were not totally understood at this point. Flandreau (1996) concludes:

> …French policymakers seemed to underrate the fact that their actions [in 1873] would undermine the credibility of their commitment to bimetallism…they clearly overlooked that their moves…would have deflationary consequences. However this was not perceived by the Germans either…(pp.890-891)

Hence we rule out the idea that there was a significant expectation of a large drop in silver's value prior to 1876. This makes it plausible to use most of 1875 as a base period for our before-and-after analysis. It is also clear that expectations change dramatically beginning in January 1876. On January 29, 1876 *The Economist* reported that France might soon completely suspend free-silver coinage. This represented the first time in more than seven months that *The Economist* printed a significant news story about French silver policy. Similarly in the Paris-based magazine, few articles about silver's fall are evident until mid-December, 1875.[8] On January 29, 1876, *The Economist* reported that the Paris Chamber of Commerce asked the French Minister of Commerce and Agriculture to abandon silver and adopt the gold standard:

> …. from the 31st of January, when the present [Latin] monetary convention expires, no more silver five-franc pieces should be coined, that those in circulation should be demonetized as soon as circumstances permitted…

This article was followed up by several news stories over the next several months that discussed various political and economic aspects of the silver question. *The Economist* reported March 4, 1876 that the Latin Monetary Union had agreed to further limit the issue of silver coinage. A week later, the Paris Political Economy Society noted that increased silver production from silver mines discovered in the United States several years before, German monetary policy, and French silver policy explained the recent drop in the gold value of silver. The article also mentioned that the Bank of France refused to grant loans on the security of silver deposits, but *The Economist* dismissed this last claim as an unfounded rumor.

[8] Willis (1901) presents a similar timeline of France's decision to abandon bimetallism.

The *Economiste Français* ran a series of articles up to March emphasizing that silver's fall was unprecedented and analyzed various causes of silver's fall. On February 5, 1876, two articles illustrate the expectation of further depreciation. An editorial, one of a series of similarly worded formulations, claimed that by the end of 1876 silver would have depreciated by fifteen percent. A report from the "principal market for silver" in London suggests that short-term expectations are for depreciation.

On March 18, 1876, *The Economist* reported that the Bank of France would continue to grant loans collateralized by silver bars and foreign coins, but with a 20 percent reduction in the amount per kilogram advanced. The weekly London financial paper also noted that silver would continue to depreciate against gold if France decided to abandon bimetallism and adopt a gold standard. On March 25, 1876, both *The Economist* and the *Economiste Français* noted that the French Senate had begun debate on whether the country should abandon silver and adopt gold. Leading debaters also discussed a couple of different methods by which silver could be demonetized. Leon Say, French Minister of Finance, presented a bill that would suspend all silver coinage.

The Economist continued to report discussions of the French silver question into early April 1876. News articles summarized political debates on whether France should adopt gold or retain a bimetallic system. This was followed by a six week hiatus of new articles on the monetary question. In fact this could coincide with a brief triumph for the forces of the status quo. An article on April 1, 1876 from the Paris-based weekly suggests that the French daily press had been talking of the defeat of the project to abandon bimetallism. The editor's reaction is that the battle may have been lost but the war was not yet over. He goes on to note the French government itself seems to see few merits in the old bimetallic system.

Discussion of the total suspension of silver coinage resurfaced in mid-June with a report that the French Senate would continue its debate over the issue. It was reported in the *Economiste Français* that the commission in charge of the bill in the French senate had approved the proposal to suspend silver coinage despite stiff resistance from the ever-important player The Bank of France. On July 1, 1876, the British financial weekly noted that the French Senate discussed a bill that would empower the French government to restrict coinage of the silver five-franc piece. Two weeks later, the British government issued a report on the depreciation of silver and argued that German demonetization and actions by the Latin Monetary Union (led by France) played a key role in the fall in the price of the precious metal. By mid-July,

confidence in the French newspaper that silver coinage would be suspended seems to have become much stronger. The notion that French suspension of coinage would lead to further falls in silver is also boldly asserted.

The Economist reported on August 5, 1876 that France passed a bill authorizing the suspension of free-silver coinage. A week later, the French Minister of Finance issued an order that silver bars would not be received at the mints of Paris or Bordeaux for coinage. *The Economist* also noted that the Vice-President of the Liverpool Chamber of Commerce attributed the recent fall in the price of silver to actions by France and the Latin Monetary Union. Articles on silver and the monetary question largely die out in the autumn of 1876 in *Economiste Français*. This is further evidence that new information about the fate of silver, which was then incorporated into asset prices, was abundant in early 1876 and that little new information about silver's trajectory entered into markets between August and December 1876.

Overall, the evidence from the popular press both in London and Paris, which we believe reflects the expectations of silver market participants, strongly suggests that financial markets believed there was a high probability France would move to suspend the coinage of silver in the months preceding the actual passage of the legislation. Moreover, this translated into expectations of depreciation, which via the asset market, turned into actual depreciation. Indeed, the sterling price of silver also suggests this interpretation as the gold-backed pound appreciated against silver more than ten percent in the first six months of 1876. For this reason, this historical episode provides an excellent natural experiment to test the proposition that depreciation could lead to an increase in default risk.

To motivate the exogeneity of the event, we need to examine the reasons behind France's abandonment of bimetallism. Flandreau's argument is that France's action depended upon a strategic interaction between itself and Germany and not on any other considerations.[9] For this very reason, the suspension of free-silver coinage becomes a key exogenous shock to the exchange rate for all silver based countries. For silver countries, there is evidence of transmission from the gold-silver market to their currencies' nominal value. In Figures 2 through 4, we plot several silver-currency exchange rates along with the silver-gold exchange rate (units of silver per

[9] The argument is that France was a large player in bullion markets due to its large reserves. It alone could stabilize the gold silver price. Its regime choice as of 1876 was not a function of expectations about the regime choice of the small peripheral silver countries we use in our sample. If it were, this could pollute the exogeneity of the test. Many in France, including the Bank of France itself, advocated the status quo maintaining that bimetallism was viable even in the face of others' adoption of gold. The political economy of France's decision was quite controversial, and should best be seen as a distributional fight where those interested in boosting trade with Britain won out. This, however, was not an inevitable outcome.

unit of gold) between the 1870s and 1880s. The figures show that there is almost a one-to-one relationship between the exchange rates of silver countries and the silver-gold exchange rate. The question then is would there be any differential impact on silver countries? Could this exogenously imposed depreciation simply increase the debt burden faster than the revenue stream could expand for the silver group? Interest and amortization costs of debt payable in gold-backed sterling should have increased one-for-one with this depreciation. But a depreciation might have been beneficial by eventually stimulating an export boom or increasing the revenue capacity of a country.[10]

For completeness consider gold countries. If the suspension of silver coinage in France was interpreted as a shock to silver's value, then this could have meant an appreciation vis-à-vis periphery countries. It could also have generated information that inflation and nominal interest rates would eventually come down in gold countries. For paper countries this would not necessarily have brought new information about currency values. In any case, the effect of the suspension of silver coinage on the yield spreads of gold and paper countries is an empirical question.

Silver countries felt this sudden depreciation would make debt repayment more difficult. Indeed the special Parliamentary enquiry in Great Britain into the fall of silver was requested so as to assess the impact on the Indian balance of payments.[11] The polymath BR Ambedkar (1923) noted that the fall of silver against gold affected silver countries (India being amongst them) by increasing the real value of debt repayments:

> The fall (of silver) increased the burden of those who were under an obligation to make gold payments. Amongst such, the most heavily charged was the Government of India. Owing to the exigencies of its political constitution, that Government has been under the necessity of making certain payments in England to meet : (1) ***interest on debt*** and on the stock of the guaranteed railway companies ; (2) expenses on account of the European troops maintained in India; (3) pensions and non-effective allowances payable in England; (4) cost of the home administration; and (5) stores purchased in England for use or consumption in India. England being a gold-standard country, these payments were necessarily gold payments. But the revenues of the Government of India out of which these payments were met were received in silver, which was the sole legal-tender money of the country. It is evident that even if the gold payments were a fixed quantity their burden must increase *pari passu* with the fall in the gold value of silver (emphasis added). [Ch. 3]

Other countries like Russia were in a similar situation and it is not uncommon in the economic history literature to note a fall in borrowing costs upon adoption of

[10] Silver briefly appreciated against gold for a period after France suspended the coinage of silver. The Economist (see 1876 and 1877) attributed this short-lived appreciation to a lower than expected supply of silver that Germany planned to sell on the world market.

[11] Select Committee on Depreciation of Silver: 'Report from the Select Committee on Depreciation of Silver; together with the Proceedings of the Committee, Minutes of Evidence, and Appendix'. 1876.

the gold standard. In this regard, we now turn to a formal cross-country statistical analysis of the relationship between country risk and surprise depreciation.[12]

Section III. Empirical Analysis

III.A. Capsule Summary of the Research Design

We propose an event study methodology that avoids confounding the impact of depreciation with that of other policy problems and country characteristics that give rise to such policies. Specifically, the research design is to observe the spreads on a group of comparable long-term sovereign bonds all of which were denominated and payable in gold or pounds sterling (linked tightly to gold), over the course of a short time span of roughly eleven months. Restricting attention to a relatively short time span allows us to be certain that unobservables did not change over the entire period of interest. We then break this period into two periods. The timing of the break point is the point at which market participants begin to anticipate and expect a substantial change in the value of silver. We then relate the *change* in bond spreads to the subsequent increase in hard currency debt liabilities relative to exports or revenue. By comparing the change in silver countries which faced a uniform and expected depreciation in the second period to a control group of "untreated" non-silver countries with no expected exchange rate change, we eliminate time-invariant heterogeneity. We also purge the impact of any shocks that affected the entire market.

III.B. Difference-in-Differences: Non-Silver-Using Countries as a Control Group

We are interested in testing whether there was a significantly different change in sovereign bond spreads for silver countries as compared to similar non-silver countries due to the increase in the currency mismatch from the French suspension of silver coinage.[13] Assume that a country's risk premium on debt payable in a gold-backed foreign currency is a function of a debt sustainability measure and other controls. An event study model for any country *i* in a given week *t* can be written as:

$$r_{it} = a + bD_{it} + cZ_i + gI_{Git} + hI_t + \varepsilon_{it}, \qquad (1)$$

[12] Flandreau and Zúmer (2004), on the other hand, argue that joining the gold standard did not lead to a reduction in spreads. While they do assert that depreciation and floating might have led markets to perceive incipient payment difficulties in theory, they claim to show that sound fiscal discipline and export-orientation play a far greater role than exchange rate movements in determining the level of country spreads between 1880 and 1913 in their specifications.

[13] We use the British consol yield as the reference yield.

where *r* is the difference between the long-term bond yield of a domestic asset payable in foreign currency at a fixed exchange rate and the risk-free rate of return, *D* is a debt sustainability measure proxied by the ratio of hard currency debt to exports or debt to revenue.

We use exports and public revenues as our proxies for a country's "asset" position. These were indicators widely used by investors at the time to assess the solvency of sovereign borrowers (Flandreau and Zúmer, 2004). *Z* is a vector of other factors specific to a country, I_{Gt} is an interaction between a market-trend control and a group indicator *G* which allows for factors differentially affecting all countries in any particular group *G* during any particular period, I_t is a market trend variable (e.g., a risk free rate or suitable time indicators) that controls for market forces affecting all countries in any particular period, and ε is a country-week specific error term that us assumed to be uncorrelated with other included variables.

Next, assume the hard currency debt to export ratio does not change over the period of observation due to new issues on capital markets but that changes in the ratio do occur because of week to week changes in the nominal exchange rate. This makes the ratio depend on the exchange rate realization of week *t* as follows:

$$D_t(e_t) = \frac{Debt_0^*}{Exports_0 e_t} \tag{2}$$

where the superscript * denotes a variable measured in terms of the foreign numeraire, e_t is the realization of the nominal exchange rate (foreign currency units per unit of domestic currency) for a given week *t*, exports are measured in local currency and both debt and exports receive a *0* subscript to denote they are fixed during the sample.[14] An alternative model we use includes a debt to revenue ratio instead of the debt to export ratio which we write as

[14] Two remarks are necessary. We assume exports are fixed in local currency units several months in advance so that the bulk of the value of exports is constant around any given date (i.e. in the short run). More generally one can think of this as saying that the depreciation (and rise in the silver value of debt) outpaces the impact on exports which seems plausible in the short run. Remer (1926) notes that in the short run only intermediaries saw the benefits of the increased silver value of exports which were paid for in gold currency in export markets. If the gold value of exports increased due to depreciation (Nugent, 1973 and Remer, 1926 argue for this though Hanson, 1975 argues against the impact of silver depreciation on export values), the ultimate impact on the spread would depend on two things: directly on the rise in the debt burden (assuming away any issues involved in time until maturity also) and negatively on the responsiveness of exports. Technically, the marginal impact on spreads would be the difference between the depreciation and the product of the elasticity of exports with respect to the exchange rate and the level of debt. If the expected boost to exports factors into expectations then the regression coefficient $b\Delta$ would identify the impact on spreads for a

$$DR_t(e_t) = \frac{Debt_0^*}{Revenue_0 e_t}. \quad (3)$$

Now substitute (2) into (1) and take first differences to arrive at

$$r_{it} - r_{it-1} = b\Delta\left(\frac{Debt_0^*}{Exports_0 e_{t-1}}\right) + g(I_{Gt} - I_{Gt-1}) + h(I_t - I_{t-1}) + \varepsilon_{it} - \varepsilon_{it-1} \quad (4)$$

where Δ is the size of the depreciation in the nominal exchange rate between *t* and *t*-1 relative to the realization in week *t*. Equation (4) suggests that changes in the bond spread between periods when the debt to export ratio is fixed is a function of the product of the change in the nominal exchange rate and the hard currency to debt ratio. It is also a function of perceptions and shocks affecting the country if it is in group *G*, and also shocks that affect the entire market. Note that under a fixed exchange rate system, and assuming group *G* (if country *i* is in it) has no differential systematic trend in factors affecting its spread, equation (4) would equal zero (plus any time trend) in expectation since there is no expected change in the nominal exchange rate. For countries on a fiat money system, we assume that the exchange rate follows a simple random walk so that the difference is also zero in expectation. However for countries following a silver standard the nominal exchange rate would move in parallel upwards with the known or expected rate of decline of the value of silver which we analyzed above. Equation (4) shows that the increase in spreads could occur because of the rise in the hard currency debt to export ratio due to the depreciation. This illustrates one way in which a currency mismatch can lead to a perception of increased sovereign risk when the exchange rate depreciates.

In general exchange rate movements could be endogenous to anticipated changes in the bond spread, so we will not implement a regression model simply based on equation (4) that includes the nominal exchange rate itself. Instead, we want to compare the change in the average spread of silver countries (which we have argued undergo an exogenous depreciation in early 1876) to the change in our "control" group of non-silver countries at similar levels of indebtedness. Moreover we

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medium/long term adjustment in the sustainability ratio. If exports were a function of the exchange rate, this factor would enter multiplicatively in equation (4) in the first term. In the long-run a one time depreciation would not be likely to cause the ratio to change. Nugent (1975) reports an average rate of depreciation of silver versus gold of about 4 percent between 1873 and 1897 and an average rate of growth of the gold value of exports over the period for silver countries of 4 percent.

want to do this over a short time period so that we are sure that the bond spread will be unlikely to move due to other changes in macroeconomic fundamentals.

To do this comparison, we employ a simple difference in differences (DID) regression based test. The baseline comparison period encompasses the 21 weeks between September 4th, 1875 and January 29th, 1876. The second period is the 27 weeks from January 29th, 1876 until July 29, 1876. Using a second period indicator variable, equation (4) admits the following estimating equation:

$$Spread_{it} = \beta_1(I_t * Silver_i) + \beta_2(I_t * Silver_i * D_i) + \alpha(I_t * D_i) + I_t + \mu_i + \varepsilon_{it} \quad (5)$$

where *Spread* is the bond yield (on debt payable in sterling or in gold at a fixed exchange rate) for country *i* in week *t* minus the "risk-free" British consol yield, *Silver* is an indicator if a country is on silver, *I* is an indicator variable equal to one in the weeks including and following the event of interest and *D* is the level of hard currency debt relative to exports for 1875. Note because we implement the regression equation (5) over a number of weeks when the debt to export ratio and the exchange rate regime did not change we do not put a time subscript on these controls. Also we have μ_i as a country-specific error term with mean zero and finite variance, and ε is an error process that may be heteroscedastic and serially correlated. Since the before and after approach is econometrically equivalent to first differencing the data, the point estimates are not altered whatsoever whether our composite error term includes a country fixed effect or a country random effect.

The key control variables, the silver dummy and the ratio of hard currency debt to exports are assumed to be uncorrelated with the composite error process (and unobserved and excluded variables collected therein) for all *i* and *t*.[15] Since we are effectively first differencing the data, correlation between these variables and other fixed but excluded characteristics is not a concern for consistent estimation of the key parameters. Moreover, since we are looking at the average change in yield spreads over a short period of time, we omit other macro-aggregate controls since they will be fairly constant (as should expectations about their evolution except for idiosyncratic shocks) during the pre-event and post-event window. In sum, the regression in equation (5) allows us to abstract from "fixed" effects that could be driving the levels of spread.

[15] In our regressions we use heteroscedasticity robust standard errors and we cluster these at the country level to allow for arbitrary serial correlation of the error process within countries. Bertrand, Duflo and Mullainathan (2004) suggest clustering to decrease bias in the standard errors arising from such correlation in the error terms.

Using equation (5) there are several quantities of interest. The partial derivative of equation (5) with respect to the post-event period and the silver control will give the impact for various values of the hard currency debt to export ratio. This is the value $\beta_1 + \beta_2 D_i$. We can also measure the marginal effect of an increase in the ratio of hard currency debt to exports for silver countries on the yield spread. This value is given by $\beta_2 + \alpha$. Finally we can identify *b*, the sensitivity of the spread to an increase in the hard currency debt to export ratio. Since we know that the percentage depreciation affecting all silver countries is the same and equal to roughly 15 percent, we have $b = \beta_2/0.15$.

III.C. The Data

For the sample employed in the empirical analysis, the average spread is 465 basis points (standard deviation = 613) and the median spread is 253 basis points.[16] The mean spread is 328 basis points for countries not on the silver standard in our sample prior to January 29, 1876 (median = 208). For this same period, the mean spread is 802 basis points for countries on the silver standard (median = 269). After January 29, 1876, the mean spread for non-silver countries drops to 304 basis points (median = 208) while in silver countries the average spread rises to 825 basis points (median = 272).[17] Although the summary statistics do not control for the influence of other factors, silver countries appear to have had an increase compared to non-silver countries in their average spread after the heightened anticipation of the suspension of silver coinage by France. It might seem alarming that there is a gap in the mean spreads between groups. There is little reason to believe this will be a problem for identification of our key parameter. First, the medians are almost identical. Also, in the econometrics we first difference the data so as to remove any time-invariant heterogeneity in levels.

Figures 5 through 8 present time series plots of the natural logarithm of the bond spread and the natural logarithm of the silver-gold exchange rate (a rise is a depreciation of silver against gold) for several silver-based countries including

[16] There are 26 countries or territories in our baseline regression samples: Argentina, Austria, Australia (South Australia), Belgium, Brazil, Canada, Ceylon, Chile, Denmark, Egypt, France, India, Italy, Japan, Mauritius, Netherlands, New Zealand, Peru, Portugal, Russia, South Africa, Spain, Sweden, Turkey, Uruguay, United States. Prussia is included in specifications that use revenues but not included when we use exports because we have been unable to locate such data. We exclude defaulters from the time of default since calculating the yield is problematic when the bond's duration is unknown.

[17] Mauro, Sussman, and Yafeh (2006) also find structural breaks in the yield spreads for several silver countries in 1876. However, they do not offer an explanation for their empirical finding despite offering explanations for almost all other breaks they located. This is likely because they largely focused on country specific events.

Ceylon, India, Mexico, and Russia.[18] The vertical line is the start date for the post-event window---January 29, 1876. Two things appear evident: (1) the bond spreads move very closely with the gold-silver exchange rate implying that depreciation raises the bond spreads and (2) the anticipated depreciation and suspension of silver coinage in France is associated with a sharp increase in bond spreads and also with a depreciation of close to ten percent between late January and July 1876.

Figures 9a and 9b present the bond spreads for the group of countries which enter our regression samples. We include a vertical line at January 29, 1876 in the tradition of a typical "event study." It is evident that for many silver countries, spreads rise significantly after January 1876. For non-silver countries, it appears much harder to make a similar case.

III. D. Econometric Evidence

We now attempt to formally test the hypothesis that the depreciation affected silver countries' risk premia. Our key control is a dummy variable when a country is on silver and an interaction variable between silver and the ratio of hard currency government debt outstanding relative to exports measured in 1876. As noted above, this ratio should be directly related to the capacity to service debts, which over this short interval of time should be affected by changes and expected changes in the exchange rate. We discuss the construction and source of these variables in more depth in the Data Appendix which is available in the working version of this paper. Since our estimation sample covers only several months around the event of interest, it should not be a problem that we assume the key control variables are fixed over this period. For this reason we also refer to the hard currency debt to exports ratio as a mismatch variable.

Column 1 of Table 1 presents the baseline specification of the difference in differences model. The specification includes a dummy equal to one for the 21 weeks beginning January 29, 1876. High levels of hard currency debt relative to exports are associated with higher increases in silver countries' spreads relative to the change in the non-silver control group. Evaluated at the mean, the increase (in basis points) in the spread for silver countries after late January 1876 *versus* other non-silver countries would have been 30 basis points (100*{-0.58 + 0.66*1.34}).[19] This accounts for 30

[18] We discontinue the Russian spread in 1877 as it became a fiat currency country in that year.

[19] The silver countries in the regression of column 1 are Austria, Ceylon, Chile, India, Mauritius, Peru, Russia, and Spain. Spain was de jure bimetallic, but by maintaining a mint ratio lower than the market ratio, it exposed itself to a silver influx, a subsequent de facto silver regime and depreciation. Chile shares a similar story.

out of the 47 basis point rise (or 64 percent) in the spread for silver countries versus non-silver countries in the post-event period. Also, if we take the partial derivative of the yield spread with respect to the ratio of hard currency debt to exports and the post-event indicator, we see that yield spreads for silver countries are higher on average by 61 (0.66 - 0.06) basis points. The effect is statistically significant at the five percent level. As predicted by the theoretical literature on original sin, hard currency debt makes spreads sensitive to exchange rate depreciation.

We can also recover the structural parameter *b*, the sensitivity of spreads to the hard currency debt to exports ratio. Our results in column 1 imply *b* is equal to roughly 4.4 (0.66/.15) assuming the depreciation between autumn 1875 and July 1876 was on the order of 15 percent. This coefficient also means that a country could expect spreads to increase by over 200 basis points with a doubling of its debt/export ratio from 0.5 to 1.

Figure 10 illustrates the marginal impact on spreads for silver countries as a function of the hard currency debt to export ratio.[20] For very small ratios, where the stock of outstanding debt is less than annual exports, there does not appear to be a statistically significant impact. Figures 11a and 11b illustrate our finding in the form of scatter plots. The dependent variable here is the change in the average spread between the two periods and the explanatory variable is the hard currency debt to exports ratio. Robust standard errors are used. To stack the odds against finding the result that depreciation mattered, we leave out outliers like Spain (silver, high hard currency debt to export ratio of 5 and a rise of 4000 basis points) and Argentina (non-silver, low hard currency debt to export ratio of 0.8 and a rise of 4360 basis points). We also drop Egypt, Turkey and Uruguay which default in the post-event window. The silver countries in Figure 11a have a large positive slope of 0.48 with a standard error of 0.25, t-statistic of 1.91 and a p-value of 0.13. The slope for non-silver countries in Figure 11b is positive (0.01) but small and very imprecisely estimated (standard error = 0.02, t-statistic = 0.5, and p-value = 0.62). The slope for silver countries is 0.8 with a standard error of 0.02 when Spain is included. Likewise, results are stronger when we include Argentina. The slope for non-silver countries in that case is -0.04 with a standard error of 0.06.

Dropping the outliers from the model does not qualitatively change the results from the baseline specification. A median quantile regression, a model designed to

[20] The marginal coefficient is the partial derivative of the spread with respect first to the post-event window and then with respect to silver. Figure 10 shows the partial derivative of the spread evaluated at the average values of the ratio of hard currency debt to exports for the countries in our sample. The 95 percent confidence bands are estimated with a bootstrap simulation in Stata made available by William Clark at http://homepages.nyu.edu/%7emrg217/interaction.html.

limit the influence of outliers, reports a (statistically significant) coefficient and a standard error in parentheses on the interaction of mismatch, silver and the post-event dummy of 2.17 (0.7) and the post-event indicator and silver indicator of 0.48 (0.16). The empirical results are also robust for the marginal effect of the ratio of hard currency debt to exports on yield spreads. The interaction of the post-event dummy and the hard currency debt export ratio is 0.31 (0.03). Moreover, in column 7 of Table 1, we leave out the obvious outliers in terms of changes in spreads (Argentina and Spain) from the baseline regression of column 1 Table 1. This leads to a coefficient on the interaction of mismatch, silver, and the post-event dummy of 0.53 (0.22) and the post-event indicator and silver indicator of -0.5 (0.43). The impact becomes positive and statistically different from zero at levels of hard currency debt to exports of 0.95.

Table 2 presents two other specifications. In both columns we separate out the components of the debt sustainability ratios (debt and exports or revenues) and use them as separate regressors (in millions of current pounds). Column 1 reveals that the net effect of the depreciation for silver countries was to raise spreads. Interestingly, the level of hard currency debt has a positive coefficient while the coefficient on the interaction of exports, post-event dummy and the silver indicator is negative. Both coefficients are highly statistically significant. This result is consistent with the possibility that in the short-run the debt burden increased as the value of debt relative to exports grew due to depreciation. In column 2 we see that revenues (interacted with the post-event dummy and silver) have a negative coefficient but this is not statistically significant at conventional levels (p-value = 0.28).

Overall, we infer that the depreciation made debt payable in foreign currency more onerous. This was associated with a jump in the average silver country's spread relative to the average non-silver country. It appears that markets perceived that hard currency debt would enhance the risk of a sovereign asset in the midst of a depreciation.

III.E. Sensitivity Analysis and Supplementary Findings

Columns 2 through 8 of Table 1 test the robustness of the baseline specification. The second column increases the length of the pre- and post-event windows, and slightly changes the event date. The pre-event window now covers the period from January 30, 1875 up to December 4, 1875. We end the pre-event window in early December when the *Economiste Français* first announced that government officials and politicians had renewed the debate about adopting the gold standard. The

post-event window covers the subsequent nine month period up to August 12, 1876. In this specification, the results are almost identical to those in column 1 although the statistical significance of the key variables is somewhat higher. The point estimate on the interaction of the post-event dummy, hard currency debt to exports and the silver dummy comes in at 0.75 in this sample.

In column 3, we also employ longer event windows and include the "world" unweighted average bond spread (excluding defaulters) pre-multiplied by country-specific coefficients –in the spirit of the CAPM-- to capture general market movements. Since the results are almost the same as those from column 2, we cannot seem to attribute the rise in spreads for hard currency debtors on the silver standard to the interaction of their future prospects and changing market conditions.

Column 4 uses the average spread in the shorter pre-event window and the average spread in the post-event window as the dependent variable. Duflo et. al (2002) show that this is one way to deal with spurious inference arising from serial correlation. This method creates two observations per country (but only one for Egypt, Peru, Uruguay and Turkey because these countries defaulted in the post-event window). The point estimates and the marginal effects are only slightly changed. Columns 5 and 6 replace the hard currency debt to export ratio with the hard currency debt to revenue ratio. Since revenues probably depend indirectly on exports, we are not surprised to see that the qualitative inference that a high ratio of hard currency debt to revenue for silver countries is associated with higher increases in the spread.

Table 3 reports some other robustness checks. In column 1 we take on the idea that the total debt (i.e., debt payable in domestic currency or with no fixed exchange rate plus gold clause/hard currency debt) to export ratio matters. This addresses the concern that the results from Table 1 are found simply because the hard currency to export ratio is highly correlated ($\rho = 0.88$) with this more conventional sustainability measure. We do indeed find evidence that silver countries with higher total debt to export ratios faced higher spreads in early 1876. However, several reasons suggest that the depreciation itself and its impact on the real repayment value of outstanding hard currency debt drives this result. First note that the debt to export ratio includes both hard and local currency debt in the numerator. Moreover, to the extent that the burden of local currency debt should be unaffected in the short run by exchange rate changes, we would expect the coefficient to be smaller in this case as some countries with higher proportions of local currency debt are included in the treatment group. Theoretically they should see much smaller impacts on their spreads, and they do.

In column 2, we test the hypothesis that *all* countries with high hard currency debt to export ratios saw an increased spread after January 1876. This is one test of the imposed assumption that silver countries were differentially impacted by news of silver suspension. The coefficient on the interaction term (post event dummy x [hard currency debt/exports]) here is very small (0.06) and is not statistically significant at the five or ten percent level of significance. When all countries are considered in one treatment group, there is no discernible effect of the French policy change. Column 3 performs a similar exercise but uses the total debt to revenue ratio as the key control. We observe a similar result; there is no impact on the spread in the wake of silver coinage suspension by France.

We also address the possibility that our treatment group might be different on a number of crucial dimensions besides the exchange rate regime from the control group. This could lead to spurious inference in Table 1. One possible explanation for our results is that the silver countries in our sample were less developed and had weak institutions that gave rise to poor fiscal outcomes. However, this is unlikely since there are several countries in the control group that possessed these characteristics. There are also several countries on the silver standard that were advanced relative to some of the emerging market countries in the control group. (e.g., Spain, Chile and India). In column 4 of Table 3, we substitute a "periphery" dummy for the silver dummy.[21] Here we find that there is no additional impact of the hard currency debt to export ratio on spreads in the periphery in the post-event window. We ran simulations to produce confidence bands (as above) for the joint coefficient (the post event dummy and the periphery coefficient and that same combination interacted with the debt ratio). We found this is not statistically significant at the 95 percent level over the relevant range of the data. The currency mismatch problem is absent in the periphery, and it does not seem convincing to argue that silver is simply a proxy for the periphery.

Finally we assessed the validity of our event date by implementing a series of placebo experiments. The idea here was to see if at other break points spreads would display similar behavior perhaps because of pre-existing trends. We changed the breakpoint date sequentially throughout 1875 and then arrived at an empirical distribution of the marginal effect. We used this to conduct a two-tailed test of the null

[21] The periphery includes Argentina, Austria (silver), Brazil, Ceylon (silver), Chile (silver), Colombia, Egypt, India (silver), Italy, Japan, Mauritius (silver), Portugal, Russia (silver), South Africa (Cape of Good Hope), Spain (silver), Turkey, and Uruguay. Norway and Switzerland did not have bonds that actively traded on the London market during this period. This leaves Australia, Belgium, Canada, Denmark, France, Netherlands, New Zealand, Prussia, Sweden and the US as core countries in the control group. The countries in our "core" grouping could also be described as high-income countries.

hypothesis that the effect found using the "true" break point is zero at the 95 percent level of confidence.[22] If our estimate of the marginal impact of the hard currency debt ratio for silver countries post-event from column 1 Table 1 is greater than the value in the 97.5th percentile or smaller than the 2.5th percentile we can reject the null hypothesis.

We conducted these 48 placebo experiments corresponding to a "false" break point in each of the weeks prior to December 12, 1875. We then interacted these pseudo-event dates with the given hard currency debt ratios and the regimes from 1875 and re-ran the specification from column 1 of Table 1. We then found the relevant percentiles in the empirical distribution of the marginal effect to test to see if we find a similar pattern. Evaluated at the means, the placebo impact in the 97.5th percentile was only 7 basis points while in the actual sample the point estimate of the marginal effect was 30 basis points. This is even more evidence that the moment in time we isolate as giving rise to expectations of silver depreciation had a substantive impact because of its effects on the expected evolution of the gold price of silver.[23]

IV. Conclusions

Does a real exchange rate depreciation increase default risk by reducing the perceived ability of a country to repay foreign currency debts denominated in a foreign currency? Under normal circumstances, this is a very difficult question to address given the endogenous properties of the exchange rate. Countries with poor fundamentals often resort to inflation finance leading to depreciation thus confounding the impact of policy mismanagement with actual depreciation. Moreover, there is a large debate between those who think original sin is a problem versus those that think *debt intolerance* (cf. Reinhart, Rogoff and Savastano, 2003) and governance is the problem. Our results show that sharp exchange rate swings can be perceived as problematic for repayment capacity.

History offers some insight into the original sin/debt intolerance debate. France's decision to permanently abandon a bimetallic standard and adopt the gold standard in the 1870s led to a large decrease in the demand for silver as the country fully suspended its substantial purchases of the precious metal. In anticipation of the demise of bimetallism, the world gold price of silver fell by a historically

[22] The assumption is that there will be no systematic impact on spreads in a series of draws on dates when there is little information entering into asset markets about silver's value.

[23] To test the sensitivity to the assumed break point, we also eliminated the last month of the pre-event window and the first month of the post-event window. Results are nearly identical to those in column 1 of Table 1.

unprecedented ten to fifteen percent in the first half of 1876. While the decision to abandon a bimetallic standard and adopt gold may have been endogenous for France, it was an exogenous decision from the viewpoint of countries and policymakers on the periphery.

The empirical results show that silver countries experienced a differential rise in yield spreads from the moment that continued sizeable depreciation became more likely. The increase in sovereign risk for countries on the silver standard is most likely a short to medium term effect, however. This is consistent with a balance sheet/exchange rate channel of financial distress that many observers of the Asian crisis of 1997 said were fundamental.

However, risk premia are partially determined by predictions about the future course of policies and events. All else equal, markets must have expected a medium term improvement in the balance sheet of silver countries. As exports expanded (cf Nugent, 1973), the ability to service debt and revenue bases would have surely expanded. This could occur either with the expansion of national income or as revenue tariffs increased in step with imports. A stronger export position also could have increased the availability of hard currency that could help pay ongoing liabilities. Many silver countries also eventually adopted the gold standard at the turn of the twentieth century. It is inconceivable however that any of our silver countries could have made the transition to gold within one year of the 1876 shock (see Meissner 2005). Other silver countries persistently ran loose monetary policies or clung to the commodity standard for a number of years. This could have led to a persistent increase in sovereign risk to the extent the size of the depreciation was unexpected. In the end such expectations would tend to bias downward the true impact on spreads in our regressions. Still, we find a positive and statistically significant impact of depreciation. Overall, we interpret our results as strong evidence that hard currency debts and depreciation can impact sovereign risk even if only in a transitory manner.

We have also examined an important public policy question by looking at the relationship between default risk and exchange rate depreciation from one of the most important disruptions to the international monetary system in the last 150 years. We conclude that if LDCs are going to embrace international capital flows denominated in hard currency, then the inevitable shocks to their exchange rates may make foreign financing significantly more costly.

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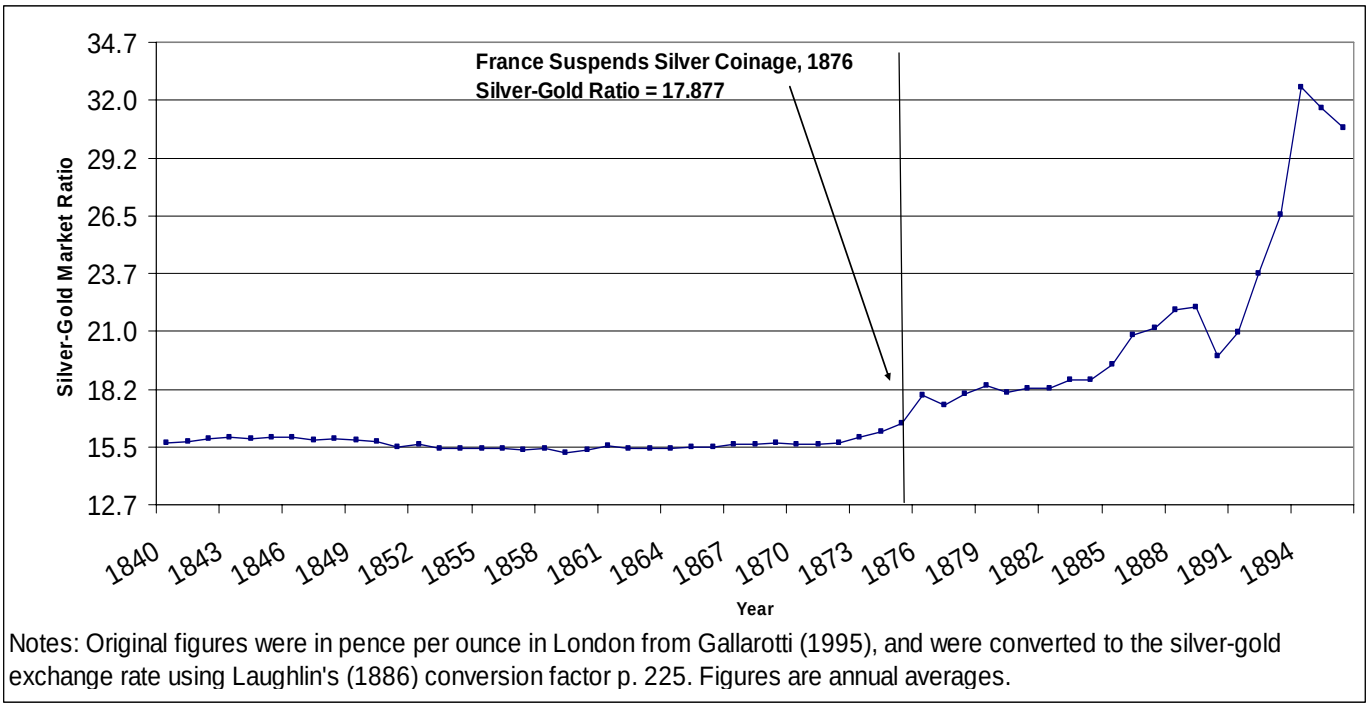
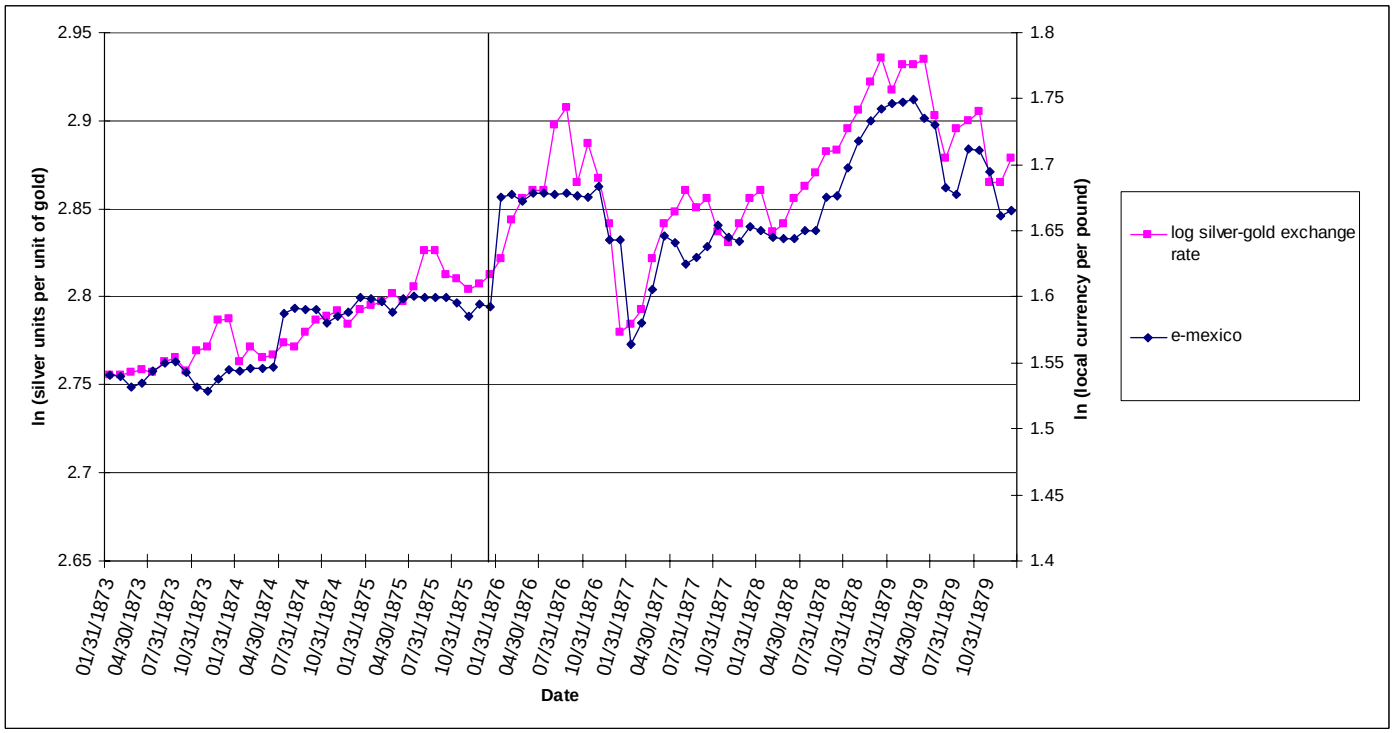
Figure 1 Silver-Gold Market Ratio, 1840-1896



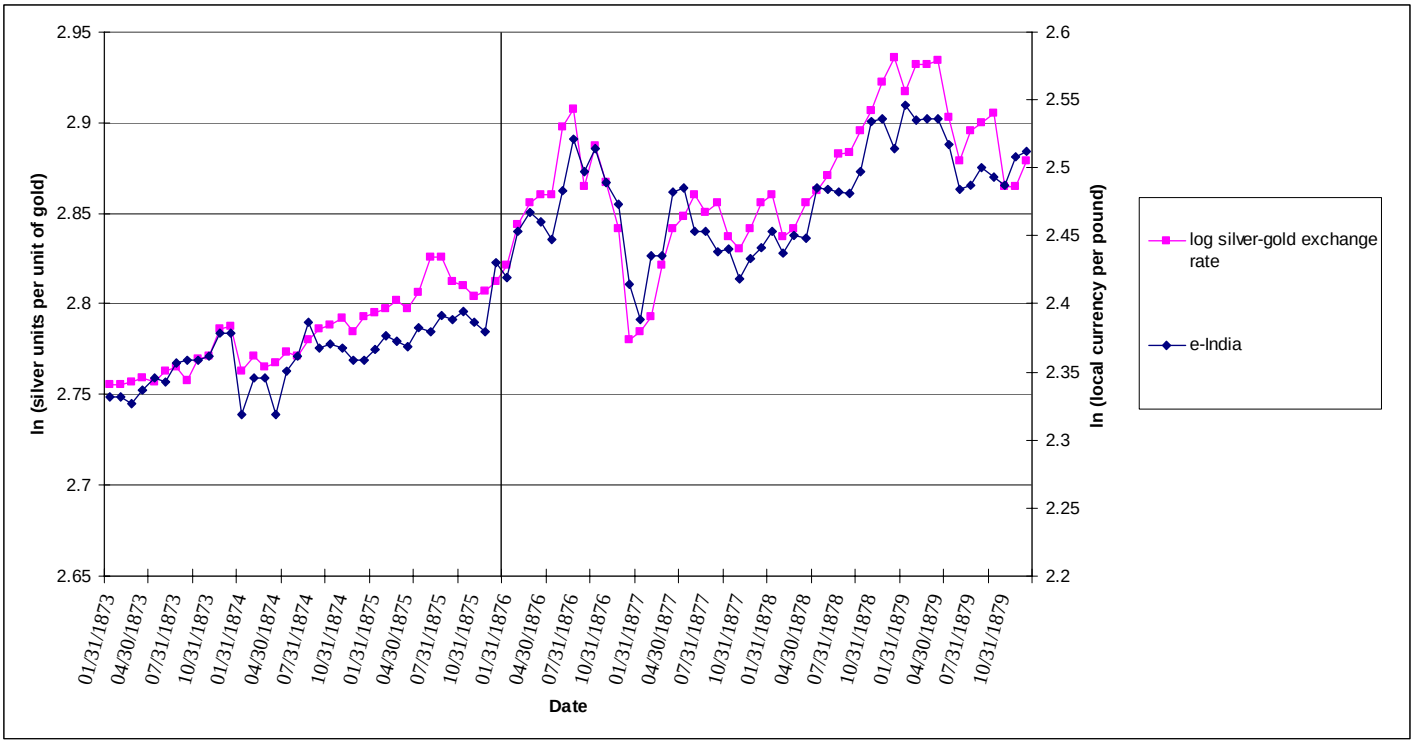
Notes: Original figures were in pence per ounce in London from Gallarotti (1995), and were converted to the silver-gold exchange rate using Laughlin's (1886) conversion factor p. 225. Figures are annual averages.

Figure 2 Mexico: Nominal Exchange Rate and the Gold-Silver Price, 1873-1879



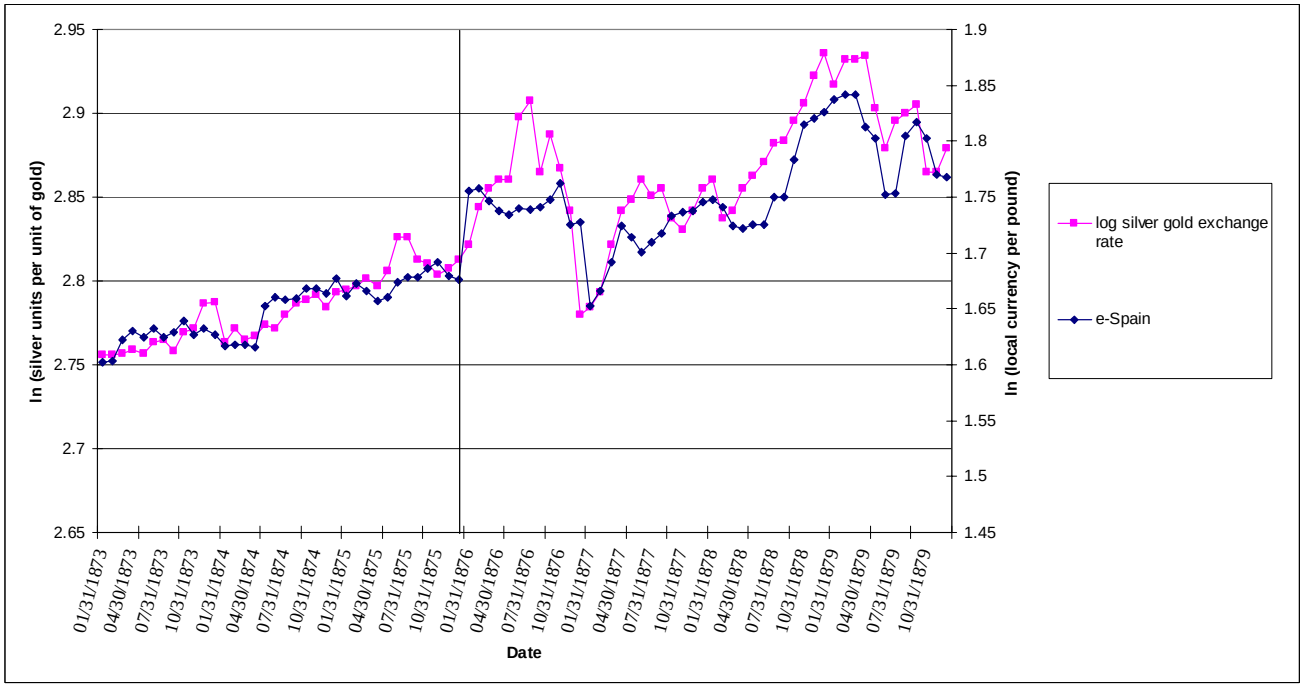
Notes: The vertical line is 31 January, 1876 which coincides with the expectation of further depreciations and the French suspension of silver coinage. Sterling exchange rates are derived from underlying data on local units per US dollar which were converted using market weekly dollar-pound exchange rates. Sources: Global Financial Data

Figure 3 India: Exchange Rate and the Gold-Silver Price, 1873-1879



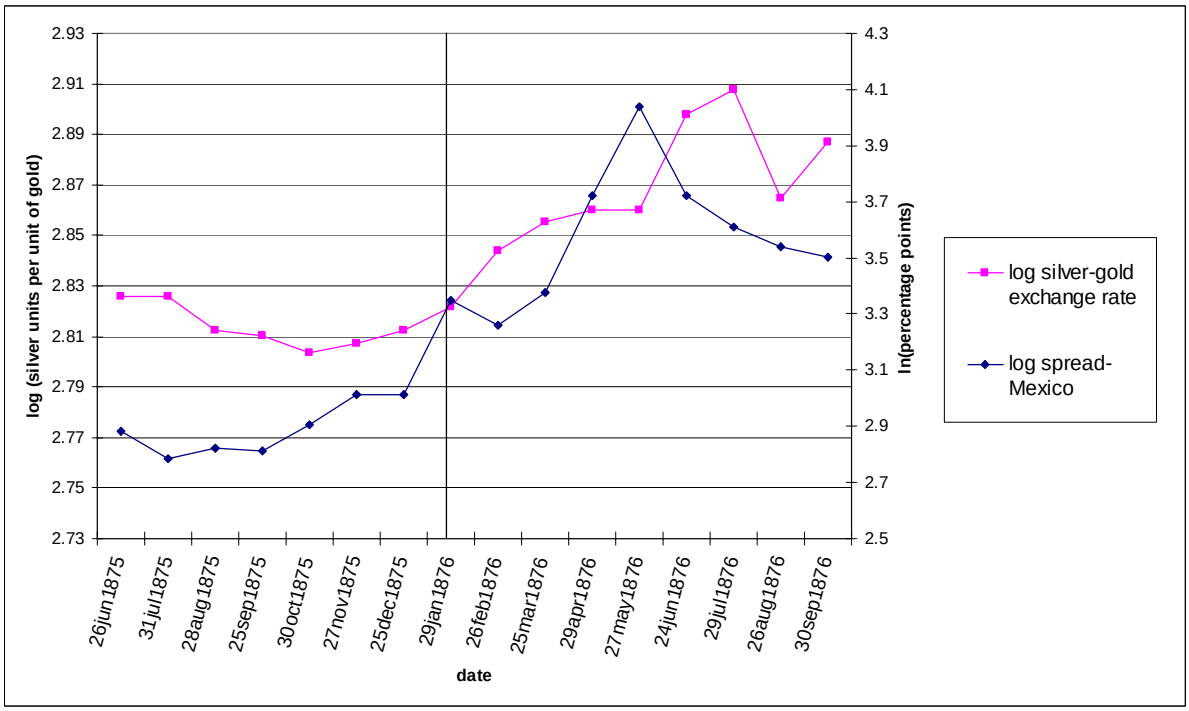
Notes: See notes to previous figure

Figure 4 Spain: Nominal Exchange Rate and the Gold-Silver Price, 1873-1879



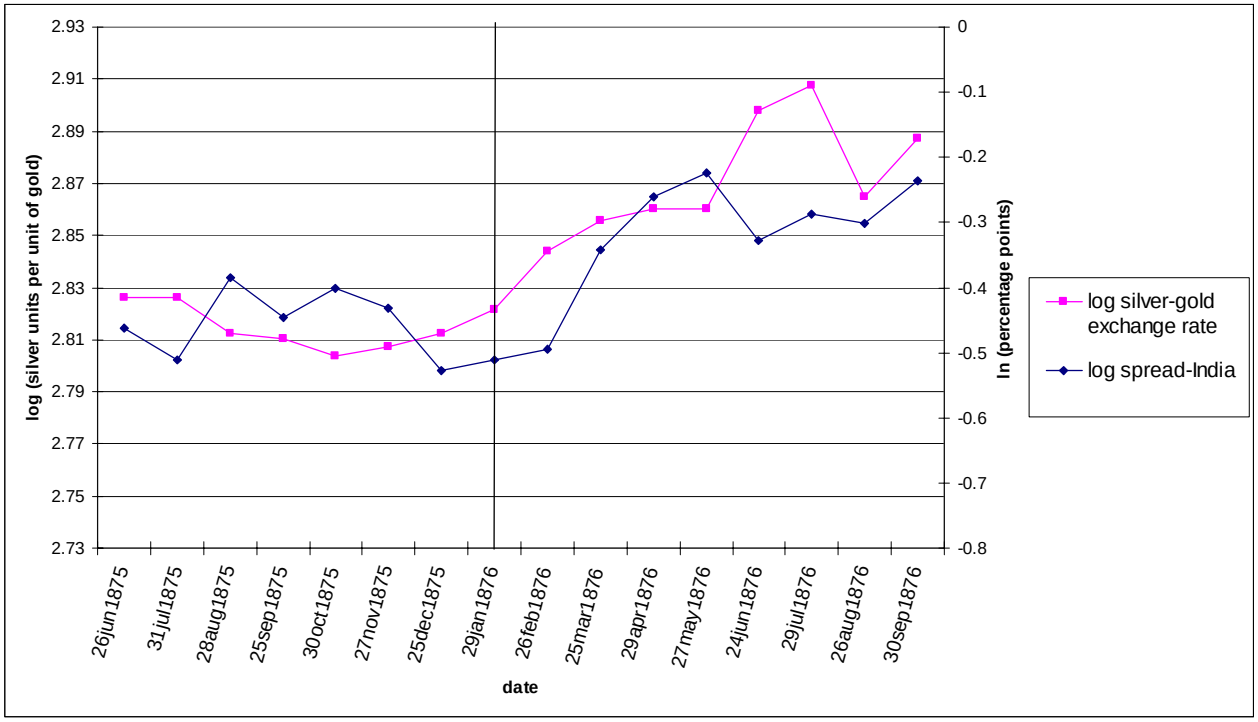
Notes: See notes to previous figure

Figure 5 Mexico: End of the Month Long-Term Bond Spread and the Gold-Silver Price, Mid-1875-Mid-1876



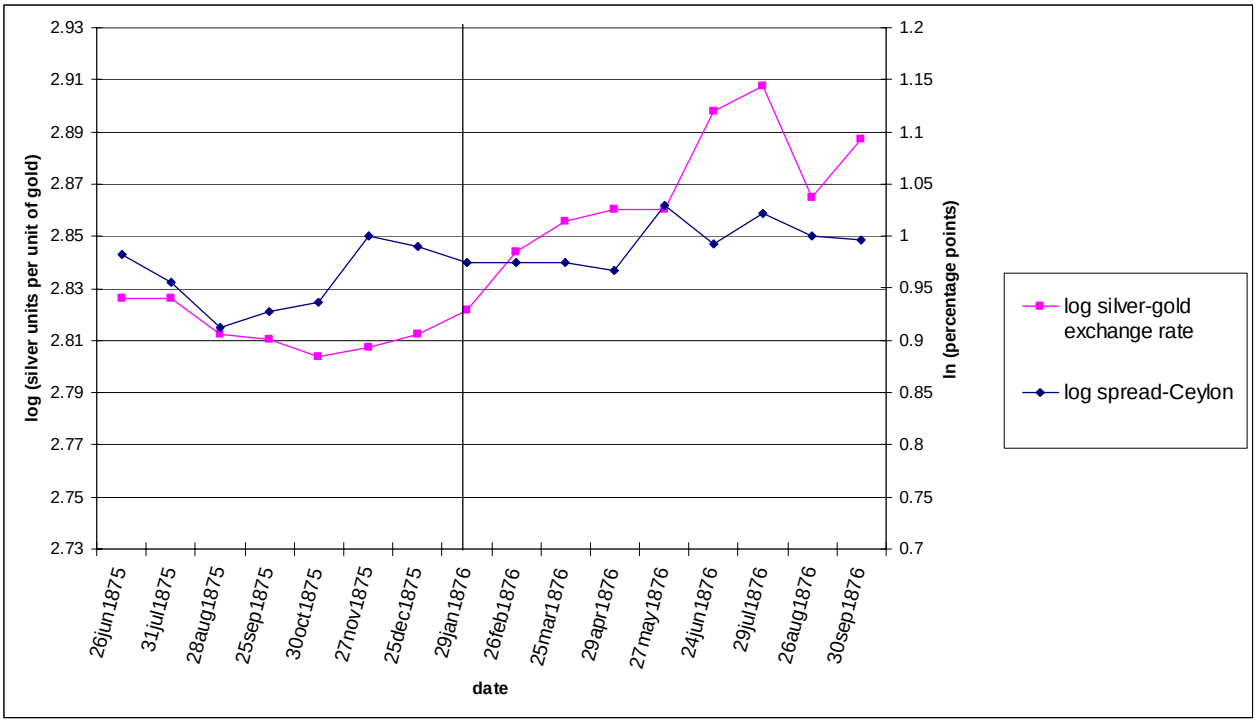
Notes: Bond spread is calculated against the British Consol. Vertical line is 29 January, 1876.
Sources: Global Financial Data and *The Economist*.

Figure 6 India: End of the Month Long-Term Bond Spread and the Gold-Silver Price, Mid-1875-Mid-1876



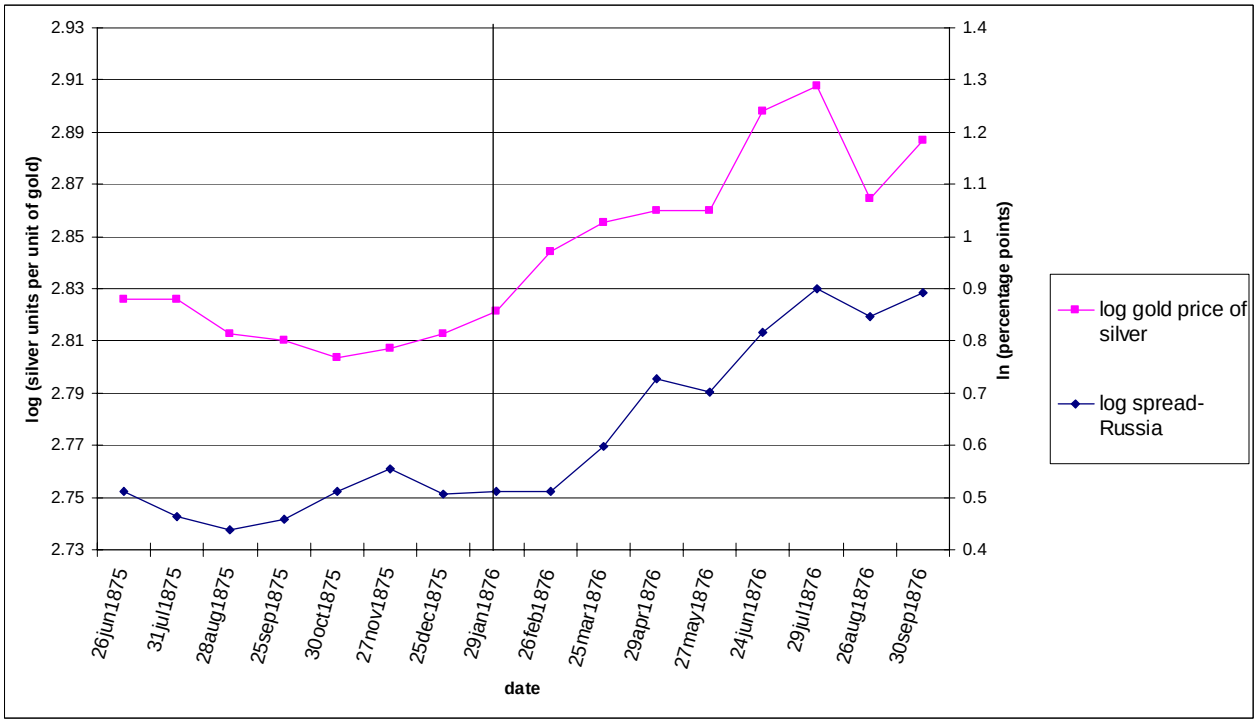
Notes: Bond spread is calculated against the British Consol. Vertical line is 29 January, 1876.
Sources: Global Financial Data and *The Economist*.

Figure 7 Ceylon: End of the Month Long-Term Bond Spread and The Gold-Silver Price, Mid-1875-Mid-1876



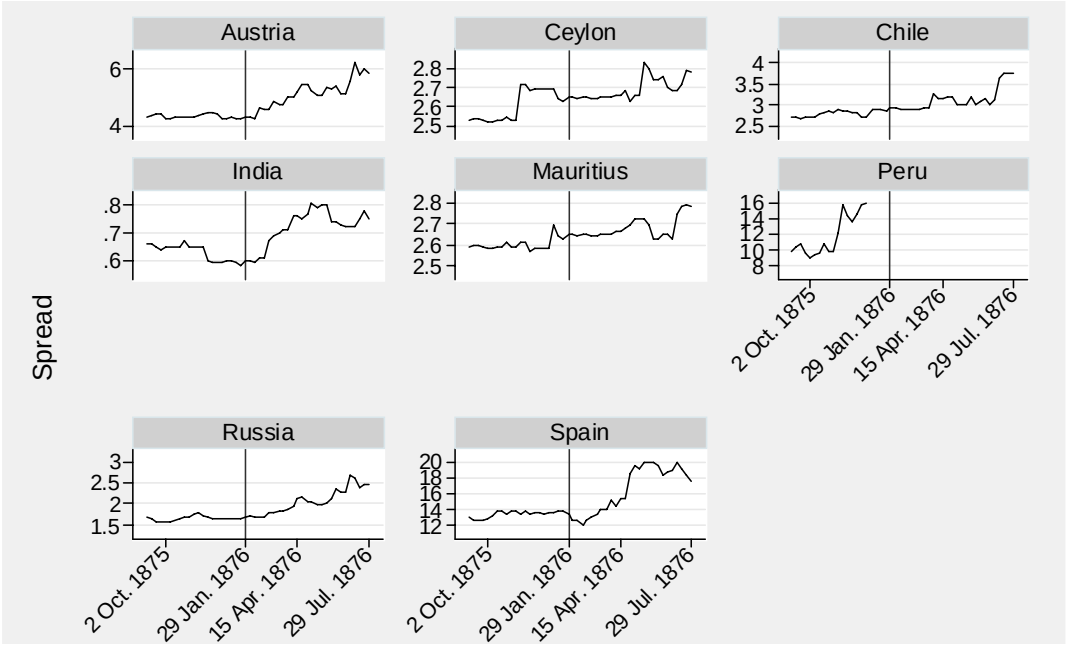
Notes: See notes to previous figure.

Figure 8 Russia: End of the Month Long-Term Bond Spread and the Gold-Silver Price, 1873-1879



Notes: See notes for previous figures.

Figure 9a Weekly Spreads by Country 2 October, 1875 to 29 July, 1876: Silver Standard Countries.



Notes: Vertical lines represent break point for the regressions.

Figure 9b Weekly Spreads by Country 2 October, 1875 to 29 July, 1876: Non-Silver Standard Countries

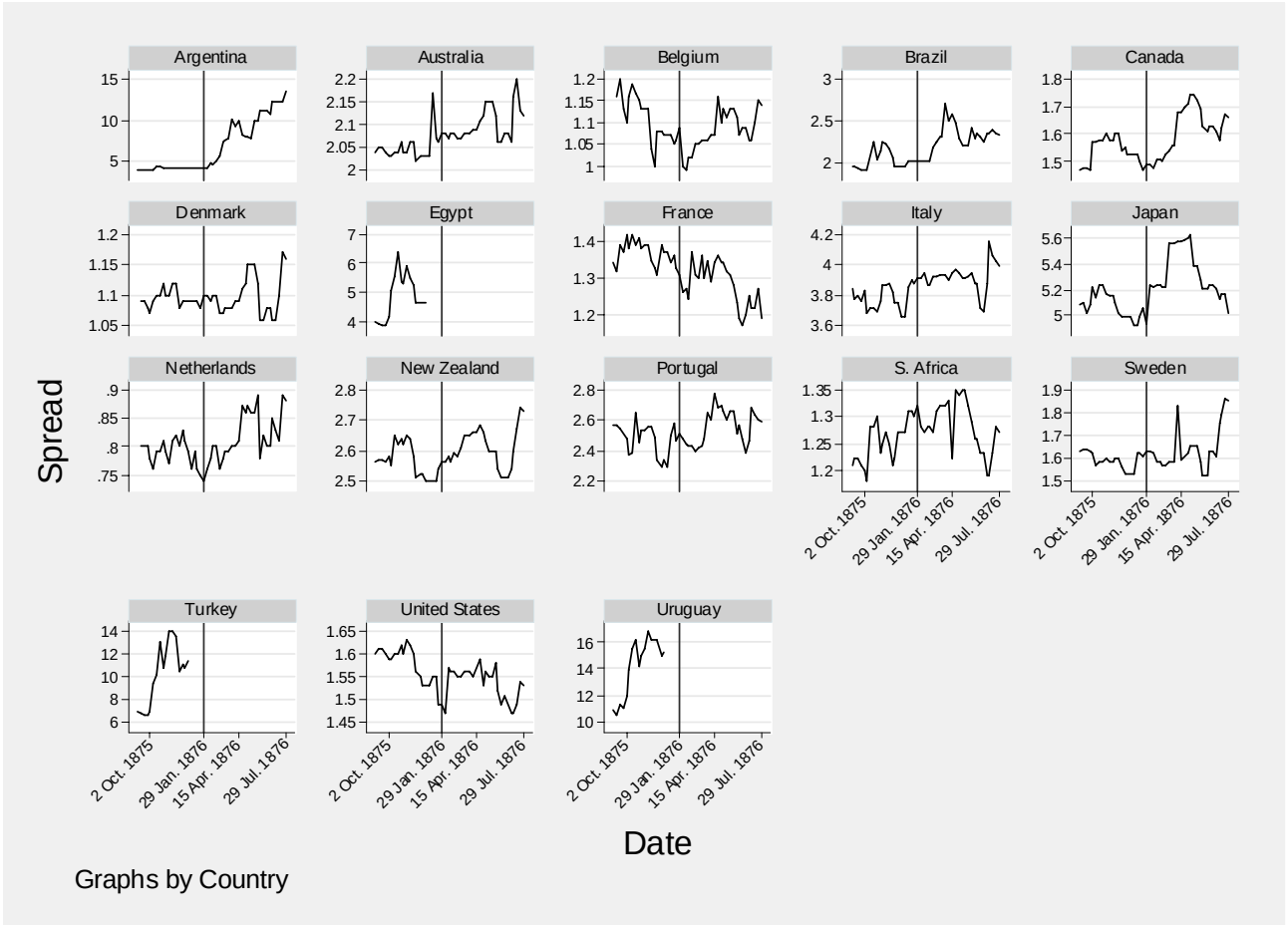


Figure 10 Marginal Effect (in percentage points) for Silver Countries for Various Values of Hard Currency Debt to Exports

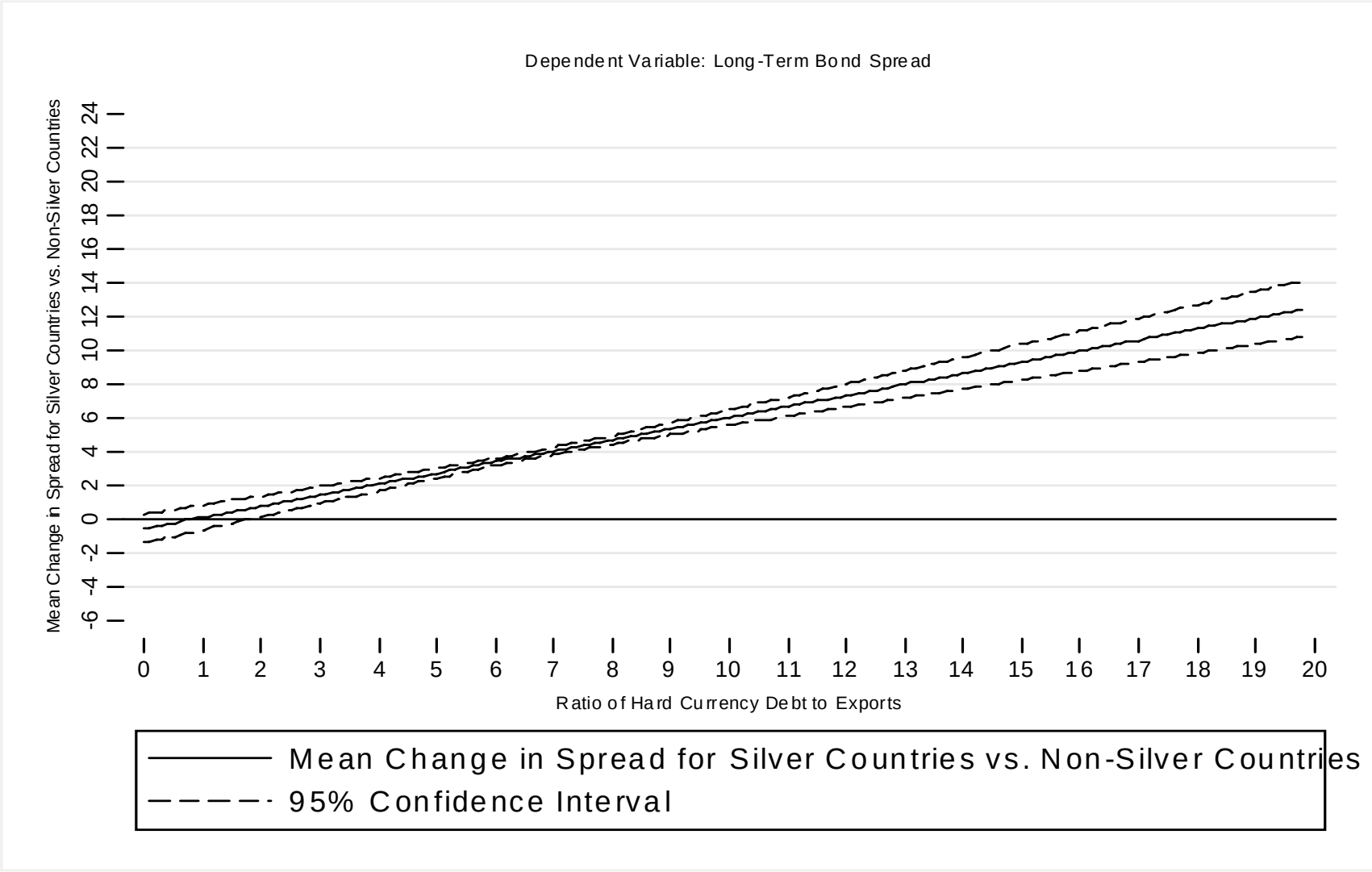


Figure 11a Scatter Plot for Regression of the First Difference in Average Spreads on the Hard Currency to Exports Ratio, Silver Countries

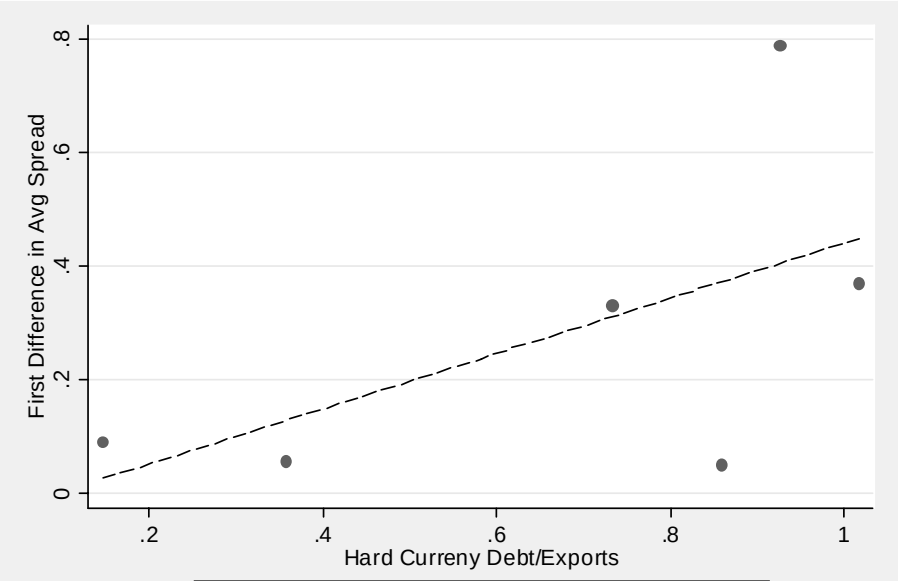


Figure 11b Scatter Plot for Regression of the First Difference in Average Spreads on the Hard Currency to Exports Ratio, Non-Silver Countries

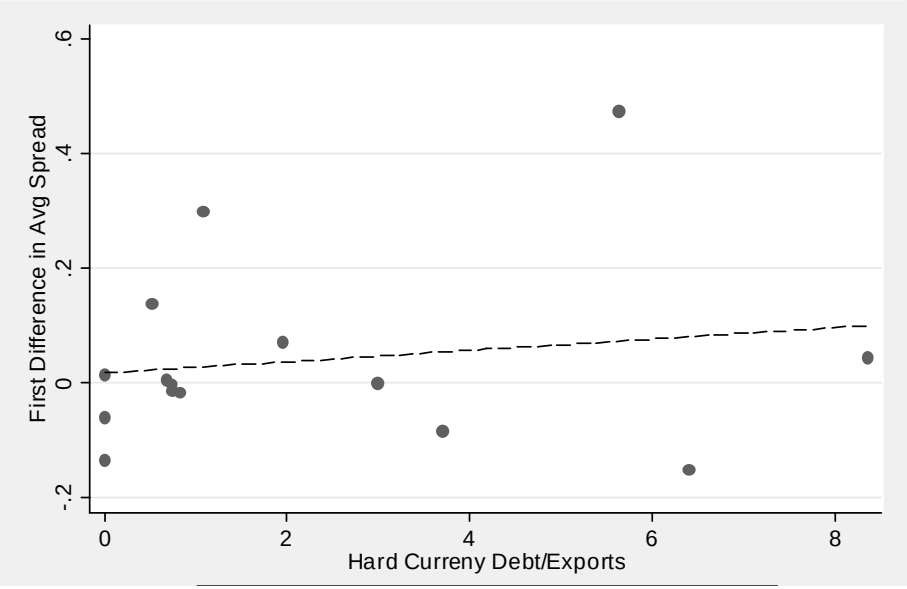


Table 1 Difference in Differences Specifications

Regressors	(1) *Baseline*	(2) *Long Window*	*(3) CAPM*	*(4) Two-Periods*	*(5) Revenue*	*(6) Revenue--Long Window*	*(7) Baseline--No Outliers*	*(8) Baseline--* ln(*spread*)
Post-Event x [HC Debt/Exports] x Silver	0.66	0.75	0.78	1.14	---	---	0.53	0.03
	[0.06]**	[0.09]**	[0.08]**	[0.08]**			[0.22]*	[0.01]*
Post-Event x [HC Debt/Revenue] x Silver	---	---	---	---	0.7	0.89	---	---
					[0.14]**	[0.11]**		
Post-Event x Silver	-0.58	-0.57	-0.58	-0.77	-0.77	-0.96	-0.5	0.01
	[0.44]	[0.40]	[0.40]	[0.49]	[0.37]*	[0.37]**	[0.43]	[0.07]
Post-Event x [HC Debt/Exports]	-0.05	0.04	0.03	-0.03	---	---	-0.05	-0.01
	[0.06]	[0.08]	[0.07]	[0.07]			[0.06]	[0.01]
Post-Event x [HC Debt/Revenue]	---	---	---	---	0.01	0.05	---	---
					[0.03]	[0.05]		
Post-Event Dummy	0.46	0.31	0.33	0.16	0.32	0.23	0.46	0.08
	[0.42]	[0.38]	[0.38]	[0.44]	[0.30]	[0.27]	[0.42]	[0.06]
Constant	3.9	3.42	2.07	3.42	3.82	3.36	3.52	0.98
	[0.77]**	[0.57]**	[1.14]	[0.60]**	[0.75]**	[0.56]**	[0.70]**	[0.17]**
Observations	1121	1974	1974	48	1168	2055	1073	1121
R-Squared	0.2	0.22	0.89	0.34	0.18	0.19	0.01	0.003

Notes: Dependent variable is the bond spread. In Column (8) it is the logarithm of the spread. Columns (1) & (5) use a 21 week pre-event window and a 27 week post-event window. Column (4) uses the mean spread pre- and post-event as the dependent variable. Cols. (2), (3), and (6) use a 44 week pre-event window (30 Jan., 1875-4 Dec., 1875) and a 35 week post-event window (11 Dec., 1875-12 Aug., 1876). Robust standard errors, clustered for intra-country correlation are reported in brackets. See the text for descriptions of the variables.* significant at the 5% level; ** significant at the 1% level.

Table 2 Alternative Baseline Specifications

Regressors	*(1)* *Baseline--Debt & Exports*	*(2)* *HC Debt & Revenue*
Post-Event x [HC Debt] x Silver	0.04	0.03
	[0.00]**	[0.00]**
Post-Event x [Exports] x Silver	-0.02	---
	[0.01]**	
Post-Event x [Revenue] x Silver	---	-0.01
		[0.01]
Post-Event x [HC Debt]	-0.0003	-0.00005
	[0.0005]	[0.0003]
Post-Event x [Exports]	-0.005	---
	[0.003]	
Post-Event x [Revenue]	---	-0.01
		[0.01]
Post-Event x Silver	-0.34	-0.47
	[0.44]	[0.42]
Post-Event Dummy	0.53	0.5
	[0.44]	[0.42]
Constant	3.9	3.82
	[0.78]**	[0.75]**
Observations	1121	1168
R-Squared	0.22	0.19

See notes to Table 1.

Table 3 Robustness

Regressors	(1) *Baseline--Debt Revenue*	(2) *Baseline--NO SilverTerm*	*(3) Debt/Rev NO Silver Term*	*(4) Baseline--Core as Control Grp*
Post-Event x [Hard Currency Debt/Exports] x Periphery	---	---	---	0.02
				[0.13]
Post-Event x [Total Debt/Revenue] x Silver	0.27	---	0.08	---
	[0.03]**		[0.07]	
Post-Event x Silver	-0.58	---	---	---
	[0.24]*			
Post-Event x Periphery	---	---	---	0.74
				[0.48]
Post-Event x [Hard Currency Debt/Exports]	---	0.06	---	0.01
		[0.11]		[0.02]
Post-Event x [Total Debt/Revenue]	0.01	---	---	---
	[0.03]			
Post-Event Dummy	0.26	0.37	0.06	-0.01
	[0.22]	[0.29]	[0.24]	[0.02]
Constant	3.82	3.9	3.82	3.9
	[0.75]**	[0.77]**	[0.75]**	[0.77]**
Observations	1168	1121	1168	1121
R-Squared	0.21	0.008	0.009	0.02

Notes: Dependent variable is the bond spread. Columns. (1), (2) (3), & (4) use a 21 week pre-event window and a 27 week post-event window.Robust standard errors, clustered for intra-country correlation are reported in brackets. See the text for descriptions of the variables.* significant at the 5% level; ** significant at the 1% level.