# Are Hard Pegs Credible in Emerging Markets? Lessons from the Classical Gold Standard

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Can policymakers enhance credibility by adopting hard currency pegs? Emerging-market countries may be able to borrow at lower rates if the adoption of fixed exchange rates confers credibility. A hard peg could potentially impact two components of sovereign yield spreads: (1) country risk and (2) currency risk. The pre-World War I gold standard provides a natural testing ground for this question since it is, arguably, the most important and well-known hard peg in modern history. Using a new database of over 250,000 observations of weekly sovereign debt prices from the period 1870-1913, we examine the movement in sovereign yields denominated in *both* local currency and pounds sterling (or gold) in order to identify the country-risk and currency-risk components of sovereign yield spreads. Our analysis indicates that the gold standard was not a very credible monetary regime in many of the largest emerging markets of the gold standard period. Years after a country joined the gold club, local currency bonds often traded at significantly higher interest rates (more than 400 basis points) than a country's foreign currency debt denominated in pound sterling. We find some evidence that the spread between a country's local currency and sterling bonds declined in the years leading up to gold standard adoption. However, we find little empirical evidence that adopting the gold standard lowered country risk.

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## I. Introduction

Can policymakers enhance credibility by adopting hard currency pegs? Countries may be able to borrow at lower rates if the adoption of fixed exchange rates confers credibility. This may be particularly important for emerging-market countries since interest rates for sovereign borrowing tend to be higher than those for high-income countries. Lower interest-rate spreads for emerging-market countries can stimulate investment and economic growth (Berg and Borensztein, 2000; Schmukler and Serven, 2002).

The analysis of sovereign-debt yield spreads is central to the debate about exchange-rate regime choice. Proponents of fixed exchange rates argue that they significantly reduce the premium on emerging-market debt. This premium has two components: (1) country risk and (2) currency risk.[1] The country risk premium represents the risk that an emerging market country will default on its debt obligations, while the currency risk premium represents the compensation that an investor receives for an adverse movement in the exchange rate of a local-currency bond (Domowitz, Glen, and Madhavan, 1998). Advocates of hard pegs argue that these currency regimes can reduce the currency risk premium, and may even eliminate it if the monetary regime is perfectly credible.[2] On the other hand, the currency risk premium may remain positive if the hard peg is not considered perfectly credible by financial markets (Schmukler and Serven, 2002, Edwards, 2000).

[1] There is a large empirical literature in international and development economics on the country-risk and/or currency-risk components of yield spreads for emerging market debt. For example, see Edwards (1984, 1986); Mauro, Sussman, and Yafeh (2000, 2006); and Sturzenegger and Powell (2000).
[2] Additionally, fixed exchange rates may reduce the probability of speculative attacks and contagion.

The pre-World War I gold standard provides a natural testing ground for this question since it is, arguably, the most important and well-known hard peg in modern history. Using a new database of over 250,000 observations of weekly sovereign debt prices from the period 1870-1913, we examine the movement in sovereign yields denominated in *both* local currency and pounds sterling (or gold) in order to identify the country-risk and currency-risk components of sovereign yield spreads.[3] Our results suggest that joining the gold club did not entirely eliminate the interest-rate differential between a country's local currency debt and gold bonds issued on international capital markets. Five years after a country joined the gold standard, the currency risk premium averaged more than 400 basis points.

The existence of a large currency premium after countries adopted the gold standard suggests that financial markets believed that the hard peg was not fully credible. Investors still considered devaluation and departure from gold a high probability event in emerging markets, even though we find some evidence that currency risk declined as countries implemented policies to join the gold club. Our results suggest that the gold standard was not a globally credible monetary system.

The paper is organized as follows. We first discuss the theoretical literature on the gold standard and whether it reduced the cost of borrowing in international capital markets. We then describe the new weekly database on sovereign debt prices and how we will use it to analyze the effects of adopting the gold standard. Section 3 provides a series

[3] Previous studies examining the gold standard have focused on country risk rather than currency risk. Bordo and Rockoff (1996) and Obstfeld and Taylor (2003) find that the gold standard lowered sovereign risk by approximately 30-40 basis points. Flandreau and Zumer (2004) find that the gold standard had no effect on sovereign yields once a broader set of economic and political variables controls are considered. Ferguson and Schularick (2006) find that the gold standard effect disappears once the sample of sovereign borrowers is expanded to include the universe of debtors on the London market.

of country and panel event studies to estimate the effect of joining the gold standard on long-term yield spreads. Finally, the paper concludes that the primary effect of joining the gold standard was to reduce currency risk rather than country risk.

## II. The Gold Standard as a Rule

### *A. Theoretical Background*

Bordo and Kydland (1995) provided an interpretation of the role of the gold standard as it relates to the literature on rules for policymakers. Accordingly, being on the gold standard tied the hands of the fiscal and monetary authorities of a country. The monetary rule served as a credible commitment mechanism that solved the classic time-inconsistency problem (Kydland and Prescott, 1985). Government policy is said to be time inconsistent when a policy plan that is determined to be optimal and to hold indefinitely into the future is subsequently revised. For example, suppose that a government sells debt to finance a war. From an *ex ante* perspective, it is optimal for the government to service its debt obligations. However, once the bonds have been sold, it is optimal for the government to default unless there is a commitment mechanism that ties the hands of the fiscal and monetary authorities. In the absence of a commitment mechanism, it is time inconsistent for the government to repay its debt obligations. Private agents will anticipate the government's incentive to default and they will not buy bonds, forcing the government to rely on taxes or money creation. Overall, the existence of an enforcement mechanism, such as a credible threat to deny the government access to

borrowing in the future, means that a socially optimal, but time inconsistent policy of borrowing can be supported as an equilibrium outcome.

Bordo and Kydland (1995) also argue that the gold standard had an escape clause. Countries could suspend specie convertibility in the event of a war or a fiscal emergency; however, after the war or extraordinary event, it was well understood that a country would return to specie convertibility at the pre-war parity. Generally, resumption occurred after a "reasonable" delay period during which a country would impose deflationary policies to retire fiat currency printed for war finance. The United States and France, for example, fought wars in the 1860s and 1870s and issued large amounts of irredeemable paper currency and debt. Following the end of the war, both countries imposed deflationary policies to restore convertibility following the cessation of hostilities, and both had returned to a specie standard by 1880. Bordo and Kydland (1995) conclude that the gold standard was a contingent rule with an escape clause.

*B. Empirical Implications*

One testable implication of committing to a policy rule such as the gold standard is that it should lower the cost of capital in international capital markets. The empirical evidence is unclear as to whether joining the gold standard reduced interest rates for sovereign borrowers during the gold standard.[4] The empirical results appear to be sensitive to the sample of countries used in cross-sectional studies as well as to the econometric methodology. The divergent results may reflect two underlying issues. First,

[4] For evidence that it mattered for country risk, see Bordo and Rockoff (1996) and Obstfeld and Taylor (2003). For a critique of these findings see (Ferguson and Schularick, 2006; Flandreau and Zumer, 2004).

gold-standard adoption is an endogenous variable that depends on a host of country-specific factors that can change depending on whether the country is on the gold standard. For example, high-income countries such as England, France, and the United States joined the gold club in the nineteenth century. A gold dummy that is supposed to measure the "beneficial" effects of the monetary rule may be capturing the advantages of good institutions and stable political regimes of high-income countries. Second, earlier studies have not separated the effects of country risk from currency risk in sovereign yield spreads.

We propose two solutions to these empirical problems. First, we examine the currency risk premium, which is defined as the current yield of country *i*'s bonds denominated in *domestic* currency minus the current yield on its sterling-denominated or gold-denominated debt. This allows us to isolate country risk from currency risk. Moreover, by examining interest-rate differentials between two bonds of the same country, where the primary difference between the obligations is their currency denomination, we can largely eliminate the need to control for observed and unobserved differences in sovereign-specific fundamentals – something that has been difficult to account for fully in cross-country studies of country risk.[5] The spread between a country's local currency bonds and its sterling denominated debt should largely reflect devaluation risk associated with leaving a hard peg.

Second, we examine the time-series behavior of high frequency (weekly) sovereign yield spreads in the weeks, months, and years before and after a country adopted the gold standard. The event study approach and use of time series data may be

[5] Empirical studies of sovereign risk during the gold standard have found the ratio of debt-to-revenue, budget deficit, and exports per capita to be important determinants of yield spreads (Ferguson and Schularick, 2006; Flandreau and Zumer, 2004).

better suited for dealing with endogeneity and selection issues found in cross-sectional studies, where it is difficult to identify a "gold-standard" effect because the fixed-exchange rate regime is highly correlated with a host of macroeconomic variables, including the inflation rate, the level of income, and measures of political stability. In the time series context, the possibility of positive selection bias (that some countries may have adopted institutions or economic reforms that made it more likely to move to a hard peg) may actually provide us with a lower bound of a long-run adherence effect. All else equal, "good institution" countries ought to have currency risk premiums that do not positively persist for long periods after adoption, so a sample limited to these would bias our estimated long-run, currency-risk effect downward.

The currency risk premium is an important measure of credibility that cannot be identified by examining country risk.[6] If a country credibly commits to joining the gold standard, then the probability of a devaluation of the exchange rate should be zero, which implies that "paper bonds should be as good as gold": that is, the interest-rate differential between a country's local currency and sterling bonds should be zero (Obstfeld and Taylor, 2003). A large spread of local currency over sterling denominated debt after the introduction of the gold standard, however, would suggest that the commitment to the fixed exchange rate was not seen as a credible monetary regime by financial markets.

There are a couple of potential shortcomings with the use of the currency risk premium as a methodology for identifying devaluation risk of a hard peg. The presence of capital controls might drive a wedge between a country's currency bonds and sterling

[6] Some studies have measured the credibility of the gold standard in core countries by estimating "target zones" that use short-term interest rates and parity conditions between two countries to estimate expected devaluation. Unfortunately, this methodology cannot be used for many emerging markets because short-term interest rates are not available.

denominated issues that traded on the London exchange. Indeed, the presence of capital controls has made it more challenging to analyze the credibility of modern hard pegs. Fortunately, for our analysis, the gold standard was a period of unfettered capital markets that were largely free of government intervention (Eichengreen, 1996, IMF, 1997).[7] The currency risk premium might also reflect differential default risk rather than devaluation risk if there is a greater probability of defaulting on a domestic currency bond than a sterling denominated issue. This is probably not a significant problem with our sample of countries, however, given that most large emerging market borrowers faithfully serviced their gold and paper bonds for the entire gold standard period. The two possible exceptions are Argentina and Brazil, which defaulted on their debt obligations in 1890 and 1898, respectively. In both instances, however, Argentina and Brazil defaulted on their sterling (gold) and paper bonds employed in our analysis, suggesting that differential default risk is not likely a significant problem for our sample.

## III. Evidence on the Movement of Country and Currency Risk Premiums

### *A. Data and Descriptive Statistics*

To analyze the effect of the gold standard on sovereign yield spreads, we assembled a new database of more than 250,000 weekly observations on bond prices. The

[7] Occasionally, during the classical gold standard period, central banks of gold-club countries attempted to alter gold flows via "gold devices," but these differ from more conventional capital controls in that they worked through a market mechanism which attempted to influence international arbitrage by manipulating gold points. This stands in contrast to administrative mechanisms of a modern nature, which are aimed at preventing individuals from freely importing or exporting specie or currencies (Bloomfield, 1959; Gallarotti, 1995).

database includes the universe of sovereign listings reported in *The Economist* from November 5, 1870 until June 30, 1914. We supplement *The Economist* database with weekly bond yields from *The Commercial and Financial Chronicle*. For domestic bond markets, we collected monthly and weekly interest-rate data from financial newspapers located in the country of interest. We report the full range of data sources in the appendix of the paper.

Convertibility under the gold standard was established by law or executive decree, although in some cases, such as France, maintenance of convertibility was left at the discretion of central banks rather than the sovereign or legislature. Table 1 presents a timeline of gold standard adoption for every country that joined the gold standard in the period 1870-1914 and had bonds that actively traded on the London Stock Exchange. Column 1 gives the date of gold standard adoption that we define as the day that the monetary authority for a given country initiated or resumed specie convertibility. Column 2 lists the period of gold standard adherence for the 15 sovereign borrowers in our sample. We limit our analysis to adoption and adherence episodes where a country remained on the gold standard for at least 2 years.[8] Details of gold standard adoption dates for each country are given the Appendix.

Tables 2 and 3 present summary tables of descriptive statistics of yield spreads for each country. We calculate two different yield spreads to measure various types of risk associated with investing in emerging market debt. The country risk premium is defined as the interest-rate differential between a country's foreign currency bonds and the "risk-

[8] We do not consider adherence to the gold standard for a period of less than two years to be a credible attempt to join the monetary rule. Although our choice of two years is arbitrary, the decision rule was selected to eliminate short-lived attempts by Argentina, Brazil, and Greece to join the gold club during the late nineteenth century.

free" British consol rate. The country risk premium represents the risk that a country will default on its debt obligations. The currency risk premium is measured as the spread between a country's local currency bonds and the interest-rate on its foreign currency (sterling) debt. The currency risk premium represents the compensation that an investor receives because of the possibility of an expected depreciation in the exchange rate of a local-currency bond.

We calculate current yields for the "representative" long-term interest rate for each country in our sample by dividing a bond's coupon by its price in period t. (The bonds included in our sample are described in the appendix.) The summary tables report average interest-rate differentials (in basis points) for 10- and 4-year windows or the largest available window. The windows are centered on the day that a country joined the gold standard except in a few cases where data constraints prevented the construction of a symmetric window. The 4- and 10-year windows are designed to measure long-run adherence to the gold standard. Each table reports the average yield spread (in basis points) for the 10- or 4-year window (or largest available sample period) for each sovereign borrower along with the average interest-rate differential in the window before and after a country joined the gold club. Column 4 shows the change in the interest-rate differential from the pre- (off-gold) and post-event (on-gold) periods. If joining the gold club reduces yield spreads and is a "good housekeeping seal of approval," then yield spreads should decline in the "on-gold" period. Column 5 reports the number of observations in each window.

Panel A of Table 2 shows that country risk dropped an average of approximately 21 basis points in the two-year period after a country adopted the gold standard. The

country risk premium declined for 13 out of 17 emerging market borrowers; yield spreads increased for India, Nicaragua, and South Africa. Turkey is the only country where the yield spread declined by more than 100 basis points. The simple summary statistics from Panel A show that the decline in interest-rate differentials was less than half the size of the drop in the 10-year windows.

Panel B of Table 2 shows that the country risk premium declined an average of 39 basis points in the five years after a country joined the gold standard. The 39 basis point figure is identical to the size of the "gold standard effect" estimated by Bordo and Rockoff (1996). Argentina and Turkey experienced more than a 200 basis-point drop in their country risk, while the premium for Greece fell more than 125 basis points in the sample period after the sovereign borrower joined the gold. The large drop in country risk for Argentina may also reflect the long-awaited economic recovery from the Baring Crisis. The resolution of a debt crisis and the establishment of foreign financial control could help explain part of the decline in the yield spreads for Greece and Turkey (Mitchener and Weidenmier, 2005). The country risk premium for Brazil, Egypt, Nicaragua, Russia, and the United States decreased between 20 and 80 basis points in the "on gold" period. The interest-rate differential changed very little for Austria, Ceylon, India, Mexico, Sweden, and South Africa (Cape of Good Hope) after these countries joined the gold club. Costa Rica and Italy were the only the sovereign borrowers in the sample where the yield spread increased in the post-event period, rising by more than 163 and 35 basis points, respectively. The large rise in yield spread for Costa Rica may reflect political instability in the region in the late 1890s.

As for the currency risk premium, Table 3 provides some preliminary evidence on this hypothesis from a sample of eight large emerging market borrowers: Argentina, Austria, Brazil, India, Italy, Mexico, Russia, and the United States. The average currency risk premium for the three sovereign borrowers declined nearly 83 basis points in the "on-gold" period of the 10-year window and more than 43 basis points in the four-year window after a country adopted the hard peg. The currency risk premium is also capturing a factor that is largely distinct from the determinants of country risk given that the correlation between the change in the currency risk premium and the country risk premium is less than 0.20 for the seven emerging market countries with both paper and gold (sterling) bonds.

There is substantial cross-sectional variation in the currency risk premium in our sample of seven emerging market borrowers. For example, the currency risk premium for Argentina decreased more than 350 basis points in the on-gold period while the yield spread for Mexico fell more than 200 basis points when the two countries joined the gold club in the 10-year event window. The interest-rate differential for India, on the other hand, declined approximately 35 basis points in the 10- and four-year windows, which represents about a 15 percent decline in its yield spread over the sample period. The yield spread between paper and gold bonds for Italy decreased 46 basis points in the 4-year window and almost 64 basis points in the 10-year event window. Currency risk for Austria fell by more than 40 basis points in the 10-year window around gold standard adoption, but was generally stable in the 4-year window. The currency risk premium for Brazil, Russia, and the United States did not significantly change in four- or 10-year event windows.

*B. Time-Series Graphs*

Although the descriptive statistics are informative, they only present average yield spreads before and after a country joined the gold standard. It may be the case that yield spreads declined between the pre- and post-event period, but a movement in the underlying trend is masked by using average interest-rate differentials. To provide some perspective on this question, Figures 1-9 show time-series plots of the currency and country risk premiums for which data on debt denominated in both home and foreign currencies exist. The vertical line in each figure denotes when a country joined the gold standard. Previous scholars have emphasized that political or country risk declined with gold standard adoption. However, it is the currency risk premium that provides direct insight into the credibility of the classical gold standard peg. As noted above, if a hard peg is perfectly credible, then the yield spread between a country's local currency bonds and its debt denominated in pound sterling should fall to zero. As Figures 1-9 show, this is clearly not the case for our sample of nine emerging market countries.

Country and currency risk for Argentina are presented in Figure 1, one of the largest sovereign borrowers in the nineteenth century. Country risk shows a general decline in the pre and post-event periods. The currency risk premium for Argentina also declines substantially in the years leading up to the country's adoption of the gold standard in 1899; however, the currency risk premium remains at approximately 1,000 basis points after the country adopts the gold standard in October 1899.

As shown in Figure 2, country risk for Austria, a country located closer to the core of Europe, declines from approximately 180 basis points in 1888 to about 140 basis points when it adopted the gold standard. Political risk for Austria remains quite stable for the remainder of the 10-year window. The interest-rate differential between Austrian paper and gold bonds displays similar time-series behavior to the Argentine series. Although exchange-rate risk declined markedly as the country adopted the gold standard in 1892, the currency risk premium averaged approximately 120 basis points in the 5-year period after the country joined the gold club.

Figure 3 shows the country and currency risk premia for Brazil, another Latin American emerging market. Brazil's country risk declined from approximately 325 basis points to 200 basis points at the time of gold standard adoption. It fell by roughly another 20 basis points after adoption. On the other hand, currency risk for Brazil rose from a little under 50 basis points to around 100 basis points at the time of adoption and remained at approximately 100 basis points after the country joined the gold standard. Figure 4 provides evidence on the currency and country risk premia for the British colony of India. The graph indicates that the country risk premium increased for India in the years leading up to gold standard adoption. It then began to fall after the British colony joined the gold club. The interest-rate differential between paper rupee and gold rupee denominated debt trading on the London market averaged 240 basis points in the five years after the country joined the gold club.

Figure 5 presents the evidence for Italy, another European emerging market of the nineteenth century. The graph shows that country risk declined over the entire sample period, although some of this effect may be driven by France's adoption of the gold

standard, given that Italian bonds were denominated in francs. The currency risk premium for Italy also declines over the sample period as the Southern European country moved towards adopting the gold standard, but hovers between 40-60 basis points five years after adoption. The country risk premium for Mexico, another large borrower during the classical gold standard period, remains quite flat over the pre- and post-event periods (Figure 6). The interest-rate differential between Mexico's local and sterling denominated bonds declines substantially prior to adoption, but a large currency risk premium for Mexico persists after adoption. The currency risk premium for Mexico averaged almost 500 basis points in the 5-year period after the country joined the gold standard.

Country and currency risk premia for Russia are presented in Figure 7. Political risk declines in the pre-event period but then remains steady in the five-years after the country joined the gold club. The decline in the pre-event period may reflect the effects of important monetary and fiscal reforms in the early 1890s that prepared the country for gold standard adoption in 1897 (Mauro, Sussman, and Yafeh, 2006). The currency risk premium is large and appears to change very little over the 10-year window, averaging more than 800 basis points in the pre-gold and gold standard periods.

Country risk for the United States, presented in Figure 8, hovers at approximately 80 basis points before gold standard adoption. After this point, sovereign risk for the United States declines approximately 60 basis points by the end of 1883. Figure 8 also shows that the currency risk premium for the United States averaged approximately 100 basis points over the entire 10-year sample period.[9]

[9] For the United States, we used both the 4.5 percent gold bonds (due in 1891) and the 4 percent gold bonds (due in 1907) to calculate the currency risk premium. We spliced the two bond series together by

Even though Chile was on the gold standard for a shorter period compared to other countries in our sample (it joined the gold standard in 1895 and kept a hard peg for fewer than four years), we include a graph of its (monthly) country and currency risk premiums (Figure 9) from 1892-1904 to provide additional insight into how these series move when an emerging market adopted the gold standard.[10] The country risk premium for Chile actually increased during gold standard adherence, but then declined after the country abandoned the monetary rule in July 1898. The currency risk premium averaged more than 583 basis points while the country adhered to the gold standard. The large interest-rate differential suggests that the hard peg was not very credible. This may help explain why Chile was on the gold standard for such a short period of time.

Overall, the descriptive statistics and time-series plots of country and currency risk premia suggest that the primary effect of gold standard adoption was to reduce a sovereign borrower's currency risk premium. The evidence also suggests that the gold standard was not very credible for many emerging market countries since the interest-rate differential between a country's local currency debt and its sterling bonds often remained more than two or three hundred basis points years after a country joined the gold standard. The gold standard may also have reduced country risk, but this effect appears to have been of secondary importance.

Table 4 provides some additional economic interpretation of the observed currency risk during the gold standard era. If investors are risk averse, they will demand

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subtracting 30 basis points off the 4.5 percent bonds in the period when data on the 4 percent gold bonds was not available. The 30-basis-point difference is the average yield spread differential between the 4.5 percent gold bonds and the 4 percent gold bonds.

[10] Bordo and Rockoff (1996) discuss the relationship between Chilean internal peso bonds and its sterling denominated external debt, but do not interpret the interest-rate differential as a measure of the currency risk premium and its implications for the credibility of the hard peg. Chile also briefly joined the gold club in the early to mid 1870s. However, we were unable to locate any domestic paper bonds to test the credibility of this earlier episode of gold standard commitment.

additional compensation for exchange rate risk. With risk neutrality, this additional compensation, or exchange risk premium, is equal to zero and the currency premium is directly related to the anticipated devaluation. Hence, assuming risk neutrality, we can compute the maximum implied devaluation by dividing the average value of the currency risk premium in the five-year period after joining the gold standard by an assumed probability of devaluation. Table 4 presents the implied devaluation (in percent) for each country in our sample using different assumed probabilities of devaluation. Bordo and Murshid (2006) have constructed a measure of the estimated probability of a currency crisis during the gold standard era. For emerging market countries, they suggest that the likelihood of a global crisis was in the range of 0.10-0.14. Even if this probability were doubled to take into account country-specific shocks, this would suggest an estimated probability of devaluation around 25 percent. As seen in our table, this implies an average devaluation of approximately 20 percent for gold standard adopters.

Because there may be some concern that our data are compounding the two effects, we also tested whether the country risk premium and currency risk premium were equal after gold standard adoption. As Table 5 shows, we can reject the null hypothesis of equal means for currency and country risk at the 1-percent level for all of the countries in our sample. We now turn to an event studies analysis in order to estimate, more precisely, the short-run and long-run effects of gold standard adoption on interest-rate differentials during the period 1870-1914.

## IV. Event-Study Analysis

### *A. Panel Analysis*

To estimate the gold-standard effect, we employ a series of event studies using a "market" model of bond yield changes over a 10-year period or the largest available sample. We use this approach to measure the relative importance of country risk and currency risk for 17 emerging market countries during the gold standard.[11] We look at changes in yield spreads rather than the determinants of interest-rate differential to test whether adherence and adoption of the gold standard led to significant changes in country and currency risk. The empirical models for the country and currency risk specifications can be written as follows:

$$YIELDSPREAD_{it,CR,CUR} = \beta_0 + \beta_1 \Delta CONSOL_t + \lambda_{i,CR,CUR} GOLD_{it} + \varepsilon_{it} \qquad (1)$$

where the dependent variable is either the change in the country (CR) or currency risk premium (CUR) for country i from the previous week *t*. $\beta_0$ is a time-invariant constant, $\beta_1$ measures changes in the overall market on the yield spread using the British consol as the benchmark, and $\lambda_1$ is an "event window" indicator variable that captures the effect of joining the gold standard on the country (CR) or currency risk (CUR) sample. The white noise error term is given by $\varepsilon_{it}$.

We estimate the long-run "adherence effect" or the "good housekeeping" effect of the gold standard (for country risk and currency risk) by examining event windows of the two, three, and four-years, both before and after a sovereign borrower joined the gold standard. Then, we combine the pre- and post-event windows to estimate four, six, and

[11] Our sample includes the following countries: Argentina, Austria, Brazil, Ceylon, Chile, Costa Rica, Greece, India, Italy, Mexico, Nicaragua, Russia, South Africa (Cape of Good Hope), Sweden, Turkey, United States, and United Kingdom (for the consol rate).

eight-year windows that cover both the "on-" and "off-gold" periods. To capture the "adoption" or announcement effect of the gold standard on yield spreads, we employ a similar strategy except the event windows cover shorter periods: three, six, and 12 months. The event study analysis allows us to determine if investors and financial markets at that time considered the gold standard as a credible commitment mechanism that lowered interest-rate differentials in international capital markets. If they considered adherence to gold a signal of financial rectitude, then yield spreads should significantly fall. Since we do not have home currency bonds for all countries, equation (1) is estimated using two different samples: (1) those for which we can compute country risk and (2) those for which we can compute currency risk. The country risk models include yield spread data on 17 countries while the models with the currency risk premium include data on eight countries.[12] We estimate separate pooled OLS and country fixed effects models – the latter to control for unobserved heterogeneity across countries. All models are estimated with robust standard errors.

We first examine the short-run event studies to measure the "adoption effect" of joining the gold standard. Table 6 shows the empirical results of the short-run event windows for three, six, and 12 months in the pre-event period. Interest-rate differentials did not significantly respond to changes in the consol market in the country risk regressions (Panel A). The three, six, and 12 month event dummies have the wrong sign and suggest that country risk increased in the period leading up to gold standard adoption. The three-month dummy variable was significant at the 10-percent level. As shown in Panel B, the country risk premium is positively and significantly correlated with changes

[12] We did not report the results of including Brazil in the empirical section of the paper since the sample size was small and there were missing data for this country. However, the empirical results we report are not sensitive to including Brazil in the sample.

in the market control. The event dummy variables of three, six, and twelve months are not statistically significant at the five- or ten-percent level.

The results for the post-event window are reported in Table 7. The country risk premium is not significantly correlated with changes in the consol market. Although the three post-event dummies are not statistically significant in the pooled OLS or fixed effects models, the coefficients are large, and suggest that joining the gold club reduced yield spreads by at least 1 basis point per week (Panel A). We find similar results in our analyses of the currency risk premium (Panel B). The interest-rate differential is positive and significantly correlated with the market variable. The event dummies are not statistically significant, but the magnitude of the currency-risk effect is large. The coefficient estimates suggest that adopting the gold standard lowered yield spreads by one-half basis point per week in the three-month post-event window, 0.2 basis point per week in the six-month post-event window, and 0.6 basis points in the one-year event window.

Table 8 combines the pre- and post-event windows for the short-run analysis. The country risk premium is not significantly correlated with changes in the market control. The event dummies are also not statistically significant at the five- or 10-percent levels, although the indicator variables are economically significant. The point estimates suggest that joining the gold standard reduced yield spreads by 0.15 basis points per week in the six-month period, 0.13 basis points per week in the one-year period, and 0.44 basis points in the two-year window. As for the currency risk premium (Panel B), we find that the interest-rate differential is positive and significantly correlated with changes in the

market control. The event dummies are positive with the wrong sign and are not statistically significant in the six different specifications.

Our preliminary empirical analysis suggests that joining the gold standard did not have a statistically significant effect on the country or currency risk premium in the period right around the adoption date. As we noted in our discussion of the adherence or long-run effects, it may be the case that, after we expand our sample of emerging market borrowers with debt issued in domestic currency that the currency risk effect will be statistically and economically significant. On the other hand, if the current results hold, they may suggest that countries adopted the gold standard for a reason other than to lower the cost of borrowing in international capital markets. For example, Lopez Cordova and Meissner (2003) suggest that countries may have adopted gold to increase trade; they show that joining the gold standard increased trade by approximately 30 percent during the period 1870-1913. Flandreau and Zúmer (2004) suggest that countries may have adopted the gold standard to reduce volatility in their real debt burden.

The results for the long-run event studies appear in Tables 9, 10, and 11. Table 9 shows that changes in British consols (the market control) did not have a statistically significant effect on yield spreads in the pre-event period.[13] The point estimate for the effect of the gold standard on the country risk premium has the "wrong" sign (positive) in the six different empirical specifications (Panel A). A slightly different story emerges from the long-run event study of the currency risk premium that appears. As Panel B shows, in all six specifications, the currency risk premium is positively and significantly correlated with changes in the market interest rate. The coefficient estimates on the event

[13] In the future, we also plan to supplement the empirical analysis with capital-asset pricing models (CAPM).

dummies are also negative and large in magnitude, suggesting that adopting the gold standard reduced the currency risk premium by at least one-half a basis point per week. However, the event dummies are not significant at the five- or ten-percent levels. The statistical insignificance of the event dummies in the currency risk premium regressions may reflect the fact that our tests have weak power since they are currently based on data for only six countries with 2,175 observations (as compared to the country risk event studies that have 16 countries with more than 7,000 observations).

Table 10 presents the empirical results of the effects of long-run adherence in the post-event period. Again, we find that changes in the market interest rate and the event dummies are not statistically significant in the country risk regressions. The post-event indicator variables, however, suggest that joining the gold standard reduced sovereign yield spreads in all six specifications (Panel A). As for the currency risk premium, shown in Panel B, the results are similar to those reported in the pre-event analysis. The interest-rate differential is positively and significantly correlated with changes in the market control. The "on-gold" dummies are negative and economically large in four out of six regressions, but not statistically significant.

Table 11 reports the empirical results for the long-run windows that combine the pre- and post-event windows. None of the event dummies is statistically significant at the five- or 10-percent level in the country risk regressions (Panel A). Four of the specifications indicate that country risk increased in the period surrounding gold standard adoption. As for the models of the currency risk premium, the event dummies are economically large, suggesting that joining the gold club lowered currency risk (Panel B).

However, we find that the event dummies are not statistically significant at conventional levels.

### *B. Rolling Regressions*

Although the empirical results provide little evidence that joining the gold standard significantly reduced country or currency risk, the figures suggest that the currency risk premium may have fallen for several countries as they implemented the necessary monetary and fiscal reforms to join the monetary rule. Since the timing of reforms varies by country, a simple event study may not capture the impact of joining the gold standard on sovereign risk.

To address this issue, we estimate a series of two-year rolling regressions (based on equation 1) to capture the effect of joining the gold standard on the currency risk premium. First, we estimate a regression over the first two-years of the sample period (104 observations) for each country with a six-month gold dummy that is designed to capture the effects of monetary and fiscal reforms on sovereign risk. The indicator variable is centered in the middle of the two-year sample period. Then we re-estimate a regression, adding a (forward) observation and dropping the first observation from the initial regression. The dummy variable is also re-specified so that it is centered in the middle of the two-year sample period. We repeat this estimation strategy until all possible two-year regression windows have been estimated for each country in our sample.

Figures 10-16 display the point estimates of the rolling regressions for each of the eight emerging market borrowers. The dashed lines indicate the 95-percent confidence

intervals. In each figure, the dates listed on the horizontal axis correspond to the ending date of each two-year rolling regression. The results from the figures show that the implementation of monetary and fiscal policies associated with joining the gold standard significantly reduced the currency risk premium for Argentina, India, and Mexico (In each of these countries, the 95-percent confidence interval drops below zero in the rolling regression during the sample period. For Argentina and Mexico, it declined prior to the adoption of the gold standard.) The rolling regressions do not indicate that the currency risk premium significantly declined for Italy, Russia, and the United States after controlling for changes in the overall market, however. Overall, our preliminary results suggest that the primary effect of the gold standard was to reduce the interest-rate differential between a sovereign's local currency bonds and external debt. The power of our panel model and rolling regressions should increase as we expand the number of countries in our sample and collect additional data.

### *C. Robustness Checks*

One potential concern with the empirical methodology employed in this paper is that the paper and gold bonds in our sample may have different default probabilities. Even though we have found no evidence of the existence of seniority provisions in the bonds used in our sample, it is possible that emerging market borrowers may have given seniority to the payment of the gold bonds in our sample in the event of a default. If seniority existed, then a significant portion of the currency risk premium observed in the empirical analysis may simply reflect differential default risk rather than devaluation risk.

A second potential concern with the empirical analysis is that devaluation risk might somehow influence default risk. Powell and Sturzenneger (2003) have suggested two different channels through which devaluation and default risk may be linked: (1) devaluation risk could have large, balance-sheet effects due to the presence of currency mismatches that increase the probability of a sovereign debt default and (2) financial contagion might set off a wave of devaluations after one country leaves a hard peg. A currency mismatch may occur when the currency composition of assets and liabilities for a government or firm is different. The net worth position of a government or firm may be sensitive to an exchange-rate devaluation if they earn income or collect revenue in one currency and service debt in another. A currency mismatch can lead to debt default and bankruptcy, triggering an economic downturn. The negative effects of a currency mismatch may be offset by an improvement in the current account through a real exchange-rate depreciation, however. The second channel discussed by Powell and Sturzenneger is an unlikely possibility given that Mauro, Sussman, and Yafeh (2002) find little evidence of contagion among large emerging market borrowers during the classical gold standard period.

To address these concerns, we estimate a series of bivariate Granger-causality tests to examine the dynamic relationship between currency risk and country risk for the eight countries in our sample. If a country discriminates against its paper bonds by granting seniority to gold bonds, then we would expect country risk to significantly increase currency risk following a negative economic shock. This means that country risk should Granger-cause currency risk. On the other hand, if devaluation risk is highly correlated with default risk, then we should expect to find that an exchange-rate

depreciation leads to a significant increase in default risk. This implies that currency risk should Granger-cause country risk in a bivariate VAR.

The results of bivariate VARs for the five-year period after each country joined the gold standard are shown in Panels A and B of Table 12. The weekly Granger-causality tests are estimated with 4 lags while the monthly tests for Brazil and Italy are estimated with 2 lags. Overall, the Granger-causality tests provide little evidence to support the hypothesis of a strong link between currency and default risk for our sample of eight emerging market borrowers. Currency risk Granger-causes country risk in only two of the eight emerging market countries in our sample. The results suggest that balance-sheet problems may not have exacerbated economic downturns during the gold standard period. One explanation for this result is that the classical gold standard era was characterized by rapid price adjustment and nearly vertical aggregate supply curves (Bayoumi and Eichengreen, 1997). An improvement in the current-account balance may have offset the negative effect of the currency mismatch following an exchange-rate depreciation. Although there is more evidence that an increase in country risk leads to an increase in devaluation risk, country risk Granger-causes currency risk in only half of the countries in our sample. The results suggest that there if there was a link between default risk and devaluation risk after a country joined the gold standard, it was not very strong.

One shortcoming of the Granger-Causality tests is that the methodology relies on past values of a given time series to forecast movements in a variable(s). A literal interpretation of the efficient markets hypothesis (EMH) suggests that Granger-causality tests do not capture a strong link between default and devaluation risk because the two yield spreads are contemporaneously correlated. To address this issue, we estimated

impulse response functions for the eight bivariate VARs using a Choleski decomposition. Although we gave the first ordering to currency risk in the Choleski decomposition to test the hypothesis that devaluation risk increases country risk, the empirical results are not very sensitive to altering the ordering of the variables in the system. The average correlation of the residuals in the bivariate Granger-Causality tests is -0.12 percent.[14] The results appear in Figures 17-23. Along with the impulse responses, we also include 95-percent fractiles – the equivalent of 95-percent confidence intervals – to test the significance of the currency and country risk shocks. The impulse response functions suggest that currency risk has very little effect on country risk even when we give the paper spread the first ordering in the Choleski decomposition. This provides additional support for the hypothesis that rapid price adjustment may have limited the impact of balance sheet problems during the gold standard. Indeed, in most of the specifications, country risk explains about 80 percent of its own forecast variance at a 16-week horizon. The empirical results also provide little evidence that country risk has an economically meaningful effect on currency risk. Russia is the only country where we find that a shock to country risk has an economically meaningful effect on currency risk.

## V. Conclusion

Did joining the gold standard improve a country's credibility and reduce interest-rate differentials in capital markets? This paper offers new evidence to address this

[14] Enders (2004) points out that that the impulse response functions from a Choleski decomposition are generally not very sensitive to the ordering of the variables if the correlation between the residuals is less than 20 percent. Austria (-0.45) and Italy (-0.25) are the only two countries with correlation coefficient greater than ±20 percent.

question by decomposing sovereign yield spreads during the classical gold standard period into its country and currency risk components. Using a new database of more than 250,000 sovereign debt prices, we examine the time-series behavior of two different types of yield spreads to identify country and currency risk premium associated with investing in emerging markets during the first global capital market, 1870-1914. Our results suggest that the gold standard was not a very credible monetary regime given the large interest-rate differential between a country's local currency bonds and its sterling denominated debt years after a country joined the gold standard (more than 400 basis points). On the other hand, we find some empirical evidence that adopting the gold standard significantly reduced the currency risk premium for some countries. The results do not suggest that the gold standard significantly reduced the country risk premium.

The large currency risk premium in emerging markets may also explain why so many bonds that were issued in international capital markets during this period were denominated in pound sterling. Risk-averse investors were concerned that a currency depreciation might erode the return on their investment in foreign government securities that were issued in a local currency. The evidence presented here suggests that it may be useful for future research to consider the economic and political determinants of currency risk during the gold standard period.

## References


Bayoumi, Tamim and Barry Eichengreen. (1997). "The stability of the gold standard and the evolution of the International Monetary Fund." In Tamim Bayoumi, Barry Eichengreen, and Mark P. Taylor (eds.) *Modern Perspectives on the Gold Standard* Cambridge: Cambridge University Press.

Berg, Andrew and Eduardo Borenzstein. (2000). "The Pros and Cons of Full Dollarization." IMF Working Paper 00/50 (March).

Bloomfield, Arthur I. (1959). Monetary Policy under the International Gold Standard: 1880-1914. New York: Federal Reserve Bank of New York.

Bordo, Michael D., and Forest Capie. (1993). *Monetary Regimes in Transition*. Cambridge: Cambridge University Press.

Bordo, Michael D. and Finn Kydland. (1995). "The Gold Standard as a Rule: An Essay in Exploration." *Explorations in Economic History* 32: 423-464.

Bordo, Michael and Hugh Rockoff. (1996). "The Gold Standard as a Good Housekeeping Seal of Approval." *Journal of Economic History* 56: 389-428.

Bordo, Michael D. and Anna Schwartz. (1994). "The Specie as a Contingent Rule: Some Evidence for Core and Peripheral Countries, 1880-1990." NBER Working Paper 4860.

Bordo, Michael, Christopher M. Meissner, and Angela Redish. (2005). " How 'Original Sin' was Overcome: The Evolution of External Debt Denominated in Domestic Currencies in the United States and British Dominions 1800-2000." In Barry Eichengreen and Ricardo Hausman (eds.) *Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies.* Chicago: University of Chicago Press.

Bordo, Michael and Christopher M. Meissner. (forthcoming). "The Role of Hard Currency in Financial Crises: 1880-1913 vs. 1972-1997."*Journal of Banking and Finance*.

Del Mar, Alexander. (1903). *A History of the Monetary Systems of France, and Other European States*. New York: The Cambridge Encyclopedia Co.

Della Paolera, Gerardo and Alan M. Taylor. (2001). *Straining at the Anchor: The Argentine Currency Board and the Search for Macroeconomic Stability, 1880-1935*. Chicago: University of Chicago Press.

Dollarization.org. (2005). *Currency Boards and Dollarization*. www.dollarization.org

Domowitz, Ian, Glen, Jack, and Ananth Madhavan. (1998). "Country and Currency Risk Premia in an Emerging Market." *Journal of Financial and Quantitative Analysis* 33: 189-216.

Edwards, Sebastian. (2003). "Exchange Rate Regimes, Capital Flows and Crisis Prevention." In Martin Feldstein (ed.) *Economic and Financial Crises in Emerging Market Economies*. Chicago and London: University of Chicago Press, 31-78.

Edwards, Sebastian. (1986). "The Pricing of Bonds and Bank Loans in International Markets." *European Economic Review* 30: 565-89.

Edwards, Sebastian. (1984). "LDC Foreign Borrowing and Default Risk: An Empirical Investigation, 1976-1980." *American Economic Review* 74(4): 726-34.

Eichengreen, Barry. (1996). *Globalizing Capital: A History of the International Monetary System*. Princeton, NJ: Princeton University Press.

Enders, Walter. (2004). Applied Econometric Time Series. New York: John Wiley & Sons.

Ferguson, Niall and M. Schularick. (2006a). "The Empire Effect: The Determinants of Country Risk in the First Era of Globalization." *Journal of Economic History* 66(2): 283-312.

Ferguson, Niall and M. Schularick. (2006b). "The Thin Film of Gold: The Limits of Monetary Commitments." Harvard Business School Working Paper.

Flandreau, Marc and Frederic Zúmer. (2004). *The Making of Global Finance*. Paris: OECD. Data from http://www.eh.net/databases/finance/

Gallarotti, Giulio M. (1995). *The Anatomy of an International Monetary Regime: The Classical Gold Standard, 1880-1914*. New York and Oxford: Oxford University Press.

Gunasekera, H.A. (1962). *From Dependent Currency to Central Banking in Ceylon*: An Analysis of Monetary Experience, 1825-1957. London: London School of Economics.

International Monetary Fund. (1997). "Globalization in Historical Perspective." *World Economic Outlook: Annex* Washington: IMF.

*Investor's Monthly Manual.* (1898). Available at <http://icf.som.yale.edu/imm/downloads.php>.

Kemmerer, Edwin W. (1944). *Gold and the Gold Standard*. New York: McGraw Hill.

Kemmerer, Edwin W. (1916). *Modern Currency Reforms.* New York: Macmillan Press.

Kydland, Finn E. and Edward C. Prescott. (1977). "Rules Rather than Discretion: The Inconsistency of Optimal Plans." *Journal of Political Economy* 85: 473-92.

*Monetary Systems of the Principal Countries of the World.* (1913). Treasury Department, Bureau of the Mint, Washington: Government Printing Office.

Lopez-Cordova, J. Ernesto and Christopher Meissner. (2003). "Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era." *American Economic Review* 93(1): 344-53.

Mitchener, Kris James and Marc Weidenmier. (2005). "Supersanctions and Sovereign Debt Repayment." NBER Working Paper 11472 (June).

Mauro, Paolo, Nathan Sussman and Yishay Yafeh. (2006). *Emerging Markets and Financial Globalization.* Oxford: Oxford University Press.

Mauro, Paolo, Nathan Sussman, and Yishay Yafeh. (2002). "Emerging Market Spreads: Then Versus Now." *Quarterly Journal of Economics* 117(2): 695-733.

Obstfeld, Maurice and Alan M. Taylor. (2003). "Sovereign Risk ,Credibility and the Gold Standard, 1870-1913 versus 1925-1931." *Economic Journal* 113: 1-35.

Schmuckler, Sergio and Luis Serven. (2002). "Pricing Currency Risk under Currency Boards." *Journal of Development Economics* 69(2): 367-391.

Pick, Franz and Rene Sedillot. (1971). *All the Monies of the World*, New York: Crown Advertising Press, Inc.

Powell, Andrew and Federico Sturzenegger. (2003). "Dollarization: The Link Between Devaluation and Default Risk." In *Dollarization: Debates and Policy Alternatives* Eduardo Levy-Yeyati and Federico Sturzenegger eds. Cambridge, MA: MIT Press.

Sussman, Nathan and Yishay Yafeh. (2000). "Institutions, Reforms and Country Risk: Lessons from Japanese Government Debt in the Meiji Period." *Journal of Economic History* 60(2): 442-67.

Young, John Parke. (1925). *Central American Currency and Finance.* Princeton: Princeton University Press.

**Table 1**
**Timeline of Gold Standard Adoption and Adherence**

| Country | Date of Adoption | Dates of Adherence |
|---|---|---|
| **Argentina** | October 31, 1899 | 10/31/1899-8/2/1914 |
| **Austria** | August 2, 1892 | 8/2/1892-8/4/1914 |
| **Brazil** | October 15, 1906 | 10/15/1906-12/12/1914 |
| **Ceylon** | September 26, 1901 | 9/26/1901-9/4/1914 |
| **Chile** | June 1, 1895 | 6/1/1895-7/11/1898 |
| **Costa Rica** | October 26, 1896 | 10/26/1896-9/18/1914 |
| **Egypt** | November 17, 1885 | 11/17/1885-8/2/1914 |
| **Greece** | March 19, 1910 | 3/19/1910-12/1914 |
| **India** | January 1, 1898 | 1/1/1898-9/5/1914 |
| **Italy** | March 1, 1883 | 3/1/1883-1894 |
| **Mexico** | May 1, 1905 | 5/1/1905-1914 |
| **Nicaragua** | March 20, 1912 | 3/20/1912-1914 |
| **Russia** | January 3, 1897 | 1/3/1897-7/1914 |
| **South Africa (Cape of Good Hope)** | February 9, 1882 | 2/9/1882-9/6/1914 |
| **Sweden** | May 30, 1873 | 3/30/1873-1914 |
| **Turkey** | January 6, 1881 | 1/6/1881-8/4/1914 |
| **United States** | January 1, 1879 | 1/1/1879-9/7/1917 |

**Table 2. Measuring the Country Risk Premium**

**Panel A: 4-Year Windows**

| Country | Whole Period (1) | Pre-Gold (2) | On Gold (3) | Change (4) | Obs (5) |
|---|---|---|---|---|---|
| **Argentina** | 376.49 | 405.42 | 347.57 | -57.84 | 209 |
| **Austria** | 139.72 | 140.21 | 139.17 | -2.40 | 209 |
| **Brazil** | 207.12 | 216.65 | 197.34 | -24.31 | 49 |
| **Ceylon** | 71.53 | 74.65 | 68.39 | -6.26 | 209 |
| **Chile** | 256.26 | 260.09 | 252.48 | -7.61 | 209 |
| **Costa Rica** | 1410.54 | 1426.72 | 1400.14 | -26.58 | 209 |
| **Egypt** | 294.84 | 328.07 | 261.94 | -66.13 | 209 |
| **Greece** | 670.43 | 709.44 | 631.71 | -77.73 | 209 |
| **India** | 52.83 | 50.05 | 55.65 | 5.59 | 209 |
| **Italy** | 147.06 | 131.34 | 162.59 | 31.25 | 49 |
| **Mexico** | 207.33 | 210.49 | 204.19 | -6.31 | 209 |
| **Nicaragua** | 499.96 | 499.24 | 501.73 | 2.49 | 153 |
| **Russia** | 105.00 | 113.65 | 96.33 | -17.32 | 209 |
| **South Africa (Cape of G. Hope)** | 144.37 | 138.99 | 149.75 | 10.76 | 209 |
| **Sweden** | 164.01 | 166.75 | 161.23 | -5.51 | 209 |
| **Turkey** | 652.56 | 704.57 | 599.86 | -104.71 | 209 |
| **United States** | 78.17 | 80.41 | 76.02 | -4.39 | 209 |
| **Country Average** | 332.25 | 332.75 | 312.12 | -21.00 | |

**Panel B: 10-Year Windows**

| Country | Whole Period (1) | Pre-Gold (2) | On Gold (3) | Change (4) | Obs. (5) |
|---|---|---|---|---|---|
| **Argentina** | 431.56 | 556.71 | 306.20 | -250.51 | 521 |
| **Austria** | 143.79 | 147.79 | 139.74 | -8.043 | 521 |
| **Brazil** | 219.325 | 236.436 | 196.103 | -40.33 | 99 |
| **Ceylon** | 78.01 | 79.00 | 76.98 | -2.01 | 521 |
| **Chile** | 253.02 | 281.78 | 237.45 | -44.33 | 521 |
| **Costa Rica** | 1005.25 | 925.49 | 1088.90 | 163.41 | 521 |
| **Egypt** | 269.61 | 300.17 | 231.37 | -68.80 | 422 |
| **Greece** | 640.59 | 699.32 | 572.42 | -126.90 | 484 |
| **India** | 45.89 | 46.93 | 44.90 | -2.03 | 521 |
| **Italy** | 145.40 | 125.75 | 161.78 | 36.03 | 111 |
| **Mexico** | 203.93 | 210.88 | 198.85 | -12.03 | 452 |
| **Nicaragua** | 542.20 | 549.68 | 501.73 | -47.95 | 309 |
| **South Africa (Cape of G. Hope)** | 118.66 | 134.22 | 103.04 | -31.18 | 463 |
| **Russia** | 147.70 | 142.76 | 154.05 | 11.29 | |
| **Sweden** | 166.43 | 169.14 | 164.99 | -4.15 | 396 |
| **Turkey** | 696.40 | 826.55 | 613.18 | -213.37 | 426 |
| **United States** | 68.79 | 83.12 | 54.53 | -28.59 | 521 |
| **Country Average** | 304.50 | 324.45 | 285.07 | -39.38 | |

**Table 3. Measuring the Currency Risk Premium**

**Panel A: 4-Year Windows**

| Country | Whole Period (1) | Pre-Gold (2) | On Gold (3) | Change (4) | Obs (5) |
|---|---|---|---|---|---|
| **Argentina** | 1217.85 | 1271.52 | 1164.74 | -106.78 | 209 |
| **Austria** | 217.65 | 213.23 | 221.98 | 8.75 | 209 |
| **Brazil*** | 97.16 | 93.65 | 100.69 | 7.04 | 49 |
| **India** | 268.65 | 281.47 | 256.07 | -25.40 | 209 |
| **Italy*** | 95.72 | 119.40 | 72.93 | -46.47 | 49 |
| **Mexico** | 575.23 | 665.32 | 489.38 | -175.94 | 209 |
| **Russia** | 795.69 | 789.17 | 802.37 | 13.20 | 209 |
| **United States** | 101.60 | 103.39 | 99.79 | -3.61 | 209 |
| **Chile*** | 572.49 | 640.67 | 583.19 | -57.48 | 49 |
| **Country Average (without Chile)** | 421.19 | 442.14 | 400.99 | -41.15 | |
| **Country Average** | 438.00 | 464.20 | 421.24 | -42.97 | |

*Monthly data.

**Panel B: 10-Year Windows**

| Country | Whole Period (1) | Pre-Gold (2) | On Gold (3) | Change (4) | Obs (5) |
|---|---|---|---|---|---|
| **Argentina** | 1286.63 | 1465.26 | 1107.95 | -357.31 | 521 |
| **Austria** | 240.31 | 260.856 | 219.649 | -41.207 | 521 |
| **Brazil*** | 89.50 | 79.45 | 99.67 | 20.22 | 71 |
| **India** | 256.47 | 282.47 | 245.46 | -37.01 | 371 |
| **Italy*** | 89.27 | 124.19 | 60.54 | -63.65 | 111 |
| **Mexico** | 582.70 | 709.13 | 489.38 | -219.75 | 452 |
| **Russia** | 804.745 | 789.23 | 812.70 | 23.471 | 313 |
| **United States** | 102.02 | 95.46 | 108.57 | 13.11 | 521 |
| **Chile*** | 581.13 | 580.11 | 583.19 | 3.08 | 79 |
| **Country Average (without Chile)** | 431.46 | 475.76 | 392.99 | -82.77 | |
| **Country Average** | 448.09 | 487.35 | 414.12 | -73.23 | |

*Monthly data.

**Table 4. Maximum Implied Devaluation after Gold Standard Adoption (Percent)**

| | Assumed Probability of Devaluation | | | | |
|---|---|---|---|---|---|
| Country | 10% | 25% | 50% | 75% | 90% |
| Argentina | 110.8 | 55.4 | 22.2 | 14.8 | 12.3 |
| Austria | 12.6 | 6.3 | 2.5 | 1.7 | 1.4 |
| Brazil | 10.0 | 5.0 | 2.0 | 1.3 | 1.1 |
| India | 24.5 | 12.3 | 4.9 | 3.3 | 2.7 |
| Italy | 6.1 | 3.0 | 1.2 | 0.8 | 0.7 |
| Mexico | 48.9 | 24.5 | 9.8 | 6.5 | 5.4 |
| Russia | 81.3 | 40.6 | 16.3 | 10.8 | 9.0 |
| United States | 6.1 | 3.0 | 1.2 | 0.8 | 0.7 |
| Chile | 58.3 | 29.2 | 11.7 | 7.8 | 6.5 |
| | | | | | |
| Average Devaluation | 39.8 | 19.9 | 8.0 | 5.3 | 4.4 |
| Average Devaluation (No Chile) | 37.5 | 18.8 | 7.5 | 5.0 | 4.2 |

Under the assumption of risk neutrality, the maximum implied devaluation is computed by dividing the average value of the currency risk premium in the five-year period after joining the gold standard by the assumed probability of a devaluation.

**Table 5. Difference in Means Test for County and Currency Risk**

| **Country** | **T-stat** |
|---|---|
| Argentina | 133.31*** |
| Austria | -18.73*** |
| Brazil | -75.60*** |
| India | 162.18*** |
| Italy | -42.05*** |
| Mexico | 148.43*** |
| Russia | 277.51*** |
| United States | 38.14*** |
| Chile | 24.58*** |

*denotes significance at the 10 percent level; **denotes significance at the 5 percent level; denotes significance at the 1 percent level.

**Table 6. The Adoption Effects of Joining the Gold Standard: Pre-Event Window**

**Panel A: Dependent Variable – Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.048 (.367) | -.048 (.366) | -.073 (.375) | -.072 (.371) | .006 (.384) | .008 (.383) |
| $\Delta Consol_t$ | -.020 (1.657) | -.022 (.182) | -.021 (1.657) | -.023 (.182) | -.019 (1.657) | -.022 (.183) |
| 3-Month | 3.064* (1.780) | 3.054 (2.203) | | | | |
| 6-Month | | | 2.054 (1.060) | 2.044 (1.612) | | |
| 1-Year | | | | | .265 (1.110) | .252 (1.144) |
| R-squared | 0.0003 | | 0.0002 | | 0.00001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable – Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.407 (.483) | -.406 (.478) | -.360 (.494) | -.357 (.485) | -.197 (.518) | -.189 (.502) |
| $\Delta Consol_t$ | .535** (.247) | .538** (.266) | .532** (.247) | .535** (.266) | .532** (.247) | .534** (.266) |
| 3-Month | 2.886 (1.755) | 2.837 (2.765) | | | | |
| 6-Month | | | .676 (1.278) | .624 (2.025) | | |
| 1-Year | | | | | -.1018 (1.127) | -1.082 (1.443) |
| R-squared | 0.002 | | 0.002 | | 0.002 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 7. The Adoption Effects of Joining the Gold Standard: Post-Event Window**

**Panel A: Dependent Variable – Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | .116 (.367) | .117 (.366) | .145 (.375) | .146 (.371) | .139 (.399) | .140 (.383) |
| $\Delta Consol_t$ | -.020 (1.657) | -.023 (.182) | -.019 (1.657) | -.021 (.182) | -.019 (1.657) | -.022 (.182) |
| 3-Month | -2.901 (1.912) | -2.915 (2.203) | | | | |
| 6-Month | | | -2.057* (1.132) | -2.072 (1.611) | | |
| 1-Year | | | | | -.916 (.696) | -.926 (1.146) |
| R-squared | 0.0002 | | 0.0002 | | 0.0001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable – Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.306 (.482) | -.304 (.478) | -.308 (.496) | -.305 (.485) | -.248 (525) | -.240 (.502) |
| $\Delta Consol_t$ | .534** (.247) | .537** (.266) | .534** (.247) | .536** (.266) | .535** (.247) | .537** (.266) |
| 3-Month | -.495 (1.862) | -.549 (2.766) | | | | |
| 6-Month | | | -.226 (1.151) | -.280 (2.025) | | |
| 1-Year | | | | | -.597 (.925) | -.659 (1.443) |
| R-squared | 0.089 | | 0.089 | | 0.065 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 8. The Adoption Effects of Joining the Gold Standard: Combined Pre- and Post Event Windows**

**Panel A: Dependent Variable – Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | .044 (.374) | .045 (.371) | .050 (.391) | .051 (.381) | .135 (.431) | .138 (.410) |
| $\Delta Consol_t$ | -.019 (1.657) | -.022 (.183) | -.019 (1.657) | -.022 (.183) | -.020 (1.657) | -.022 (.183) |
| 6-Month | -.153 (1.369) | -.167 (1.611) | | | | |
| 1-Year | | | -.131 (.832) | -.145 (1.184) | | |
| 2-Year | | | | | -.443 (.737) | -.458 (.870) |
| R-squared | 0.00001 | | 0.00001 | | 0.00001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable- Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.392 (.493) | -.389 (.485) | -.346 (.521) | -.339 (.500) | -.090 (.587) | -.071 (.541) |
| $\Delta Consol_t$ | .533** (.247) | .536** (.266) | .533** (.955) | .536** (.266) | .533** (.247) | .535** (.266) |
| 6-Month | 1.239 (1.381) | 1.189 (2.024) | | | | |
| 1-Year | | | .222 (.955) | .166 (1.492) | | |
| 2-Year | | | | | -.956 (.864) | -1.036 (1.107) |
| R-squared | 0.002 | | 0.002 | | 0.002 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 9. The Long-Run Adherence Effects of Adopting the Gold Standard: Pre-Event Window**

**Panel A: Dependent Variable- Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.066 (.430) | -.063 (.410) | -.010 (.488) | -.004 (.442) | -.209 (.509) | -.215 (.478) |
| $\Delta Consol_t$ | -.019 (1.657) | -.021 (1.83) | -.019 (1.658) | -.021 (.183) | -.018 (.758) | -.020 (.183) |
| 2-Year | .456 (.749) | .443 (.870) | | | | |
| 3-Year | | | .140 (.707) | .122 (.771) | | |
| 4-Year | | | | | .576 (.758) | .589 (.736) |
| R-squared | 0.00001 | | 0.00001 | | 0.0001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable- Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.181 (.563) | -.163 (.541) | -.179 (.576) | -.177 (.569) | -.066 (.527) | -.078 (.598) |
| $\Delta Consol_t$ | .532 (.248) | .534** (.266) | .531** (.248) | .533** (.266) | .527** (.249) | .530** (.266) |
| 2-Year | -.577 (1.000) | -.652 (1.107) | | | | |
| 3-Year | | | -.449 (1.003) | -.455 (1.013) | | |
| 4-Year | | | | | -.671 (1.039) | -.639 (.974) |
| R-squared | 0.002 | | 0.002 | | 0.002 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 10. The Long-Run Adherence Effects of Adopting the Gold Standard: Post-Event Window**

**Panel A: Dependent Variable – Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | .116 (.442) | .110 (.408) | .309 (.485) | .297 (.438) | .277 (.605) | .278 (.510) |
| $\Delta Consol_t$ | -.018 | -.021 (.183) | -.016 (1.657) | -.018 (.183) | -.016 (1.657) | -.018 (.183) |
| 2-Year | -.369 (.579) | -.343 (879) | | | | |
| 3-Year | | | -.856 (.625) | -.818 (.778) | | |
| 4-Year | | | | | -.491 (.693) | -.494 (.735) |
| R-squared | 0.00001 | | 0.0002 | | 0.0001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable – Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | -.239 (.599) | -.222 (.541) | -.236 (.667) | -.204 (.591) | -.443 (.980) | -.410 (.728) |
| $\Delta Consol_t$ | .537** (.247) | .539** (.266) | -.235** (.863) | .539** (.266) | .531** (.247) | .534** (.266) |
| 2-Year | -.339 (.774) | -.411 (1.107) | | | | |
| 3-Year | | | -.235 (.863) | -.322 (.992) | | |
| 4-Year | | | | | .213 (1.051) | .155 (.966) |
| R-squared | 0.002 | | .002 | | 0.002 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 11. The Effects of Long-Run Adherence to the Gold Standard: Combined Pre- and Post-Event Windows**

**Panel A: Dependent Variable – Country Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | .028 (.567) | .024 (.482) | .510 (.827) | .500 (.611) | -.034 (2.467) | -.089 (1.247) |
| $\Delta Consol_t$ | -.019 (1.657) | -.022 (.183) | -.018 (1.657) | -.020 (.182) | -.020 (1.651) | -.022 (.183) |
| 4-Year | .018 (.668) | .026 (.731) | | | | |
| 6-Year | | | -.731 (.883) | -.716 (.761) | | |
| 8-Year | | | | | .076 (2.462) | .136 (1.306) |
| R-squared | 0.00001 | | 0.0001 | | 0.00001 | |
| Obs. | 7535 | 7535 | 7535 | 7535 | 7535 | 7535 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Panel B: Dependent Variable – Currency Risk Yield Spread Change**

| Independent Variable | (1) Pooled OLS | (2) Fixed Effects | (3) Pooled OLS | (4) Fixed Effects | (5) Pooled OLS | (6) Fixed Effects |
|---|---|---|---|---|---|---|
| Constant | .006 (.786) | .067 (.659) | .151 (1.041) | .226 (.834) | 1.961 (5.086) | 2.235 (2.220) |
| $\Delta Consol_t$ | .538** (.247) | .540** (.266) | .536** (.247) | .538** (.266) | .537** (.247) | .538** (.266) |
| 4-Year | -.680 (.921) | -.808 (.960) | | | | |
| 6-Year | | | -.699 (1.147) | -.811 (1.020) | | |
| 8-Year | | | | | -2.395 (5.103) | -2.682 (2.278) |
| R-squared | 0.002 | | 0.002 | | 0.002 | |
| Obs. | 2175 | 2175 | 2175 | 2175 | 2175 | 2175 |

Robust standard errors are in parentheses. *denotes significance at the 10-percent level. **denotes significance at the 5-percent level. ***denotes significance at the 1-percent level.

**Table 12. Granger-Causality Tests**

**Panel A. $H_0$: Currency Risk Does Not Granger-Cause Country Risk**

| Country | F-Statistic |
|---|---|
| Argentina | .556 |
| Austria | 1.082 |
| Brazil | 1.134 |
| India | 2.705*** |
| Italy | 1.733 |
| Mexico | .340 |
| Russia | 2.541*** |
| USA | .563 |

**Panel B. $H_0$: Country Risk Does Not Granger-Cause Currency Risk**

| Country | F-Statistic |
|---|---|
| Argentina | 1.920 |
| Austria | 1.991* |
| Brazil | 18.402*** |
| India | 3.620*** |
| Italy | 7.157*** |
| Mexico | 1.680 |
| Russia | 1.335 |
| USA | .412 |

Notes: *denotes significance at the 10-percent level; **denotes significance at the 5-percent level; ***denotes significance at the 1-percent level.

**Figure 1**
**Country and Currency Risk for Argentina, Nov. 1894-Oct. 1904**
**(Basis Points)**

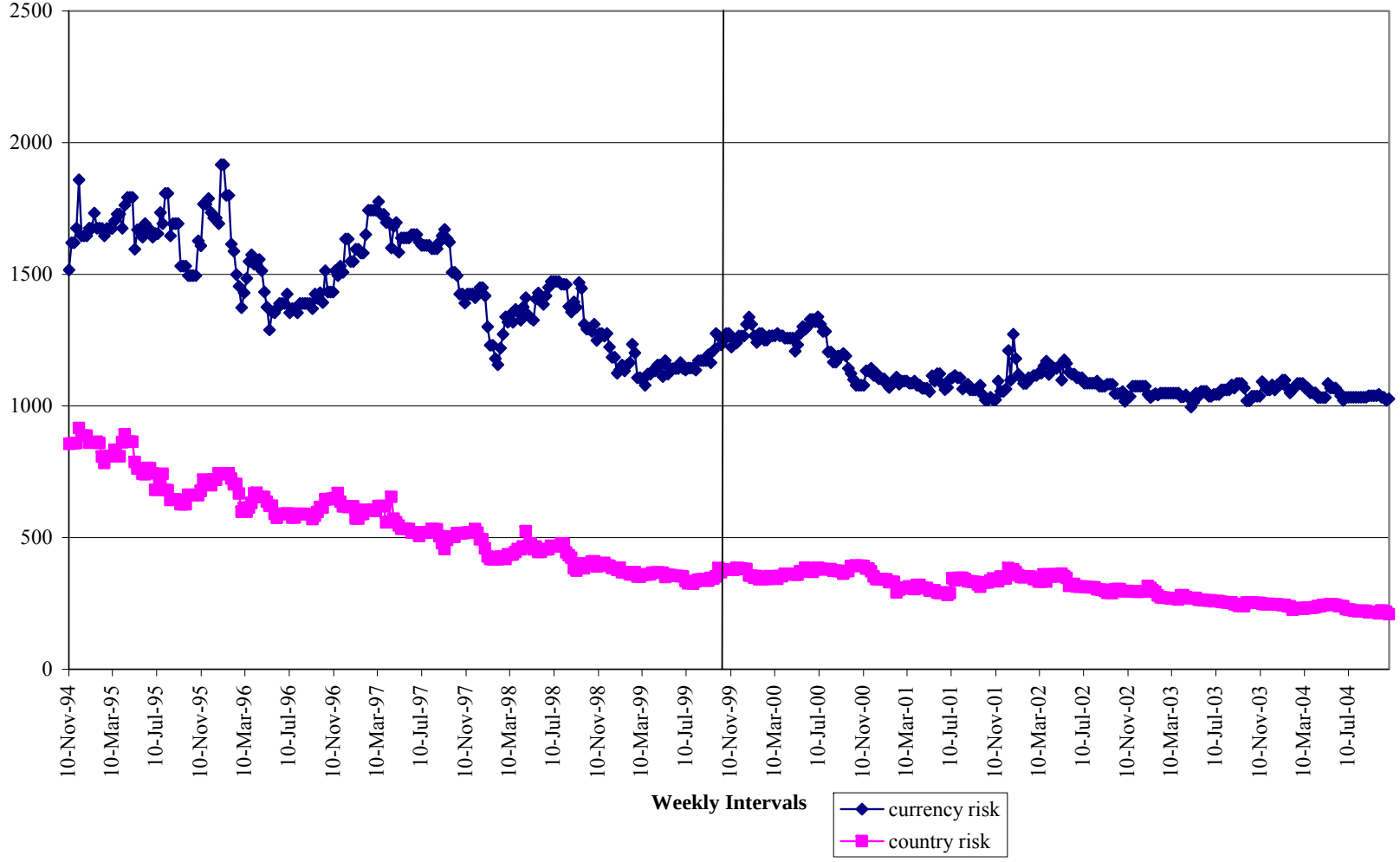


**Figure 2**
**Country and Currency Risk for Austria, Aug. 1887- July 1897**
**(Basis Points)**

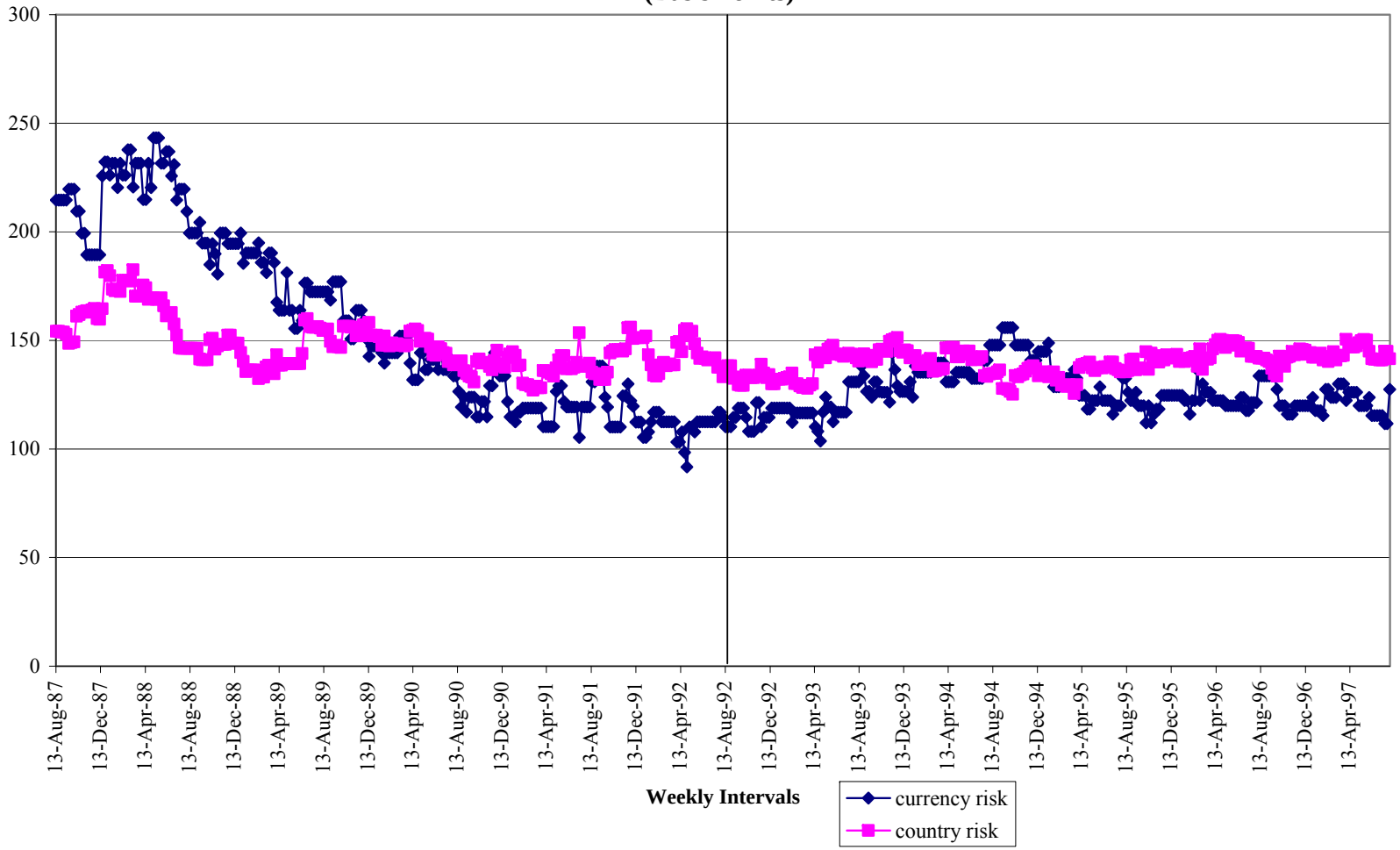


**Figure 3**
**Country and Currency Risk for Brazil, 1902-March 1910**
**(Basis Points)**

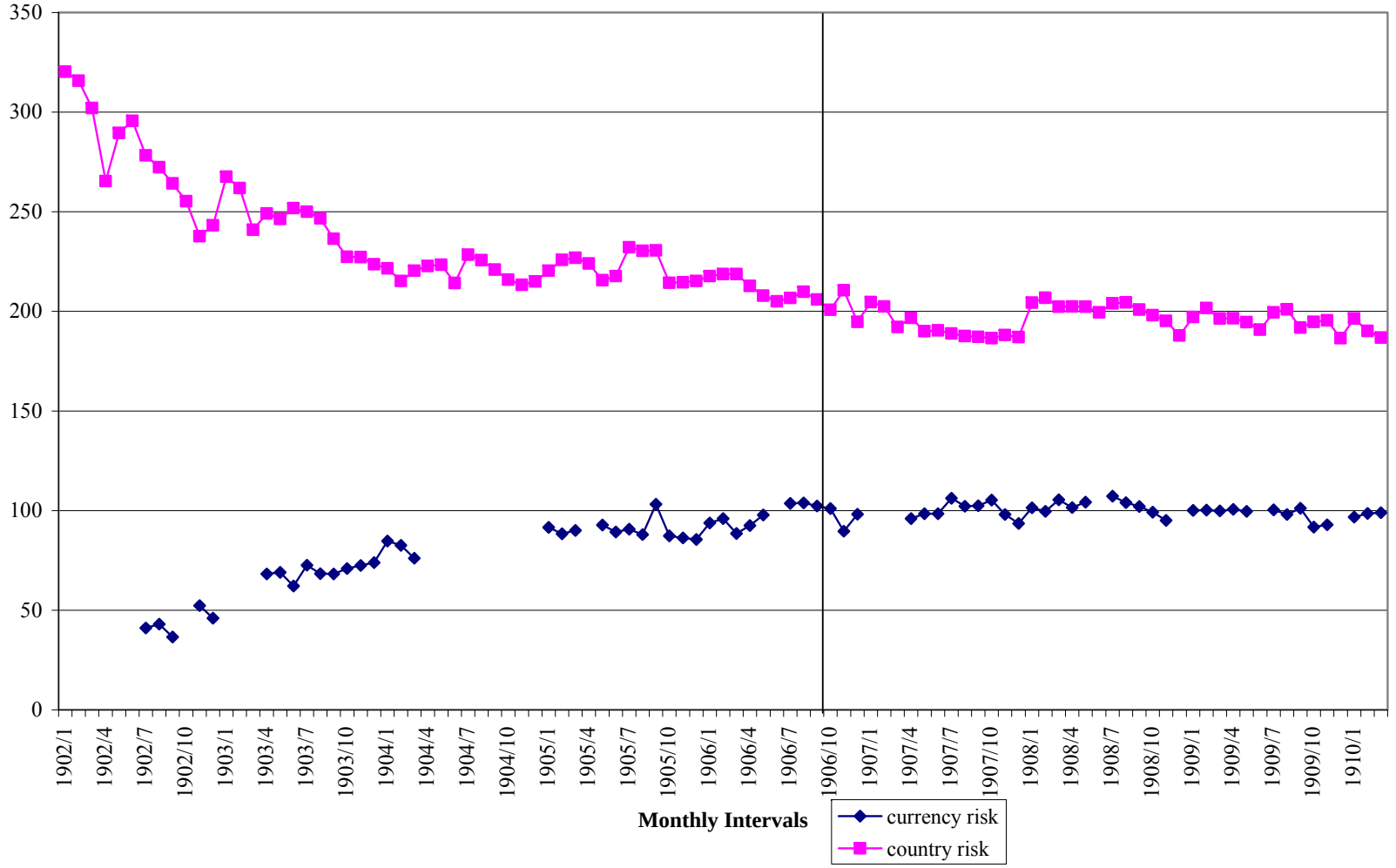


**Figure 4**
**Country and Currency Risk for India, Nov. 1895- Dec. 1902**
**(Basis Points)**

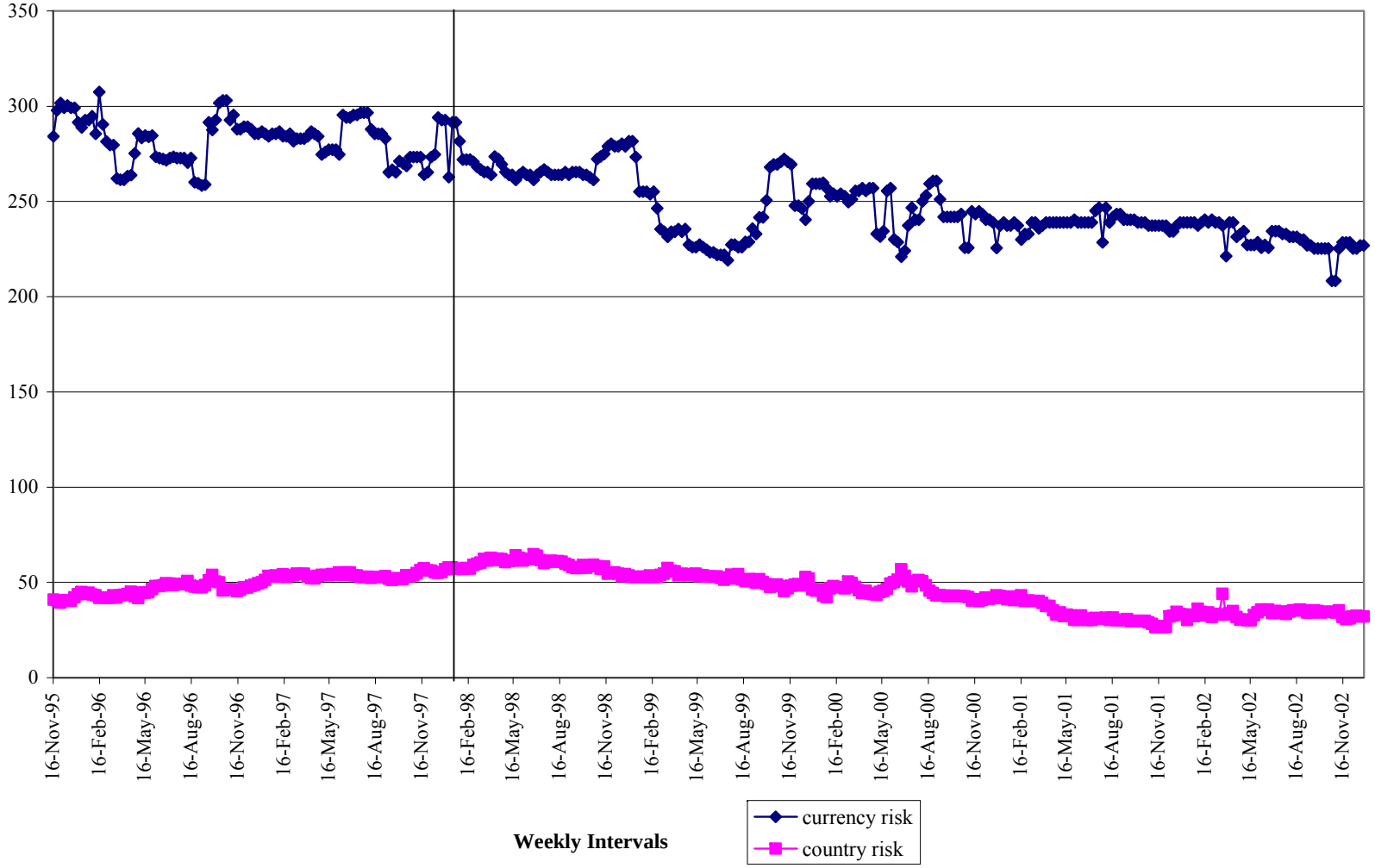


**Figure 5**
**Country and Currency Risk for Italy, Jan. 1879-March 1888**
**(Basis Points)**

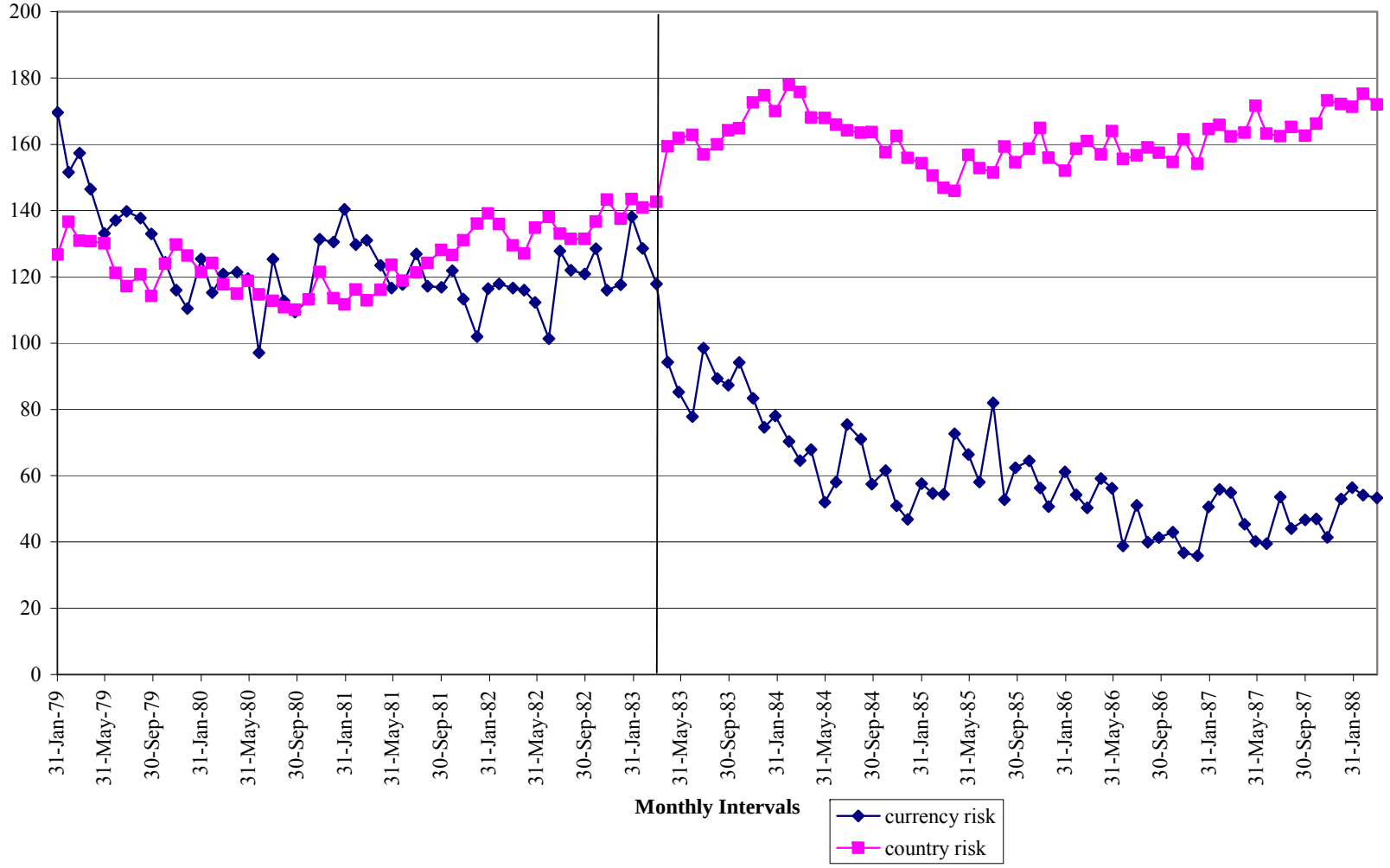


**Figure 6**
**Country and Currency Risk for Mexico, Sept. 1901- April 1910**
**(Basis Points)**

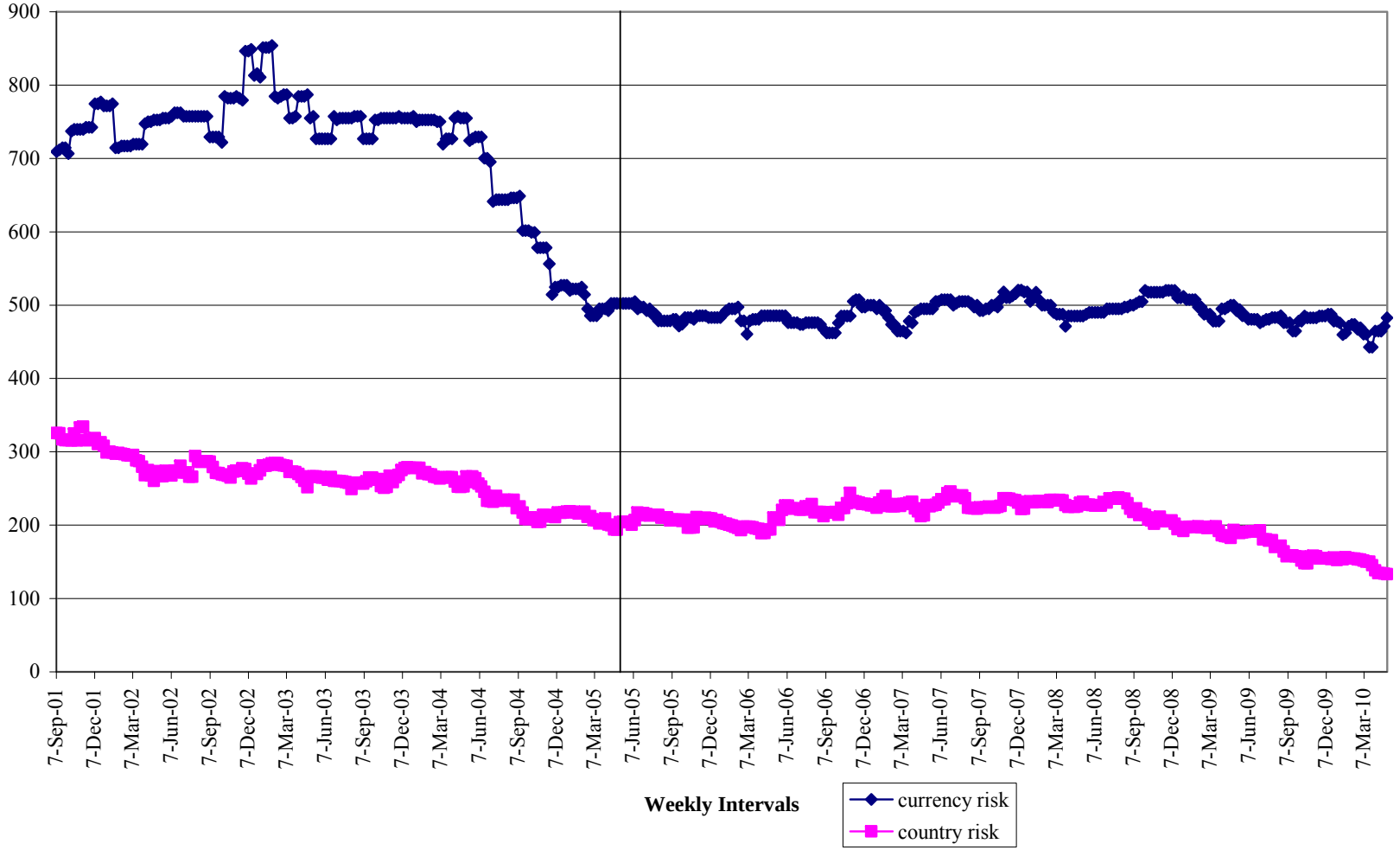


**Figure 7**
**Country and Currency Risk for Russia, Jan. 1892-Jan. 1902**
**(Basis Points)**

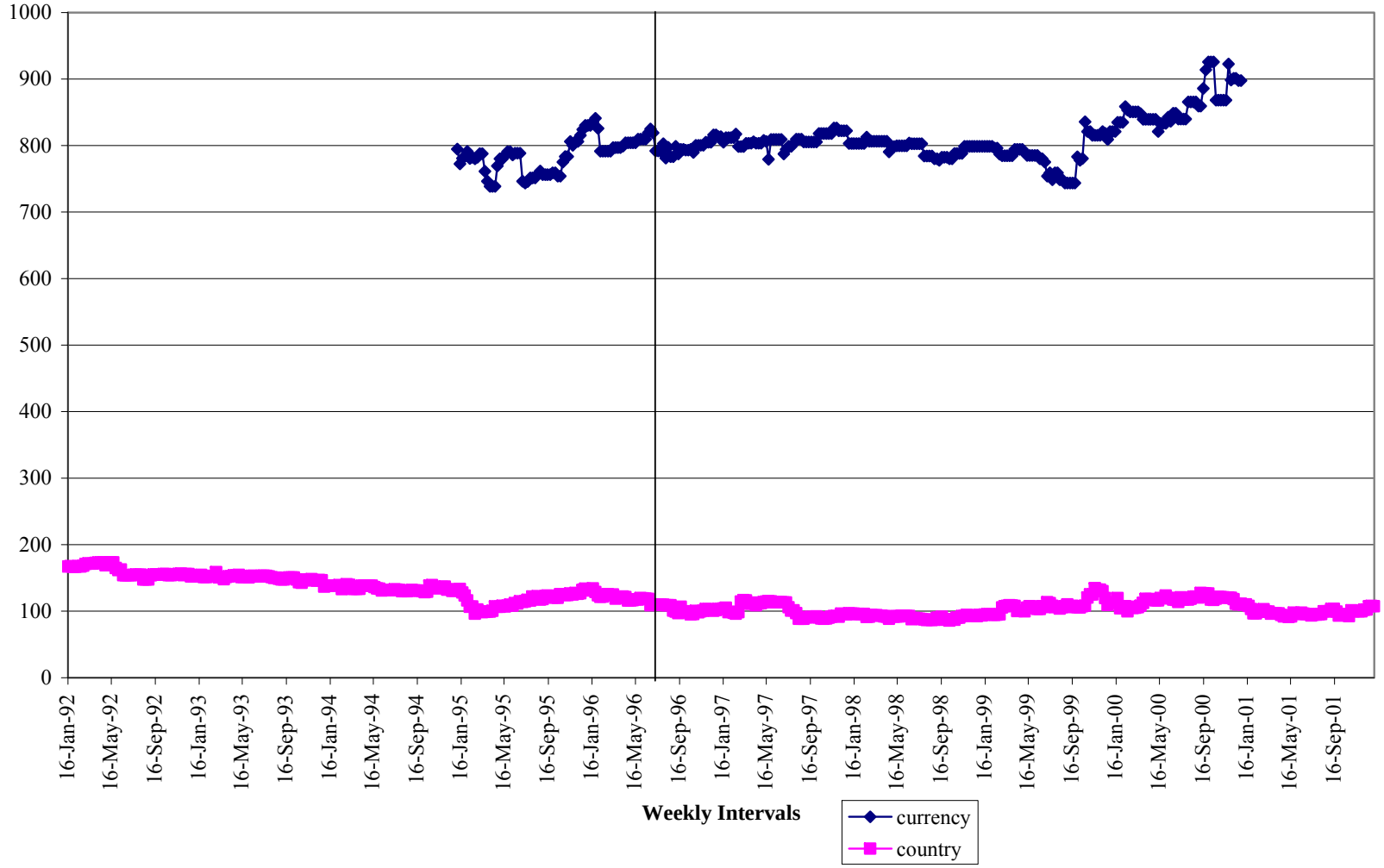


**Figure 8**
**Country and Currency Risk for the USA, 1874-1883**
**(Basis Points)**

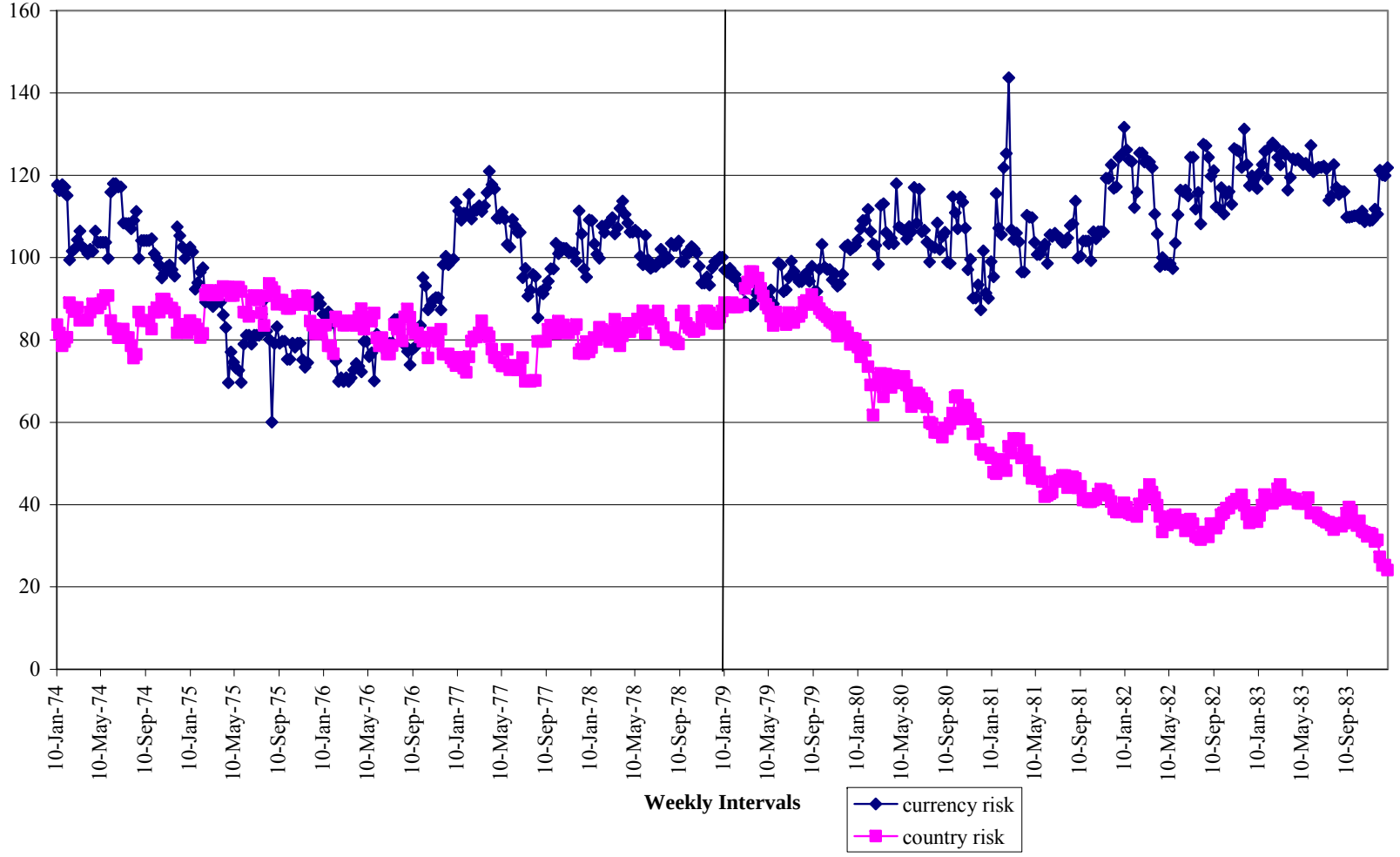


**Figure 9**
**Country and Currency Risk for Chile, 1892-1903**
**(Basis Points)**

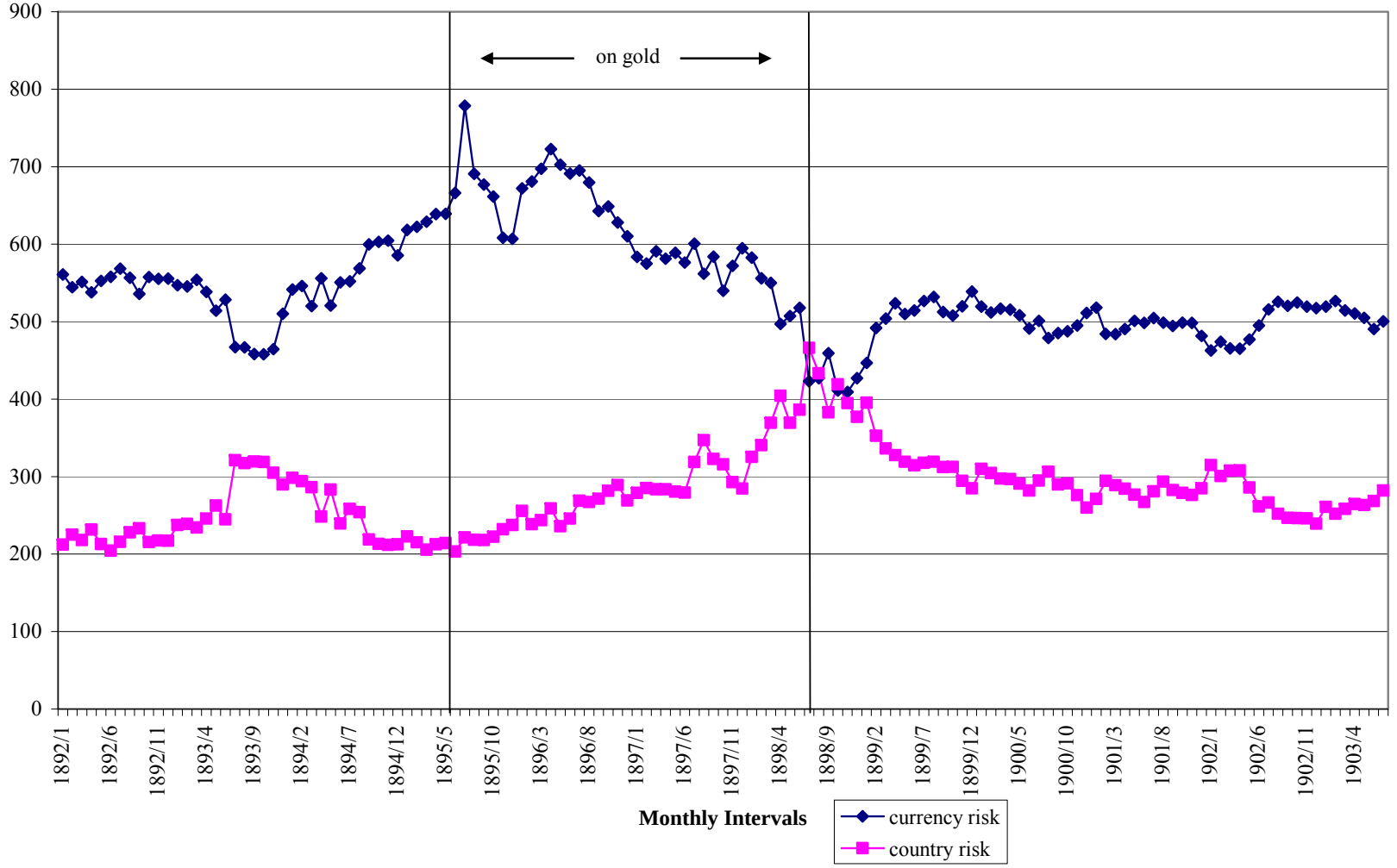


**Figure 10**
**Two-Year Rolling Regressions of Gold Dummy for Argentine Currency Risk Premium**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**

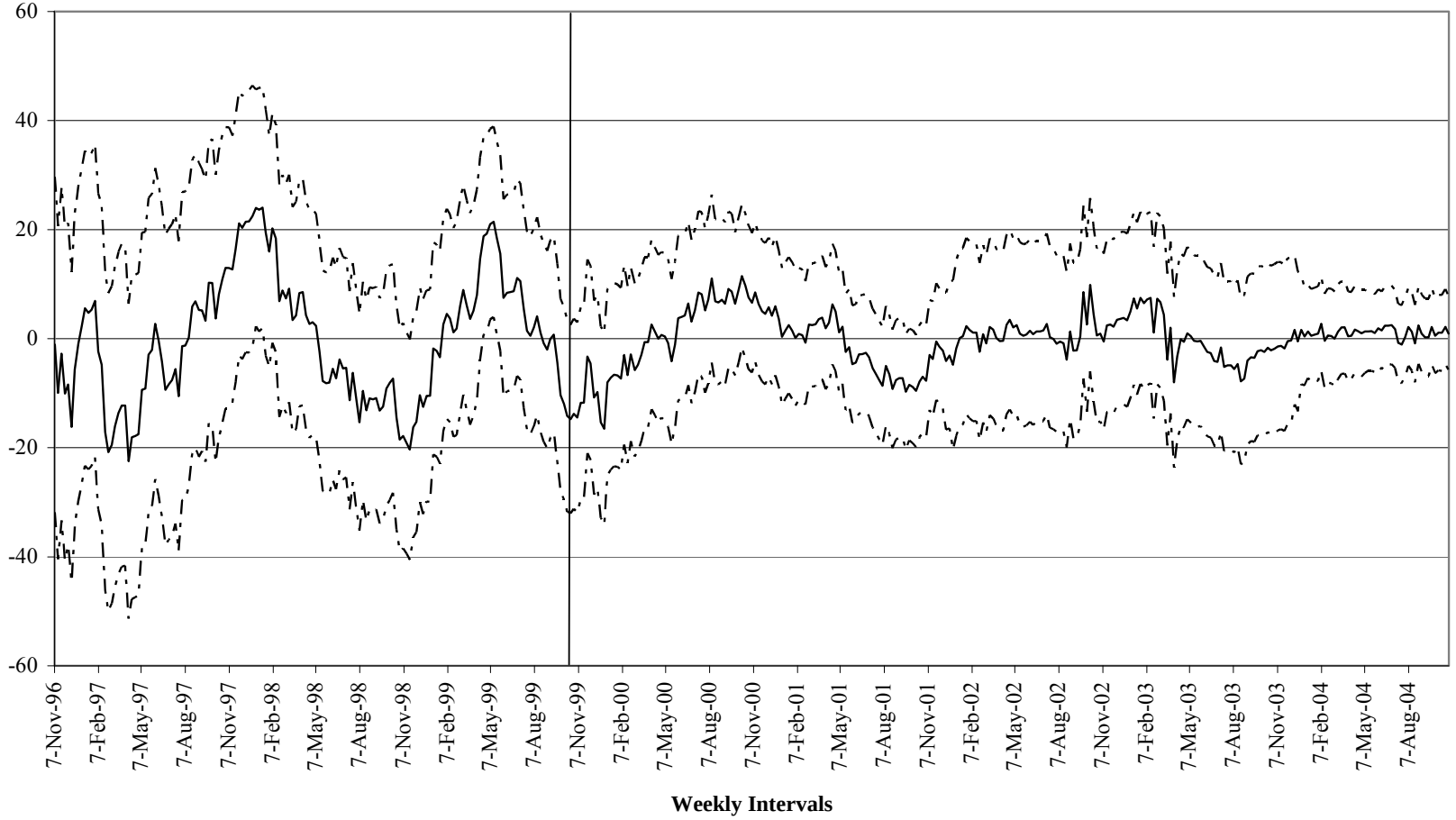


**Figure 11**
**Two-Year Rolling Regression of Gold Dummy for Austrian Currency Risk Premium**
**(Dashed Lines show 95-Percent Confidence Intervals of the Point Estimates)**

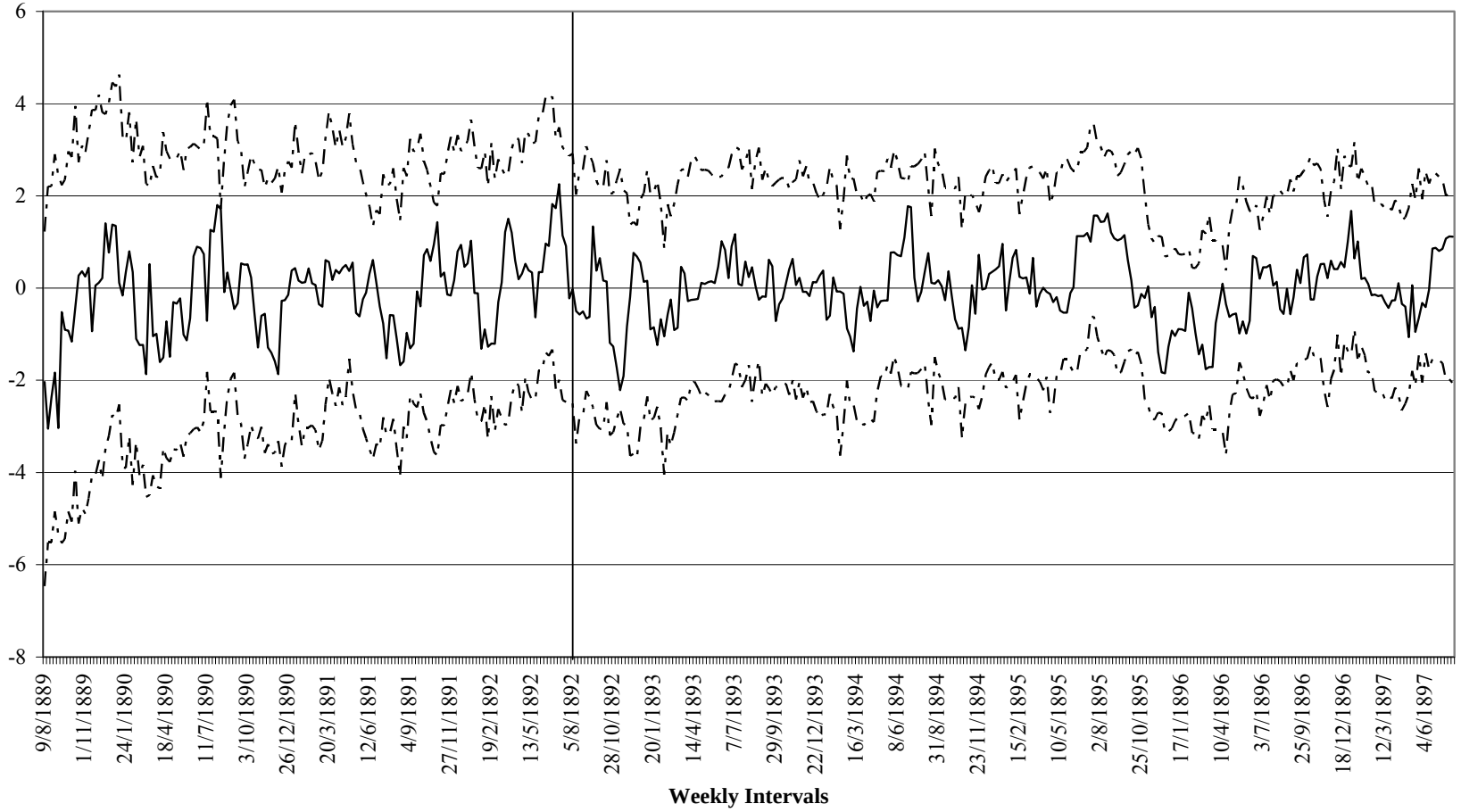


**Figure 12**
**Two-Year Rolling Regressions of Gold Dummy for Indian Currency Risk Premium**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**

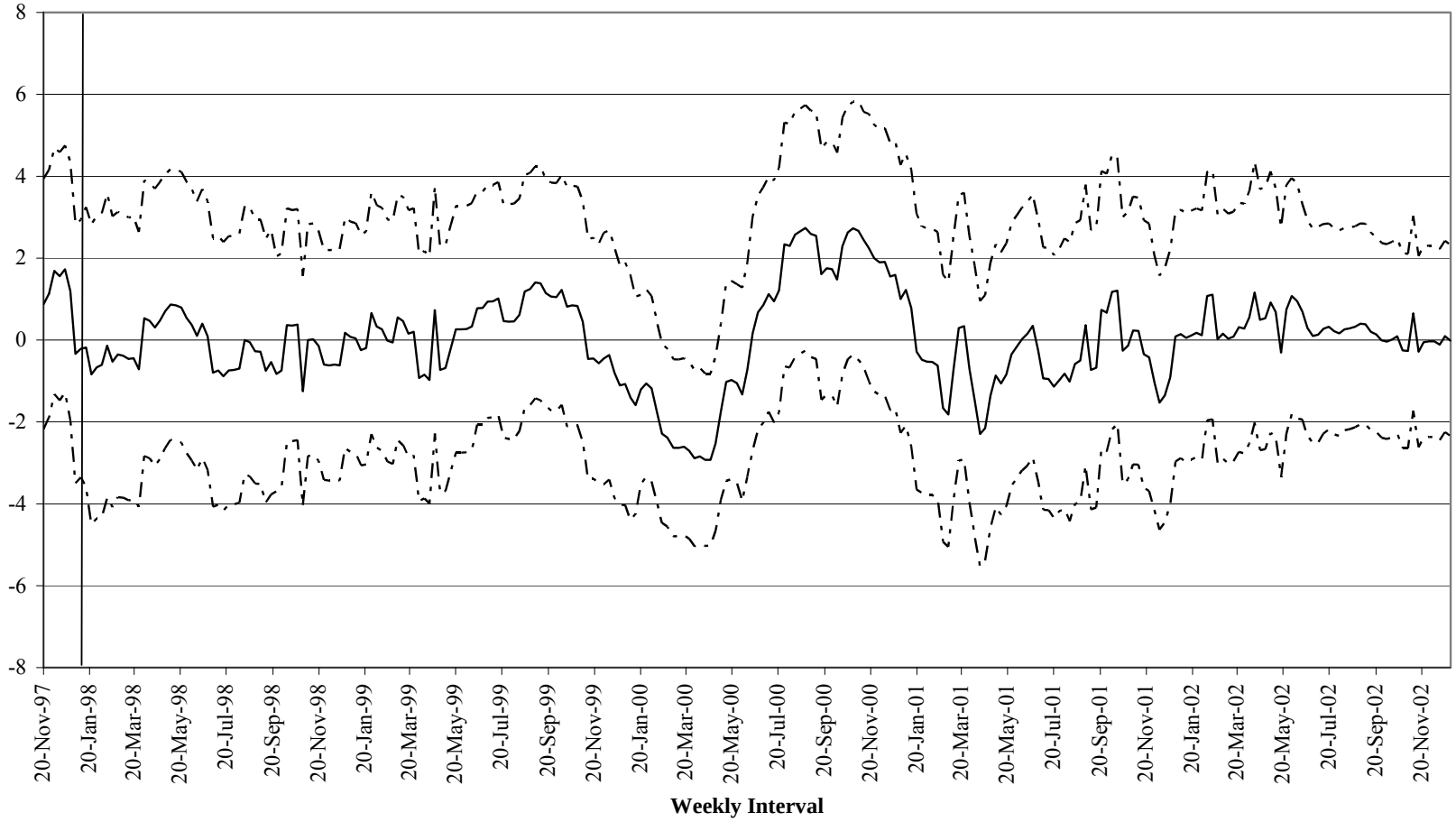


**Figure 13**
**Two-Year Rolling Regressions of Gold Dummy for Italy**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**

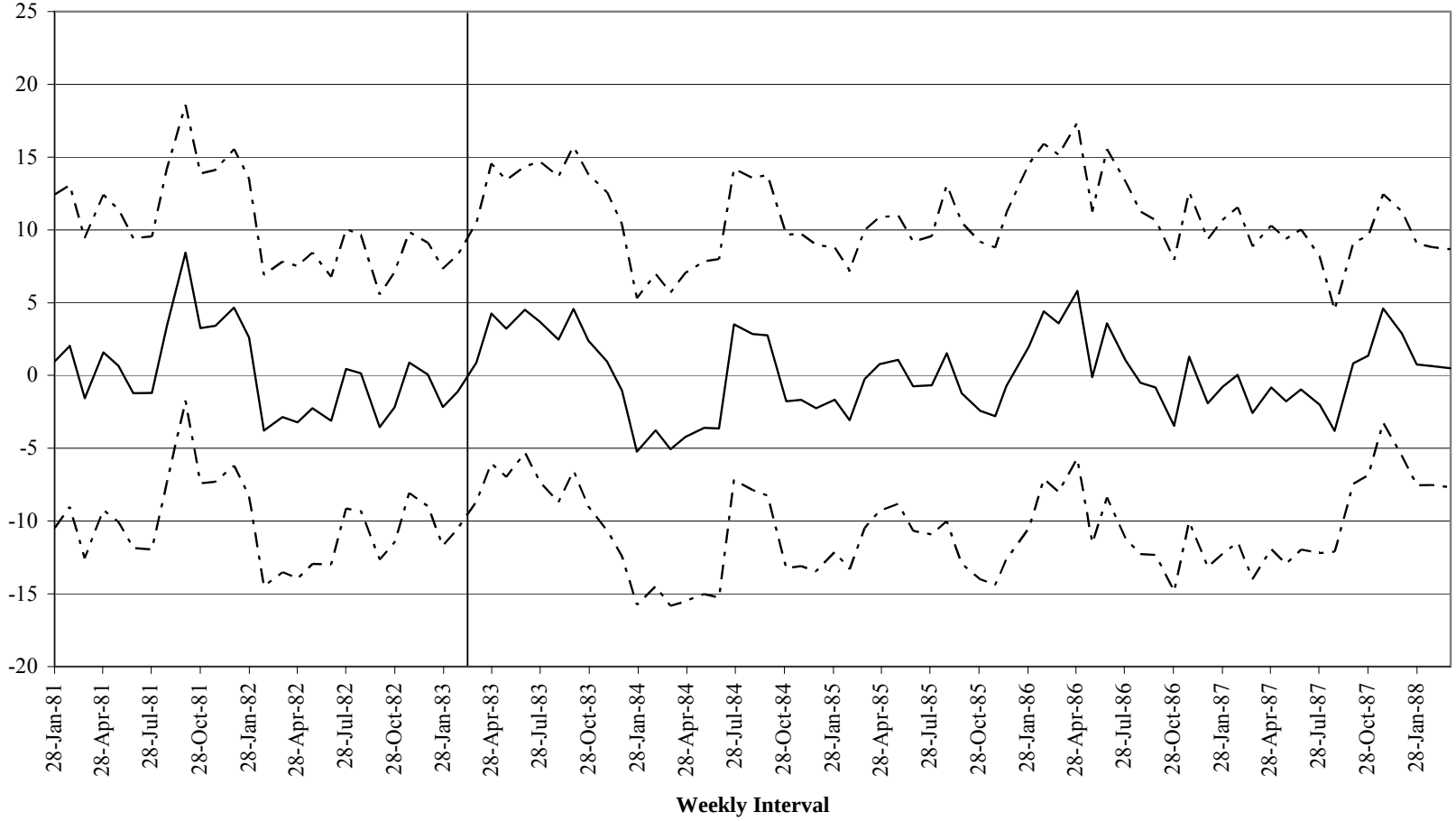


**Figure 14**
**Two-Year Rolling Regressions of Gold Dummy for Mexican Currency Risk Premium**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**

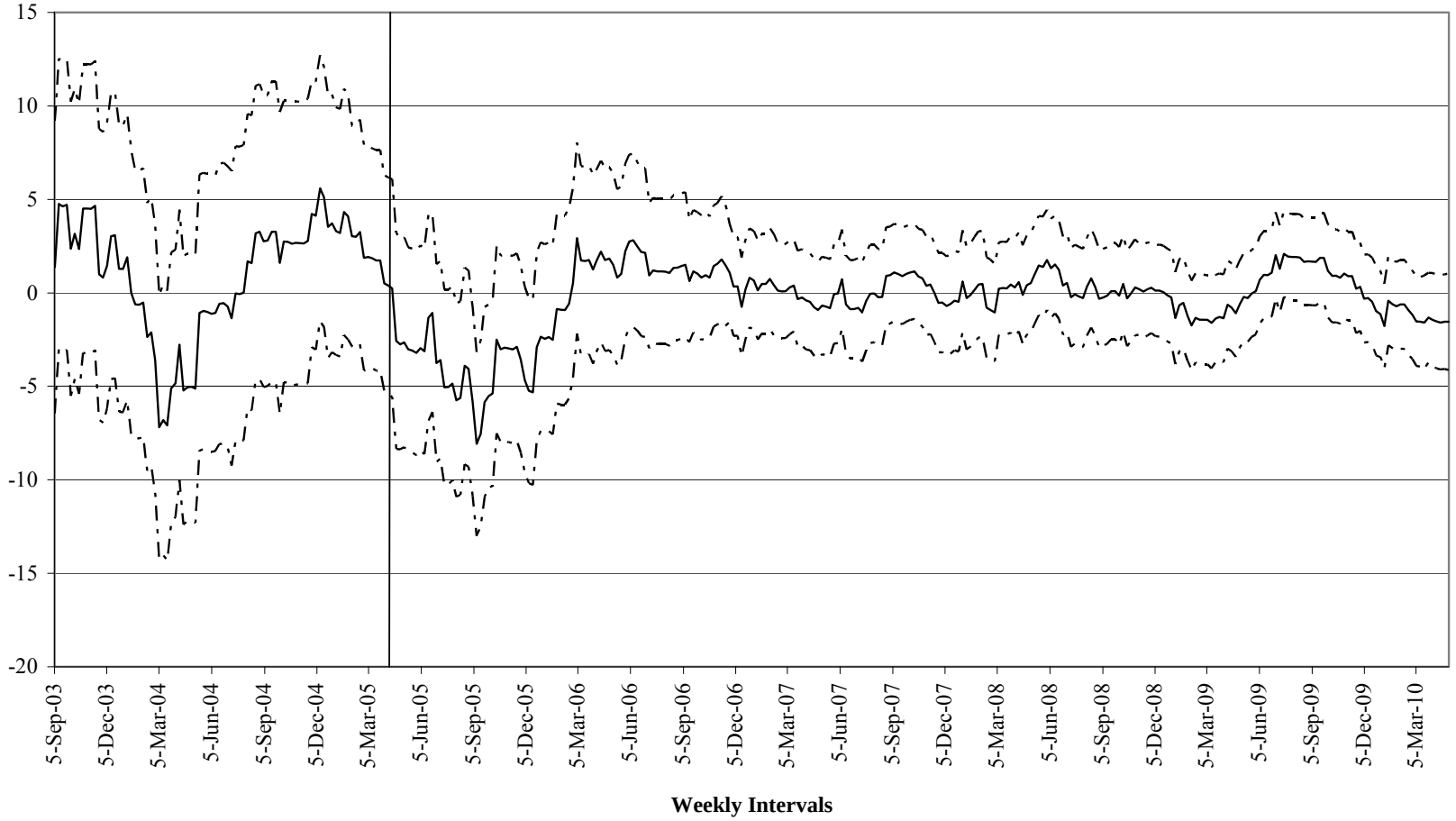


**Figure 15**
**Two-Year Rolling Regressions of Gold Dummy for Russia**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**

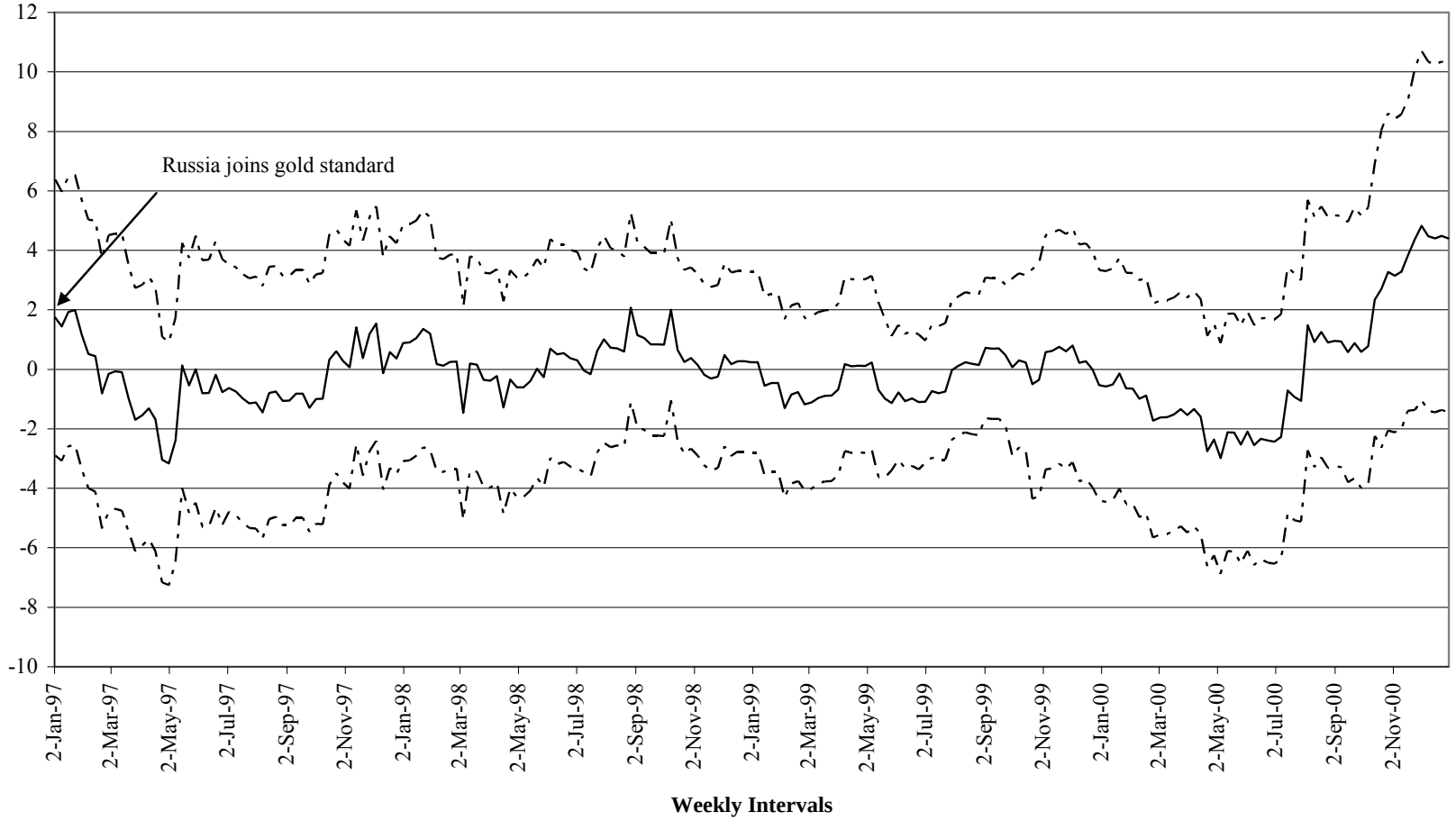
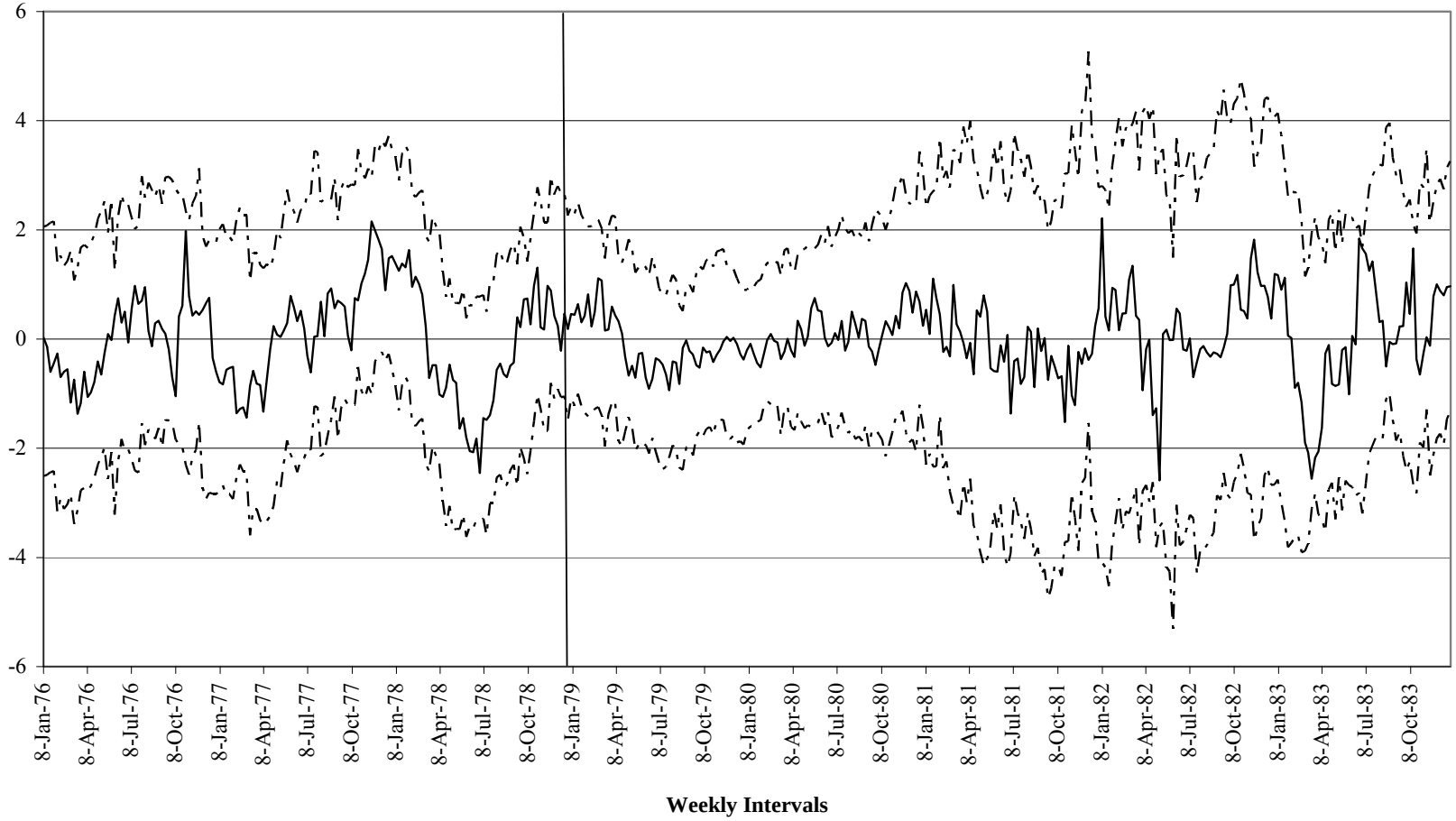
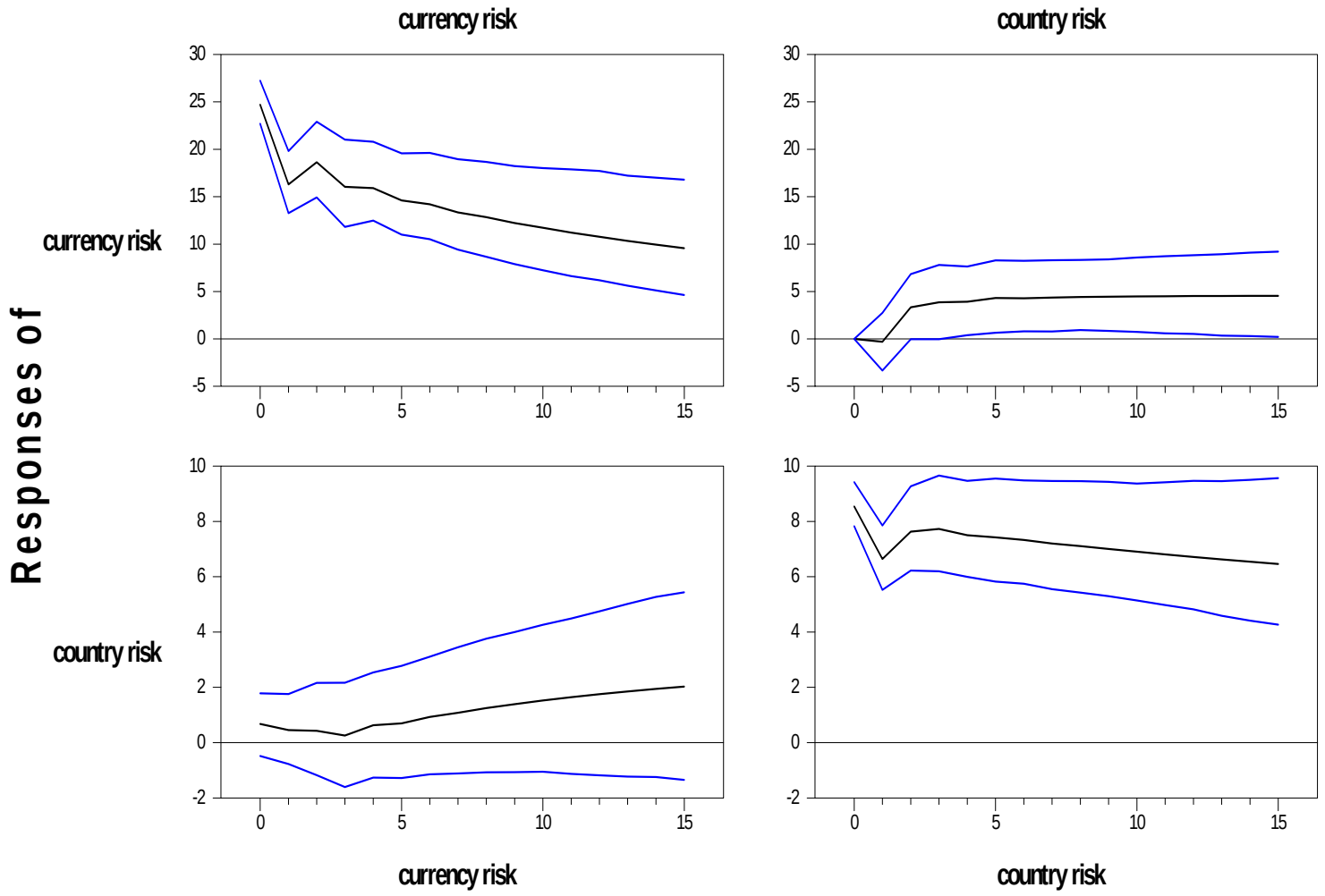


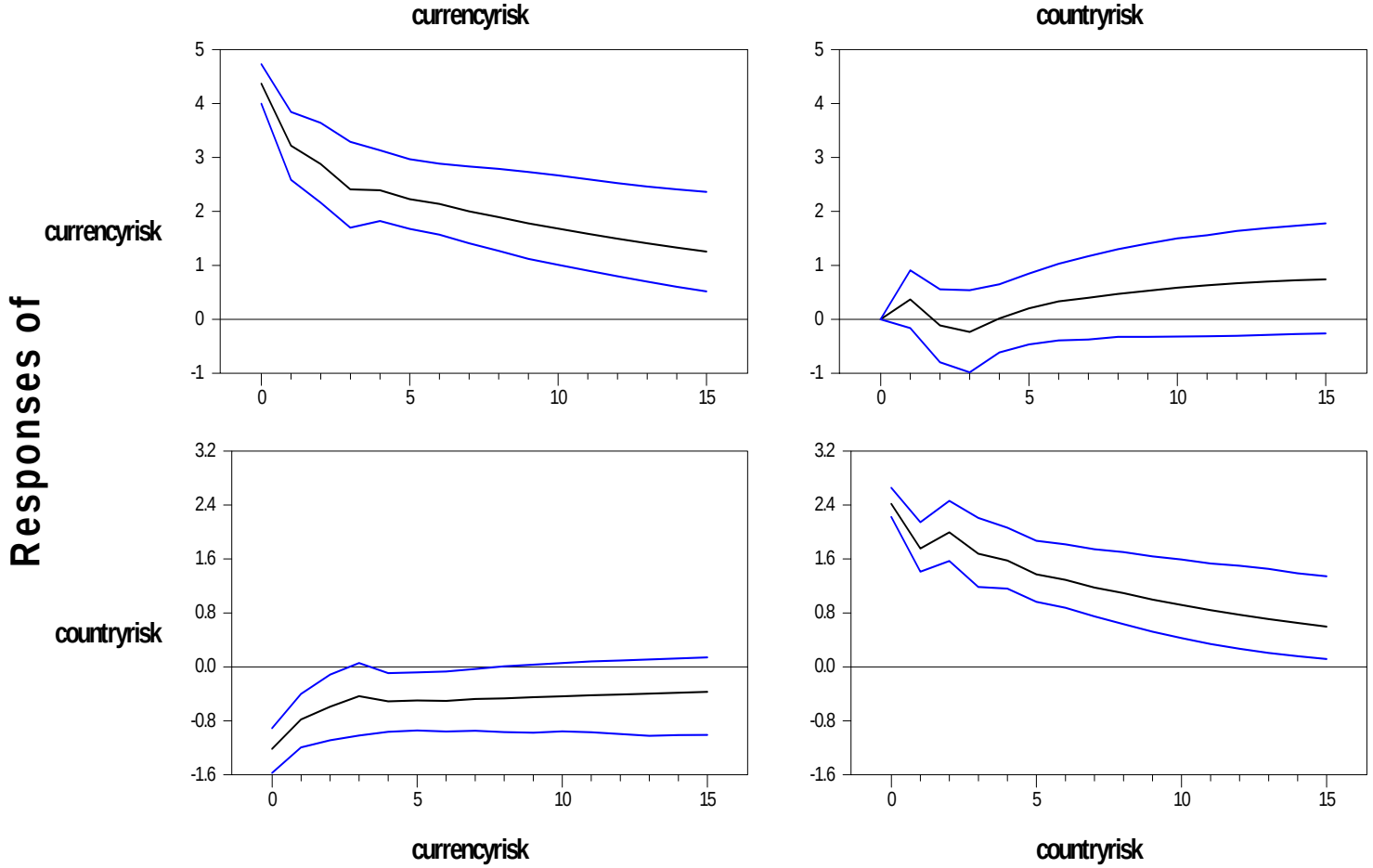
**Figure 16**
**Two-Year Rolling Regressions of Gold Dummy for US Currency Risk Premium**
**(Dashed Lines Show 95-Percent Confidence Intervals of the Point Estimates)**



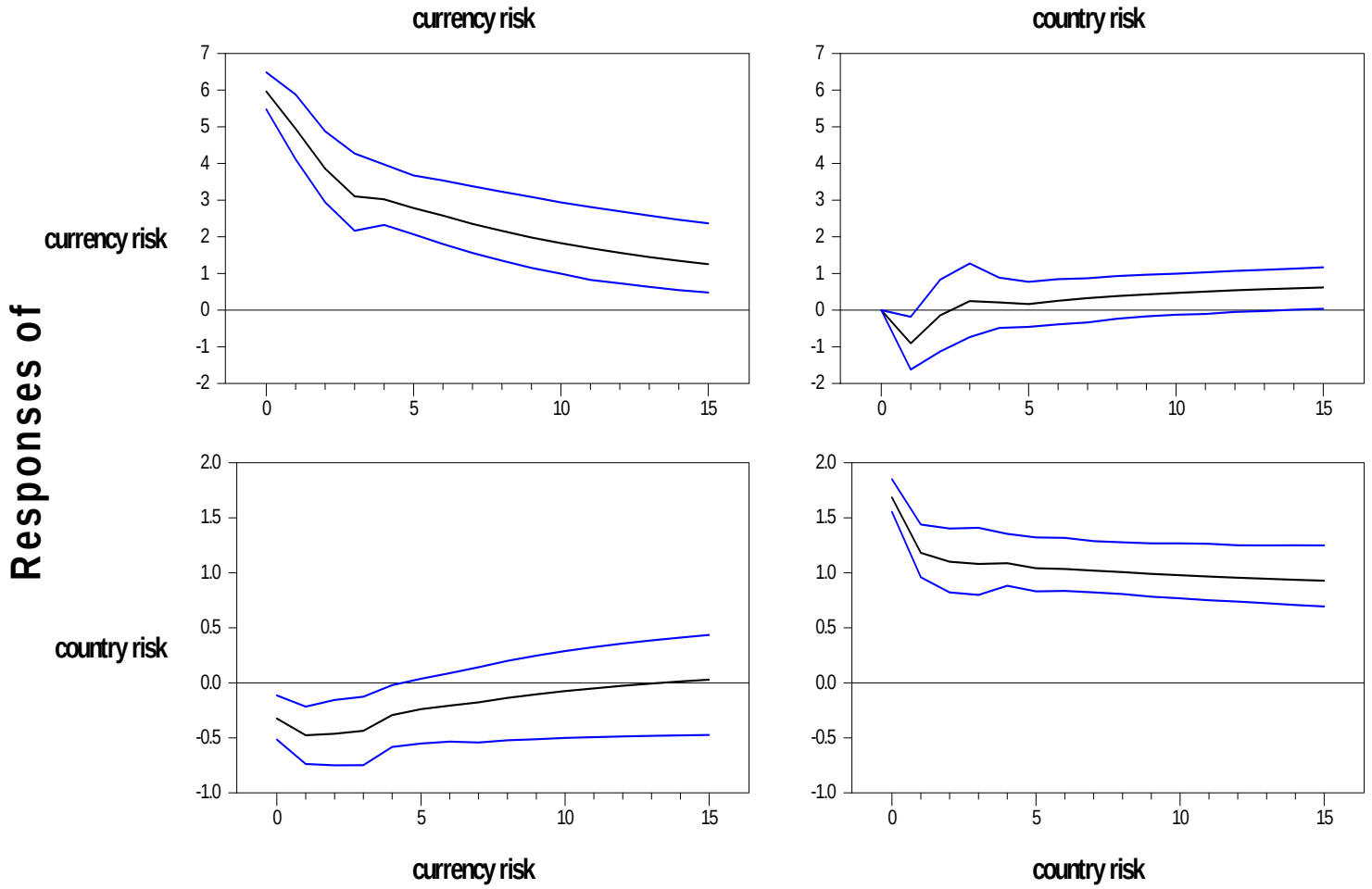
# Figure 17. Impulse Responses for Argentina



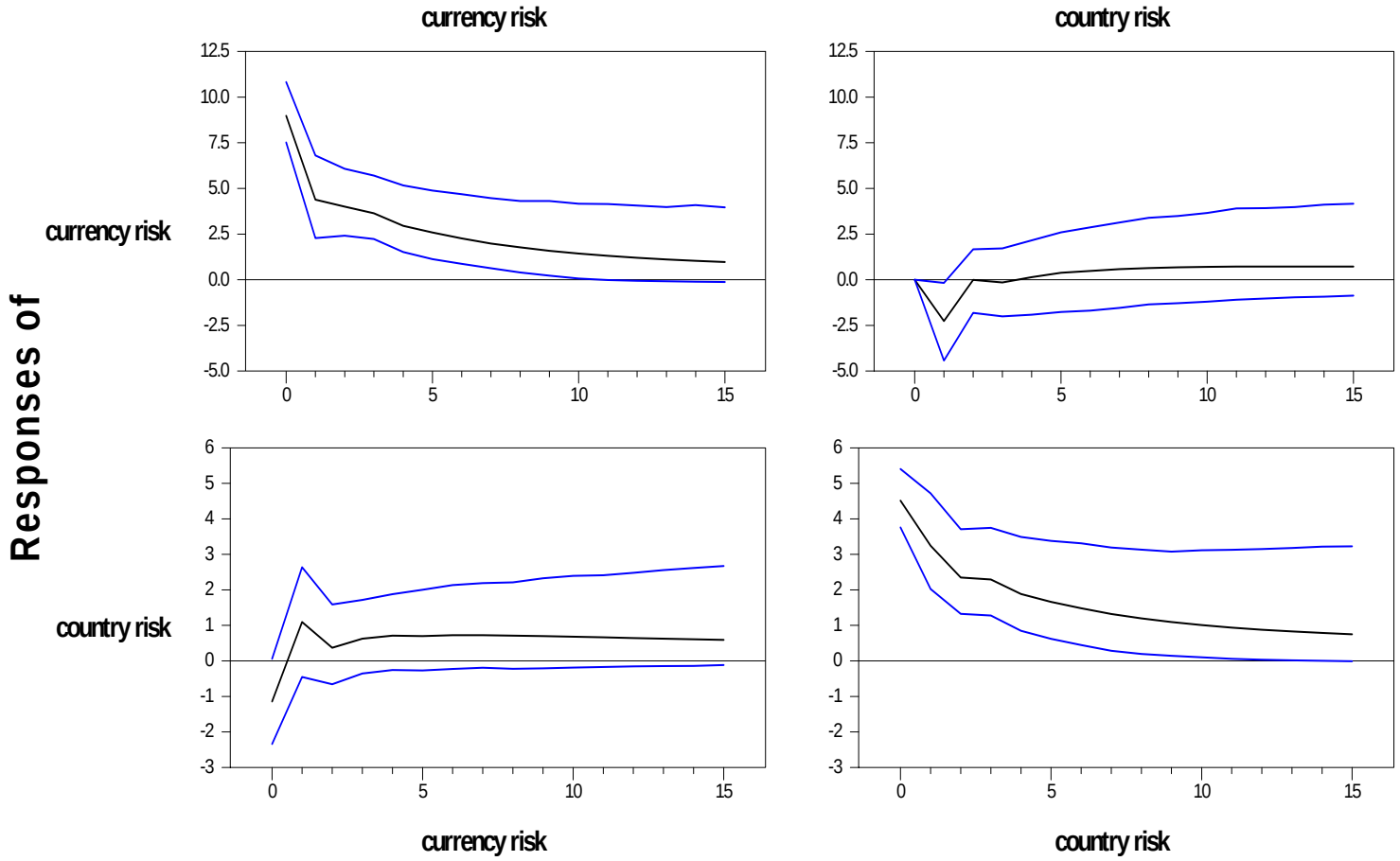
# Figure 18. Impulse Responses for Austria



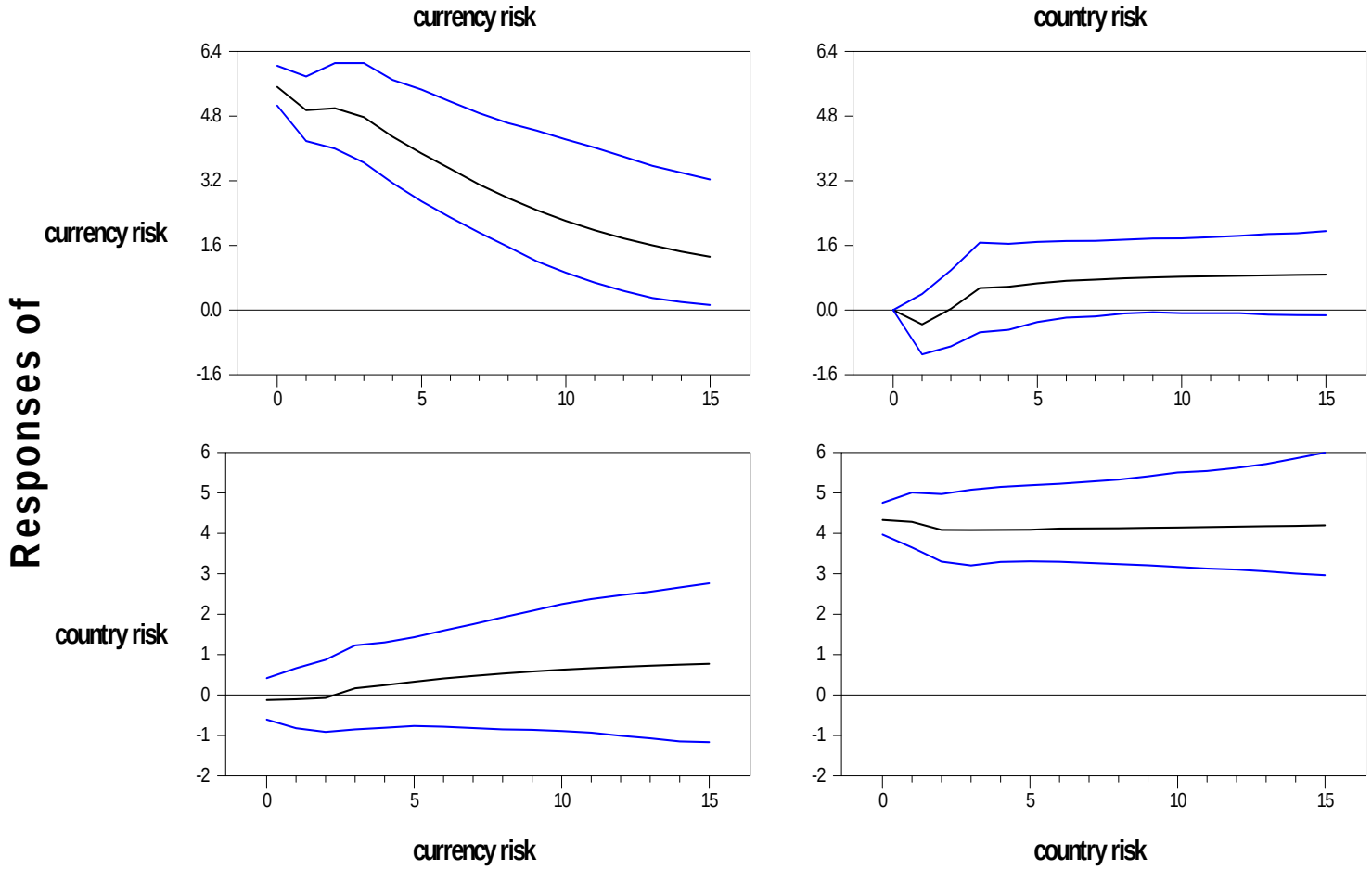
# Figure 19. Impulse Responses for India



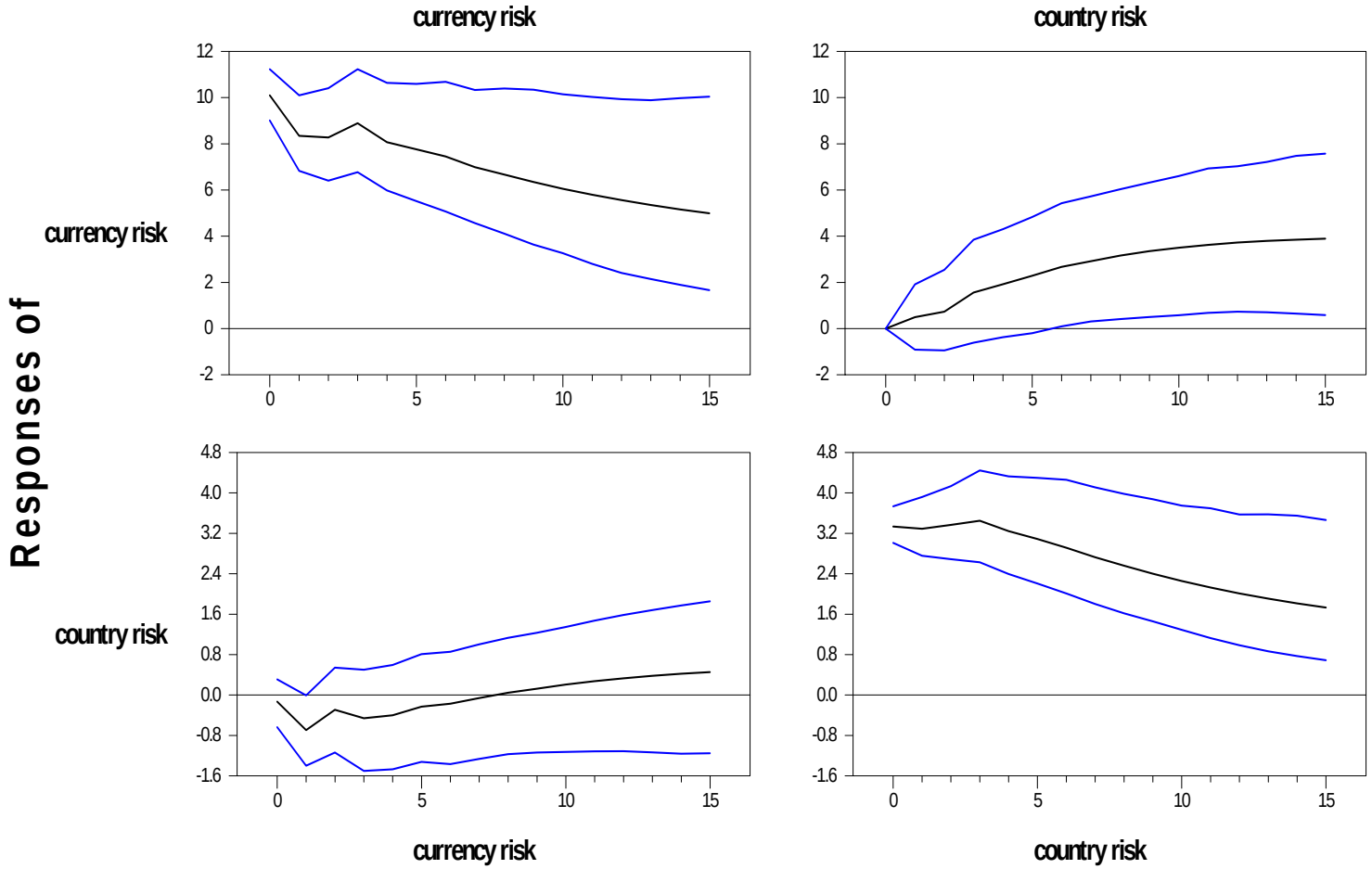
# Figure 20. Impulse Responses for Italy



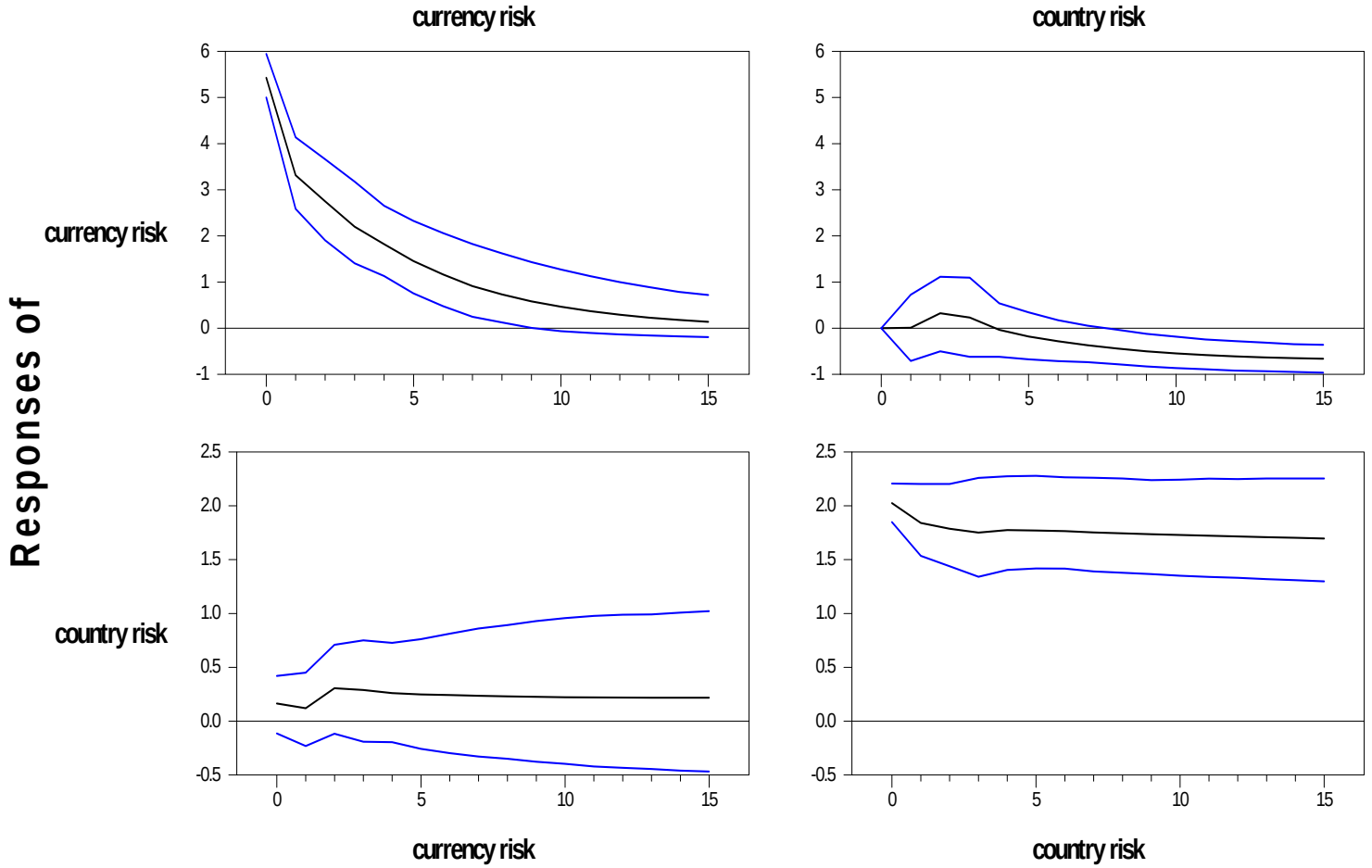
# Figure 21. Impulse Responses for Mexico



# Figure 22. Impulse Responses for Russia



# Figure 23. Impulse Responses for USA



## Appendix of Gold Standard Adoption Dates

Gold standard adoption dates for each country are from the following sources.

Argentina – The Law of Conversion was passed on Oct. 31, 1899 restoring convertibility (della Paolera and Taylor, 2001, p. 120).

Brazil – "Under an act which went into effect December 22, 1906, a conversion fund was established by means of import duties collected in gold." ((Monetary Systems of the Principle Countries of the World, p.8).

Ceylon – Adopted in 1901 with the Gold Ordinance Act of 1901 and maintained until 1914 (Gunasekera, p. 137).

Chile – A new conversion law of Feb. 11, 1895 set June 1, 1895 as the day for the redemption of notes. This continued until July of 1898. (Bordo and Kydland, 1995, p. 437-438).

Costa Rica – On July 16, 1900, the bank began redeeming certificates in gold (Young, 1925, p. 196).

France – Adopted the gold standard on Nov 5, 1878 (Pick and Sedillot, 1971, p. 587).

Greece – Adopted the gold standard on March 19, 1910 (Bordo and Kydland, 1995).

India – Adopted the gold standard the week of May 7, 1898. The scheme of Indian Government for establishing a gold standard published and severely criticized (*Investor's Monthly Manual*, December, 1898)

Italy- On April 12, 1884, the country adopted the gold standard. By 1894, it was back on a paper standard (Bordo and Schwartz, 1994, pp. 20-21).

Mexico- The Enabling Act was passed on Dec. 9, 1904 authorizing the establishment of a gold standard. On March 25, 1905, a decree promulgated the new system. The law went into effect on May 1, 1905 (Kemmerer, 1944, p. 524).

Nicaragua - Law of March 1912 embodied recommendations for gold-exchange system. (Young, 1925, Pgs. 147-150). A new currency system began on March 23, 1913 (Young, 1925, p. 159).

Russia – The country adopted the gold standard January 3-15, 1897(Pick and Sedillot, 1971, p. 488).

South Africa(Cape of Good Hope) - On Feb. 10, 1882, silver coins were made clearly tokens, placing the currency firmly on a gold standard (www.dollarization.org).

Sweden – The country signed a convention in December 1872 instituting the gold standard (Bordo and Capie, p. 15).

Turkey - Starting on March 13, 1880, there was in practice a "limping" gold standard, even though the country was officially on a hard peg. This system was maintained until Aug. 3, 1914 (dollarization.org, 2005).

United States – Resumed specie convertibility following the Civil War on January 1, 1879 (Kemmerer, 1916, p. 85).

## Data Appendix

We collected the data on weekly bonds yields from *The Economist*, and *The Commercial and Financial Chronicle*. In the following table, we list the interest rate stated in the terms of the bond as well as the maturity date (if known).

Argentina – 4.5 percent, bonds are to be redeemed within 39 years after they were issued in 1889.
Argentina – 7 percent Cedula 'B' currency bonds
Brazil – 4.5 percent sterling bonds, bonds redeemable with a sinking-fund of 1 percent per annum.
Brazil – 5 percent apolocies (paper bonds) taken from *Jornol do Commercio*.
Ceylon – 4 percent debentures, redeemable by 1934.
Costa Rica – 5 percent A Series, interest rate reduced to 3 percent on April 22, 1899.
Chile – 4.5 percent sterling bonds, bonds redeemed when the bonds fall below par or by a sinking-fund provision. 8% Bonos (paper bonds) hand collected from *El Mercurio*.
India – 3.5 percent sterling bonds redeemable on or after 1931.
India – 3.5 1854-1855 rupee bonds, repayable 3-months after notice by the government.
Italy – five percent rentes, perpetuity bonds traded in London; 5 percent irredeemable paper and gold rendita bonds.
Mexico – 5 percent external bonds redeemable by 1945.
Mexico – 5 percent Internal Silver Bonds, redeemable with a cumulative sinking-fund of .25 percent.
Nicaragua – 1886 six percent bonds.
France – 3 percent rentes, perpetuity bonds.
Russia – 1822 five percent, coupons payable in London
Russia – 6 paper bonds, coupons payable in Amsterdam
South Africa (Cape of Good Hope) – Cape of Good Hope 4.5 percent, due in 1900
Sweden – 5 percent, issued in 1868
Turkey – 4.25 percent external tribute of 1871, redeemable by 1900.
UK – consols 3 percent until, then 2.75 which were redeemable in 1923.
United States - 6 percent currency bonds, due 1895-1899; 4.5 percent gold bonds due 1891; 4 percent gold bonds due 1907.

**Appendix Table 1. Paper Bonds during the Classical Gold Standard, 1870-1913**

| Issue | Size of Issue(year) | Foreign Markets for Paper Bonds (primary domestic market) | Market for Gold Bond |
|---|---|---|---|
| Argentine 7% Cedulas 'B' Currency | $9.58 million(1900) | London and other Continental Bourses | London and other Continental Bourses |
| Austrian 5% Perpetuity | £177 million(1890) | London and other Continental Bourses | London and other Continental Bourses |
| Brazil 5% Apolicies | Mx63.6 million (1905) | No (Rio de Janiero and Sao Paolo) | Rio de Janiero and Sao Paolo |
| Chilean 8% Bonos | 151 million gold pesos(1900) | Valparaiso | London and other Continental Bourses |
| Indian 3.5% Rupee | Rx13.75 million(1900) | London | London |
| Italian 5% Perpetuity | Half of all government debt is in paper bonds | No (Milan) | Paris |
| Mexican 5% Internal | $59 million | London | London |
| Russian 6% | TBD | Amsterdam | Amsterdam |
| United States 6% | $64 million(1879) | No (New York) | New York |

Sources: *Investor's Monthly Manual*, *Official Stock Exchange Intelligence, and* Llona (1990). Rx stands for Rupee. Mx stands for milreis.