IMF Working Paper

Sudden Stops and Currency Drops:
A Historical Look

Luis A.V. Catão

IMF Working Paper

Research Department

Sudden Stops and Currency Drops: A Historical Look

Prepared by Luis A.V. Catão[∗]

Authorized for distribution by Gian Maria Milesi Ferretti

May 2006

Abstract

This paper shows that recent manifestations of sudden stops (SSs) in international capital flows have striking parallels in the early financial globalization era preceding World War I. All main capital-importing countries then faced episodic capital flow reversals averaging some 5 percent of GDP and with a median duration of four years. Most SSs also displayed striking cross-country synchronization, being immediately preceded by rising world interest rates. Both fixed and floating exchange rate regimes were hit, with no significant differences between them. Yet, not all SSs resulted in currency drops: while some countries experienced currency collapses, others managed to preserve exchange rate stability. These different responses are related to domestic "frictions" that heightened the procyclicality of absorption and hindered precautionary reserve accumulation in some countries relative to others.

JEL Classification Numbers: E44, F31, F34

Keywords: sudden stops, currency crises, international capital flows, gold standard

Author(s) E-Mail Address: lcatao@imf.org

<div align="center">Contents   Page</div>

I. INTRODUCTION

A prominent strand of the international macroeconomics literature has recently devoted considerable attention to what have been dubbed as "sudden stops," that is, sharp reversals in aggregate foreign capital inflows. While there seems to be insufficient consensus on what triggers such reversals, two consequences have been amply documented—namely, exchange rate drops and downturns in economic activity, which effectively constrict domestic consumption smoothing. This literature also notes, however, that not all countries respond similarly to sudden stops: whereas ensuing devaluations and output contractions are often dramatic among emerging markets, financially advanced countries tend to be far more impervious to those disruptive effects.[1]

These stylized facts about sudden stops have been based entirely on post-1970 evidence. Yet, periodic sharp reversals in international capital flows are not new. Leaving aside the period between the 1930s Depression and the breakdown of the Bretton - Woods system in 1971, when stringent controls on cross-border capital flows prevailed around the globe, a large body of the historical literature has highlighted the fact that the pace of international capital flows has been anything but smooth (Edelstein, 1982; Stone, 1999; DeLong, 1999; Eichengreen, 2003). In particular, past financial crises in emerging economies have been shown to be frequently associated with dramatic downturns in capital flows that often hard to rationalize (Kindleberger, 1978). Partly because of data limitations, however, cross-country evidence on historical patterns of sudden stops and their relationship to exchange rate developments has been unsystematic at best.

This paper aims to fill some of this gap. First, it describes the historical evidence on sudden stops (SSs henceforth) using a new international data set on capital flows and related macro variables spanning 16 countries since the early days of financial globalization around 1870— when asset market arbitrage was greatly spurred following the advent of the transatlantic telegraph in 1866—through the eve of World War I. Two key features that underpin the current relevance of this period are the high degree of world capital market integration and the widespread use of bond financing as the main instrument of sovereign borrowing—two clear similarities with the late 20th and early 21st centuries.[2]

Four set of questions are then asked about the nature of SSs:

---

[1] Calvo, Izquierdo, and Mejía (2004) note, for instance, that whereas 63 percent of sudden stop episodes have been associated with devaluations in emerging markets, the proportion drops to 17 percent among advanced economies.

[2] See Obstfeld and Taylor (2004) for measures of international capital integration over the past century and a half.

- Do SSs generally hit capital-importing economies irrespective of their level of development and monetary regimes, or are there specific characteristics that typify countries prone to SSs?

- How large are such SSs relative to the size of the recipient country's economy, and what is their average duration?

- Do SSs display some systematic cross-country pattern and time bunching, or is there evidence that they are typically triggered by idiosyncratic country shocks?

- Is there a systematic relationship between SSs and shifts in monetary policy and interest rates in the main capital-exporting countries?

Against this background, the second contribution of the paper is to establish the links (if any) between SSs and currency crashes. A feature of the pre–World War I period which makes it especially interesting for looking at this relationship is the existence of an international monetary system that provided one key incentive for countries to peg their currencies to gold and thus forestall devaluations or depreciations. Bordo and Rockoff (1996) and Obstfeld and Taylor (2003) argue that membership in the "gold club" tended to shave off between 40 and 60 basis points in countries' spreads. This represented non-negligible savings to sovereign borrowers, given the generally high ratios of countries' foreign-currency-denominated debt to GDP at the time and the much narrower dispersion of country spreads relative to today (Mauro, Sussman and Yafeth, 2002). In this setting, a currency drop following an SS would thus tend to be starkly revealing about other costs of keeping the peg. As discussed below, these costs include the need to accumulate large gold reserves yielding low returns (relative to other domestic investment opportunities) as well as to forgo the role of the exchange rate as a shock absorber. Further, decisions to abandon or not to adopt the peg may also be revealing of the existence of institutional "frictions" that mitigated the political cost of currency crises in some countries relative to others.[3]

To shed light on this relationship between SSs and currency drops, a central consideration of the analysis is the various factors that drive exchange rate behavior. Based on a simple model of nominal exchange rate determination and using probit panel regressions, the paper looks at what distinguishes successful peggers to those that experienced currency crashes. As will be

---

[3] For instance, if interest groups linked to export sectors had higher leverage on domestic policy-making in some of these countries, this would tend to mitigate such political costs and foster the politics of a weaker currency, delaying or even thwarting efforts to join or re-join a gold peg. There is considerable controversy in the literature, however, on whether such export lobbies systematically succeeded in shaping currency policies in the various countries during the late 19th and early 20th centuries. See, for instance, Fritsch (1988) on the case of Brazil. Using a broader cross-country sample, Meissner (2005) finds no significant econometric evidence that inflationist agricultural interests played a significant role in the timing of gold pegs.

seen below, this approach helps discern country-specific from common international factors driving the relationship between SSs and currency drops.

The remainder of the paper is structured as follows. Section II documents SS patterns across the 16 countries comprising the study. Section III looks at the distinct exchange rate responses to capital account shocks in the context of a simple exchange rate model and probit regressions. Section IV zooms in on country-specific monetary and fiscal stances as well as financial structures which may account for the different outcomes to common international shocks. Section V concludes with a summary of the main findings and a discussion of some salient implications.

II. PATTERNS OF SUDDEN STOPS

A first issue in the definition of an SS is whether capital inflows are measured in net or gross terms. The recent literature overwhelmingly uses the net concept —the capital or financial account balance—for which data are available at higher (usually quarterly) frequencies.[4] However, this choice is not inconsequential. For instance, straightforward balance-of-payments accounting indicates that an exogenous improvement in a country's net barter terms of trade automatically translates into a drop in net capital inflows, all else constant. In an economic sense, this is very different from a situation in which the country faces a sudden drop in the supply of external financing which the current account has to accommodate (unless the country possesses sufficient international reserves to smooth the capital account shock) through a devaluation or a contraction of income. In principle, the concept of sudden stops should refer to the latter and not to the former type of event.

In what follows, lack of data on *total* gross inflows for every country requires a somewhat eclectic approach. Specifically, I combine a measure of net capital inflows to countries for which the series is available with information collected by Stone (1999) on *gross* portfolio calls on the London market. Since Britain was then the largest capital-exporting nation (in terms of both absolute annual flows and ratios to GNP) and the most important lending center for the overwhelming majority of emerging markets, one would expect such a portfolio call measure to closely trace fluctuations in gross flows to most countries. As shown below, information about SS patterns derived from these different sources yields a broadly consistent story.

---

[4] See, for example, Dornbusch, Goldfajn, and Valdes (1995); Edwards (2004), and Calvo, Izquierdo and Mejía (2004). One study that considers both gross and net flow variables is Caballero, Cowan, and Kearns (2004).

Figure 1 plots net capital flows into capital importing countries for which data are available.[5] As expected with countries having very different commodity specializations and distinct policy regimes, there is clearly some diversity in the time pattern of capital inflows. Yet, what is arguably much more striking about Figure 1 is the apparent synchronicity of the downswings across most countries. Three main episodes stand out in particular: the downswing of 1874–80, that of the early 1890s, and the shorter downturn of 1906–08. Clearly, not all countries were equally affected and, in a couple of occasions, foreign capital flows moved in opposite directions in a subset of them (e.g., Norway and Russia in the early 1890s). But, overall, such downswings hit the overwhelming majority of countries at around the same time and were often abrupt. This suggests that pre-WWI SSs did display some time bunching similar to that observed over the past decade and a half (Calvo, Izquierdo, and Mejía, 2004).

As discussed further below, it is also striking that SSs hit countries with widely disparate per capita income levels and distinct monetary regimes. They struck countries as poor as Brazil (with an estimated per capita GDP of US$ 811 in 1913 on constant 1990 PPP basis) and as rich as the United States (with a per capita GDP of US$ 5,301 on the same PPP basis in 1913).[6] Some of them remained on a gold peg throughout, such as countries in Scandinavia and North America, whereas others experimented with distinct monetary regimes such as bimetallism, temporary gold pegs, and plain inconvertible paper money; none of these regimes could prevent a capital importer from being hit by a SS.[7]

These inferences are broadly corroborated by available data on gross flows based on portfolio calls on the London market. While the latter seem to account for a smaller share of total gross foreign investment in Southern Europe and Russia—where French and German capital flows were prominent—bond flotations in London were by far the most important external financing instrument to capital-importing countries in Latin America and the Anglo-Saxon new world. Starting with Argentina, this gross inflow indicator portrays a very similar pattern as that of the net inflow data, both highlighting the major SS of 1889–94, which was closely associated with a famed financial crisis that brought down the Baring's investment bank (see della Paolera and Taylor, 2001, for a detailed account). Similarly, sharp downturns in gross portfolio inflows around the same period are also observed for Brazil and Chile,

---

[5] Net capital import data are not available for Greece and Portugal throughout the period, or for Argentina and Russia before the 1880s and Brazil after 1900. See Appendix II for information on the respective data sources.

[6] International data on per capita GDP on a constant PPP basis since 1870 are available in Maddison (2003).

[7] It may well be that more flexible exchange rates helped insulate domestic output from the SS, as argued in Edwards (2004) based on post-1970 evidence. A comparison between output responses to SSs across the different exchange rate regimes in the pre war era is not discussed here, however, and constitutes an interesting topic for future research.

which experienced additional SSs earlier in the 1870s and later in the 1890s—in the Brazilian case leading to a sovereign debt rescheduling in 1898 and in the Chilean case to an abandonment of the gold peg.[8] With regard to Southern Europe and bearing in mind the above-mentioned caveat about the limitations of gross flow data for these countries, Figure 2 also fleshes out a similar timing of SSs in much of Southern Europe.[9]

Turning to the Anglo-Saxon capital importers, the gross capital inflows indicator further highlights the fact that these countries also experienced SSs despite operating a more "rules-based" monetary regime, displaying greater fiscal discipline overall, and remaining pegged to gold throughout.[10] Similar considerations apply to all four Scandinavian countries (Denmark, Finland, Norway, Sweden).[11]

Further corroboration of the evidence that SSs usually bunch over time is provided in the more formal classification of these episodes reported in Table 1. Although Figures 1 and 2 make reasonably clear what episodes should qualify as SSs, Table 1 summarizes this information using the following working definition: an SS is defined as a drop (from peak to trough) of no less than two standard deviations of the deviations of respective series from a linear trend, and/or any drop that exceeds 3 percent of GDP over a period shorter than four years. Timing the beginning of an SS as the year when capital inflows (measured in million pounds) peak, the SS is then said to end in the year when capital flows start rising relative to trend without falling back to its lowest level (also relative to trend) within a four-year

---

[8] For further specifics, see Franco (1990) and Llona Rodriguez (2000).

[9] In the case of Russia, discrepancies in the timing of the SSs between the gross and the net capital inflow series plotted Figure 1 suggest that capital flows into Russia other than those associated with London flotations were important and may have dominated in the aggregate. Another possibility is that, since the net capital flow series was derived from the difference between the current account balance and changes in international reserves, it may reflect large inaccuracies in the measurement of these two variables. See Appendix II.

[10] The United States formally adopted the gold standard in 1879 but policy actions and statements, as well as a gradual appreciation of the currency underway since the mid-1870s toward the ante bellum parity, signaled to market participation that gold resumption was imminent.

[11] Fiscal discipline was especially remarkable among Scandinavian countries where public debt averaged between 15 and 20 percent of GDP during 1870–1913. On this front, Scandinavian countries were superseded only by the United States for which the public-debt-to-GDP ratio averaged 9 percent and fell to a low around 3 percent by the eve of World War I. This contrasts with much higher period averages for countries such as Argentina, Chile, Greece, Italy, Portugal, and Spain. The implications of these differences in fiscal performances are examined below.

window. On this basis, it is clear that both the net and the gross flow data yield a broadly similar picture about the timing of SSs in most countries.

Using the same definition, Figure 3 plots the incidence of SSs over time normalized by total SS observations in the sample. Both the net and gross measures clearly indicate that SSs bunched around the mid-1870s, the early 1890s, in 1906–07, and also, albeit to a lesser extent, in the late 1890s according to the net flow measure. Such a pattern is consistent with that of the net capital outflow series from Britain, France, and Germany—the three main capital-exporting countries of the late 19th century, which is plotted in the upper panel of Figure 4. At the same time, the lower panel of the same figure also shows that *all* SSs were, in turn, preceded with a one- or two-year lag by a hike in core central banks' discount rate. This has striking parallels with the more contemporary evidence on the adverse impact of advanced countries' monetary tightening on capital exports to "emerging markets" (Calvo, Leiderman, and Reinhart, 1993; Fernandez-Arias, 1996), indicating that exogenous monetary shocks were key drivers or "push factors" in capital flow reversals during the prewar period as well.

To further gauge the macroeconomic importance of SSs during the period, Figure 5 plots the usual metric of scaling net capital flows by GDP.[12] As one would expect in an era of free capital mobility and extensive international borrowing, Figure 5 shows that fluctuations in net foreign capital inflows (NFKIs) were sizable. Absolute annual deviations from a balanced capital account indicate that the macroeconomic impact was largest in Argentina (where such deviations averaged 10 percent of GDP over the entire period), followed by Canada (7½ percent of GDP), Finland (6¼ percent of GDP), and Australia (5½ percent). Pooling together all SS events in countries for which the respective NFKI series is available, the peak-to-trough median drop in inflows amounted to 5.1 percent of GDP. This is of a very similar magnitude as the trough-to-peak magnitude of current account reversals identified by Calvo, Izquierdo and Mejía, (2004, Appendix Table 3) in the more recent vintage of SSs (4.9 percent). Further, as with its contemporary counterpart, pre-WWI SSs tended to persist measured in terms of mean or median, and regardless of whether one uses the available gross or net capital inflow measures, the average duration of SSs is four years over the whole panel.

Also consistent with the prima-facie evidence presented above, standard tests on mean differences in the magnitude of SSs (again measured from peak to trough) show no statistically significant difference between fixers and floaters.[13] No less interestingly, there is

---

[12] It would be useful, as suggested by Calvo, Izquierdo, and Mejía (2004), to use tradable-sector output as a scaling factor if such information were available.

[13] The mean for the floating (off-gold) group was 10.3 percent whereas that for gold -peggers was 5.6, but this large mean difference results from one large outlier—Argentina in 1890–92. Dropping the latter, the mean for the off-gold group falls to 5.1 percent. Partly because of that outlier, intergroup variances are large, at 141 and 13.9 percent. Not surprising in light of

no statistically significant difference in the duration of SSs between the gold and non-gold country groups: SSs are reasonably persistent in both cases, with median durations of 3.7 and 4.2 years, respectively, and again no statistically significant difference in means.[14] This evidence calls into question the view that fixing the exchange rate was a sine qua non condition for attracting and/or stabilizing capital inflows. The fact that SSs also struck other gold-pegged countries with histories of sensible macro policies suggests that neither the monetary regime nor the fiscal policy stance can insulate a country from a capital account shock, an evidence with striking parallels to that amassed by Calvo, Izquierdo, and Mejía (2004) who find that neither differences in monetary regimes nor country-specific fiscal behavior can explain the incidence of SSs in their sample of 32 countries over 1990–2001.

III. Capital Flows and Currency Crashes

Despite the relatively rapid international spread of the gold standard from the 1870s and the fact that all core industrial nations continued to peg their currencies to gold until the eve of World War I, many capital-importing countries continued to operate distinct monetary regimes during the period. What one observes is either a repeated switch between a gold peg and a floating regime (as for instance in Argentina, Brazil, Chile, and Greece),[15] or the postponement of gold standard membership until a later stage once substantial gold reserves were accumulated, facilitating uninterrupted adherence to the peg, as in India, Japan, and Russia from 1897 (see Catão and Solomou, 2005, for specifics). Within this wide spectrum of country-specific monetary arrangements, there were also those that never pegged to gold (China and Spain), one (Portugal) that adopted gold much earlier (1856) but also left earlier (1891), and countries such as Austria-Hungary and Italy which were formally off-gold during much of the period but saw their national monetary authorities successfully shadowing the gold parity, which resulted in relative exchange rate stability.

This diversity is apparent in the behavior of the various spot exchange rates. While Anglo-Saxon and Scandinavian currencies were kept within the narrow gold points and thus were virtually flat, Figure 6 shows how widely the price of the domestic currency varied relative to

---

such high variance, the respective z-statistic for differences in mean is 0.99, thus well below the 10 and 5 percent critical threshold levels of 1.64 and 1.96.

[14] The respective z-statistic is 0.69. In computing this statistic, the duration of SSs in Greece, Portugal, and New Zealand (countries for which a NFKI series is unavailable), as well as in Argentina and Russia prior to 1880, was measured using gross capital inflow series as reported in Table 1.

[15] Argentina stabilized its exchange rate and held onto a gold peg in 1870–75, 1883–84, and 1899–1913. Brazil was on gold for a few months between 1888 and 1889 and from 1906 to 1913. Chile was on a bimetallic standard through 1879 and on gold between 1895 and 1898. Greece was on gold in 1885 and then in 1910–1913.

gold elsewhere.[16] Among Latin American economies, not only did exchange rates displayed long-term depreciating trends but they also witnessed large, discrete downward adjustments in the mid- to late 1870s and between the late 1880s and early 1890s, which in the case of Chile, was compounded a further downward adjustment in 1906–08. Several European countries under paper-money regimes also witnessed nontrivial fluctuations in the gold parity of their currencies. Depreciation was relatively mild in Italy, but sizable in Russia in 1875–78, Greece in both 1884–86 and 1890–95, Spain in 1890–93 and 1895–98, and Portugal in 1891–94. Comparing the timing of these various currency crash episodes with the timing of SSs in each countries, reported in Table 1, it is clear that currency crashes were either concomitant with SSs or followed the latter with a one or two year lag.

Three main questions then arise. First, to what extent are SSs driving these exchange rates relative to other factors? Second, is the causality running from SSs to exchange rates or from exchange rate risk to SSs (driven by, say, contagion or by factors that may be common to several countries such as primary commodity terms of trade)? Third, why did some large capital exporters that also faced SSs manage to stick to the peg when others did not?

To shed light on these questions, one needs to consider the role of other potential explanatory variables in explaining the exchange rate as well as the possibility of reverse causality running from exchange rate changes to SSs. A useful starting point is a model of exchange rate determination which nests the various possible relationships, for instance, along the lines of the monetary models of the 1970s and 1980s which allow for short-run price rigidity (see Frankel, 1979, and Frankel and Rose,1995, for a synthesis). Appendix I shows how these earlier models can be straightforwardly extended to allow for a time-varying country risk premium—which becomes a function of the supply of international liquidity—and for violations to long-run purchasing power parity (PPP); instead, the real equilibrium exchange rate is let to be driven by terms-of-trade trends, long-run productivity differentials between home and abroad, and the country's fiscal position—consistent with a wide class of open economy macro models (see, e.g., Edwards, 1989, and Obstfeld and Rogoff, 1996, for surveys).

The formal derivation of the model laid out in Appendix I yields the following reduced form equation for expected parity deviations of the spot exchange rate:

$$E[e_t - \bar{e}_t] = \mu - (\Delta m_t - \rho \Delta y_t) + \alpha \, (tot - \overline{tot})_{t-1} - \varphi(\bar{y}_{pc} - \bar{y}_{pc}^*)_{t-1} - \eta(g/t - \overline{g/t})_{t-1} + \frac{1}{\theta}(i_t - i_t^*) + \upsilon(\Delta b^* + \psi \Delta res)_t \qquad (1)$$

---

[16] Since the British pound was then the main international currency which adhered to a pre-established gold content throughout, all the nominal indices are measured relative to the pound. To facilitate comparison, all series are rebased to 1900=100. Defining the exchange rate as the foreign price of domestic currency implies that a rise in the index corresponds to an appreciation of the respective national currency relative to the pound. The experience of countries that pegged their currencies to silver, such as Mexico, China, India, and Japan, is not reviewed here but is examined in Catão and Solomou (2005).

where *tot* stands for the respective country's net barter terms of trade; *m* is domestic money supply, and *y* for domestic real output; y_{pc} and y_{pc}^* stand for domestic and foreign per capita GDP respectively, and *i* and *i** for the short-term domestic and foreign interest rates; *g/t* is the ratio of public expenditure to revenues;[17] $\Delta b*$ stands for changes in the supply of foreign capital flows and Δres for changes in the ratio of international reserves to paper currency in circulation. All variables are expressed in natural logarithms with the bar subscript denoting the respective long-run or trend "equilibrium" levels.

Recalling that the exchange rate is defined here as the foreign price of the domestic currency, equation (1) states that the expectation of a currency drop will be higher as: i) money supply grows relative to output; ii) terms of trade deteriorates relative to trend; iii) domestic productivity declines relative to foreign countries' productivity; iv) the domestic interest rate drops relative to its foreign counterpart; v) the foreign supply of capital flows shifts down without the offsetting of rising reserves relative to currency in circulation. It is straightforward to see in equation (1) that once the terms $\frac{1}{\theta}(i_t - i_t^*)$ and $\psi \Delta res$ are shifted to the left-hand side, we have an index analogous to that of currency pressure popularized in the work of Eichengreen, Rose, and Wyplosz (1996).[18]

On the basis of the above model, Table 2 reports probit estimates of the determinants of a currency crash. In the absence of a commonly agreed criterion in the literature,[19] a currency crash is defined here as an exchange rate depreciation greater than at least one standard deviation of the annual percentage change of the nominal exchange rate (relative to sterling) over the entire 1870–1913 period, provided that this depreciation is not fully reversed within a three-year window. Thus defined, our sample comprises 19 such events which are listed in

---

[17] The ratio of fiscal expenditure (*g*) to revenues (*t*) is used instead of the more conventional of scaling by GDP for two reasons. One is that it is always a non-negative number which allows us to work with a log specification. Second, it circumvents the problem of the well-known deficiencies of GDP data for many of the sample countries during the period.

[18] An advantage of the present formulation is that the weights of the interest rate differential and the reserve terms can be econometrically determined through the estimation of $1/\theta$ and ψ, rather than being imposed so as to equalize the respective unconditional variances as in Eichengreen, Rose, and Wyplosz. (1996).

[19] See Frankel and Rose (1996), Kaminsky and Reinhart (1999), and Milesi-Ferretti and Razin (2000) for the different classification criteria employed in this literature. One feature of the pre-1914 period which helps minimize disagreements on crisis dates is the more stable price environment and the absence of policy devices such as crawling pegs, which make it harder to separate currency crashes from non-crisis-related discrete exchange rate adjustments in response to high inflation bouts.

Table 1.[20] As in Frankel and Rose (1996) and many others, the dependent variable is set to one in the first year of a crisis episode and zero otherwise; the observations pertaining to the period during which the crisis is ongoing (i.e. as the exchange continues to slide) are dropped since they are part of the same crisis already counted once. Specifics on measurement and data sources are provided in Appendix II.

The first column of Table 2 shows the estimates for the baseline model. All variables yield the sign predicted by theory and most of them are statistically significant at 1 percent. The exceptions are the terms-of-trade gap (i.e., deviations of actual TOT from a log-linear trend),[21] output growth [$\Delta \ln(Yreal)$] and the interest rate differential (i-i*). While the coefficient on output growth yields the correct sign, the interest rate differential indicator (which enters the regression with a one-year lag to mitigate endogeneity) actually yields the opposite sign as that predicted by the model—not an uncommon result in many empirical estimates of the uncovered interest parity condition (cf. Frankel and Rose, 1995). Overall, the coefficients show M2 growth to be a main determinant of currency crashes, with a 1 percentage point increase in the former increasing the likelihood of the later by 3.4 percentage points. The other main drivers of currency risk are the ratio of government expenditure to revenues measured relative to its log-linear trend ("g/t gap") and changes in the supply of foreign capital ("World K flows") net of changes in the reserve to currency ratio ("res/Mo"). The relative productivity differential is an additional significant predictor with the expected negative sign, though the estimated elasticity is a lot lower. Overall, the model fits the data reasonably well: a pseudo R-squared of about 0.5 is high relative to that found in similar studies and, more importantly, the model correctly predicts some 98 percent of events once a cutting-off point for refinancing a crash is that of a predicted likelihood greater than 50 percent. Employing a lower cut-off point of 20 percent reduces the prediction rate slightly, but even then the model correctly predicts 11 of the 18 crash events in the sample.

The two ensuing columns in Table 2 fine tune the previous results by dropping the TOT (which had been statistically insignificant throughout), and replacing the interest rate differential variable by the foreign interest rate, i*, which is proxied by the Bank of England discount rate—the closest proxy to a short-run "risk-free" rate during the period. Consistent with the prima facie evidence presented in Section II, higher foreign interest rates in the year prior to the currency crash have a positive and significant impact on the crash at 10 percent. This corroborates the finding that monetary tightening in the core countries is a significant driver of currency pressures in capital-importing countries. As also expected given the evidence presented in Section II, the inclusion of i* lowers the estimated coefficients on both

---

[20] Due to lack of data on relevant covariates for Russia in the 1870s, the effective number of crisis events is reduced to 18 in the probit estimation.

[21] Throughout this paper, detrending is made on a linear or log-linear time trend given evidence of trend stationarity from augmented Dickey-Fuller tests. These are available from the author upon request.

the capital flow and reserve variables. This is consistent with the results of Eichengreen (1992) who, using Granger-causality tests in a VAR model of the U.K. economy, finds that changes in the Bank of England discount rate Granger-caused capital exports. To the extent that the two other core European central banks in France and Germany tended to follow the Bank of England's lead around cyclical turning points—as illustrated in the bottom panel of Figure 4 and also noted in Lindert (1969)—the effect of hikes in the U.K. discount rate on net capital importing countries was thereby reinforced.

Finally, columns (5) to (8) check the robustness of the foregoing regressions to the inclusion of three other potentially important variables. One is the ratio of external public debt to exports—a usual yardstick of country solvency in the sovereign debt literature. The respective estimate is statistically insignificant and has the opposite sign as that postulated by theory. A similar finding obtains for the ratio of total public debt to GDP (column 6). The following column reports results for the inclusion of the ratio of external to total public debt—an indicator of the extent of currency mismatches in countries' balance sheets which is commonly associated with the concept of "original sin," that is, a country's incapacity to issue debt denominated in its own currency. This idea, much popularized by Eichengreen and Hausmann (1999) and further elaborated in many subsequent contributions, suggests that the greater the mismatch, the higher the risk of sovereign defaults and currency crashes; therefore, one would expect the coefficient on this variable to be positively signed. Column (7) of Table 2 shows that while the respective point estimate is indeed positive it is small and not statistically different from zero. And so, there is no evidence that currency denomination of the country's debt is a significant determinant of currency risk. Finally, the last column of Table 2 gauges whether trade imbalances (defined as the log of export to import values) add any significant additional explanatory power to the regressions and help predict crash events. The estimates show that this does not seem the case, likely reflecting the fact that such imbalances are already captured by the other covariates in the model.

In short, the above econometric results indicate that fluctuations in international capital flows are significant determinants of currency risk. Accordingly, it is not surprising that SSs tend to be associated with currency crashes. Further, since SSs are often preceded by interest rate hikes in core countries, it thus appears that financial developments exogenous to net capital importing countries are at the root of currency crises. Yet, this econometric evidence also indicates that this is not the full story: since not all countries respond similarly to those external shocks, country-specific factors do matter—notably the growth of money supply, the cyclicality of fiscal balances, and variations in the international reserve coverage of the domestic money stock. Each of these factors is discussed in the next section.

IV. DOMESTIC FINANCIAL IMPERFECTIONS AND PROCYCLICAL BEHAVIOR

Two broad generalizations command wide consensus in the historical literature on the financial markets of countries that witnessed currency crashes before WWI.[22] One is that their financial markets were much shallower relative not only to the so-called European core (Britain, France, and Germany) but also relative to other "emerging" economies of the Anglo-Saxon world and Scandinavia. This can be unambiguously gauged by a broad range of financial development indicators such as the number of banks and bank capitalization per capita, or the ratios of broad money and domestic bank credit to GDP. In addition, banks in these economies were deemed to be poorly regulated and information about borrowers' credit history usually hard to obtain. While these imperfections were in some cases mitigated by stringent controls restricting entry (as in Brazil for instance), such regulations appear to have greatly hindered efficiency—a point stressed in Cameron's classic comparative study on early banking (Cameron, 1972). To these structural features, one added ingredient in those economies was the existence of multiple issuing banks and the lack of a national bank holding the monopoly of fiduciary money and soundly performing the role of lender of last resort.[23]

Some salient implications follow. First, shallower domestic bond markets and limited access to bank credit by firms imply that borrowers were typically credit constrained; hence, any outward shift in the external supply of funds would tend to automatically translate into faster credit growth. Second, once information about the creditworthiness is hard to obtain, lending becomes more responsive to current collateral values pledged against loans. As formalized by Kiyotaki and Moore (1997), this boosts the procyclically of bank lending. Third, illiquid domestic markets would make it harder for banks to borrow from the local private sector or sell to others the illiquid (but otherwise solvent) items in their portfolios during monetary crunches, exacerbating the risk of fire sales and bank runs in the wake of SSs and business cycle downturns. Finally, the decentralization of note-issuing rights combined with deficient regulations and governments that were dependent on banks to finance large deficits tended to exacerbate moral hazard and thus undermine the practice of backing outstanding bank notes with "safe" levels of specie holdings. This was likely to heighten the depressing effects of money creation on the exchange rate.

---

[22] See, for instance, della Paolera and Taylor (2001) on Argentina; Goldsmith (1986), Haber (1997), and Triner (2000) on Brazil; Llona Rodriguez (1990) on Chile; Fratianni and Spinelli (1997, ch. 3) on Italy.

[23] This seems to have been an important distinguishing feature of successful financial development in Northern Europe. On the less well-known but interesting experience of countries other than the European core and the United States, see the key role played by the Nationalbanken in Denmark, the Nederlandsche Bank in the Netherlands, and the Riksbank in Sweden which are discussed in Hansen (1991), Jonker (1997), and Jonung (1984), respectively.

Figure 7 shows that countries that experienced currency crashes were indeed the ones that embarked upon rapid monetary expansion that far exceeded domestic income during cyclical upswings. Argentina is the most notable case, with the ratio of M2 to GDP rising from 28 to 65 percent of GDP between 1880 and 1889, even though real GDP itself nearly tripled during the same period. The flip side of such a rapid monetary expansion was a sharp drop in the international reserve coverage of the domestic currency in the later stages of the boom which left banks highly vulnerable to a run when capital flows dried up in the run up to the "Baring's crisis" of 1890–91. Likewise in Brazil, where monetary expansion had been previously curbed by stringent regulations on bank entry, the sudden stop of 1890–91 was preceded by unprecedented monetary expansion resulting from the sudden lifting of controls on bank issuance (the "Encilhamento"), leading to a twofold increase in the ratio of broad money to GDP ratio between 1889 and 1891.

Data for other countries are likewise suggestive of the significant role of monetary expansion in brewing currency crashes during SSs. In Chile, Portugal, and to a less degree Spain, the elasticity of broad money to income rose well above unity in the two to three years prior to the 1890–92 crashes. This contrasts with the smoother behavior of money supply in other countries which either managed to stick to the peg or experienced a relatively mild depreciation, such as Italy and Russia in the early 1890s. Figure 8 corroborates the view that a high procyclicality of domestic bank credit, as proxied by the M2 multiplier, contributed to currency crashes:[24] as with the ratio of broad money to GDP, the money multiplier is noticeably more cyclical in crisis countries than in noncrisis ones.

The other distinguishing feature of countries in which SSs were followed by currency crashes pertains to fiscal behavior. Gauged by either the ratio of public expenditure to revenues or the ratio of public debt to GDP averaged by country over the entire period, it appears that fiscal behavior was generally more lax in currency-crash countries. The upper panel of Figure 9 shows that three of the countries that experienced the worst currency crashes in the pre–World War I era (Argentina, Chile, and Greece) were precisely the ones with the highest average ratios of public expenditures to revenues, whereas countries which managed to stick to gold throughout tended to display lower ratios. Clearly, there were exceptions such as Brazil (which experienced currency crises without strikingly high fiscal imbalances on average), and the association is certainly not one to one for all countries (Australia and New Zealand being two other obvious outliers). Overall, the ratio of expenditure to revenues in the currency-crash group was around 10 percent higher than that for the non-crash group. The lower panel of Figure 9 further reinforces this point: not only did six of the eight non-crash

---

[24] The focus on M2 rather than on domestic bank credit is motivated by two considerations. One is that theoretical models of nominal exchange rate determination (including the one outlined in Appendix I) commonly postulate a direct link between monetary expansion and the exchange rate. The other is the lack of data on domestic bank credit for several countries. An alternative indicator considered was to derive aggregate bank credit by the difference between broad money and international reserves of the consolidated banking system using available data on the two variables. This yields a very similar pattern to that of M2.

countries lie at the bottom of the debt-to-GDP distribution over the entire period, but also the average ratio of debt to GDP was twice as high among crash countries (85 percent) than among non-crash ones (38 percent).

No less importantly, such period averages obscure the fact that fiscal behavior was more procyclical in currency-crash countries. While there are different metrics to gauge the degree of fiscal procyclicality across countries (see, e.g., Bayoumi and Eichengreen, 1995; Gavin and Perotti, 1997), one measure that mitigates endogeneity issues is that of regressing the cyclical component of real government expenditure on the cyclical component of real GDP and/or foreign capital inflows. As discussed in Kaminsky, Reinhart, and Végh (2004), this is because tax revenues are themselves a direct function of the real GDP cycle—a relationship that is bound to be strong among emerging markets, where tax bases are highly procyclical. This is especially the case during the period under consideration, import and consumption taxes accounted for over 80 to 90 percent of tax revenues in most countries comprising our sample (see Bordo and Cortes-Conde, 2003).

The first column of Table 3 reports the estimated coefficients of a regression of the cyclical component of real government expenditure (as before measured as deviations from a log / linear trend) on the cyclical components of real GDP (also defined as deviations from a log / linear trend). While such a regression potentially suffers from well-known biases associated with the use of generated regressors (a downward bias) as well as the potential omission of other explanatory variables (a bias which can go in either direction), it is still valuable for the task at hand which is to highlight cross-country differences in fiscal reactions to the business cycle. The bivariate regression estimates in the first column of Table 3 suggest that fiscal policy was highly procyclical in the countries that experienced the worst currency crashes during the period (Argentina, Brazil, Chile, Greece, and Portugal). While there is evidence that the fiscal stance was also procyclical in three other countries that stuck to gold throughout (Australia, Canada, and New Zealand), averages over "crash" and "non-crash" groups indicate that the former was about twice as procyclical than the latter (0.98 versus 0.51). A similar inference about the higher fiscal procyclicality of the first group of countries also follows when using the one-year-lagged instead of current real GDP cycle, as reported in the second column of Table 3.

In assessing the procyclicality of fiscal policies during this period of free capital mobility, it is also of interest to gauge the extent to which real government expenditure responded to the international cycle in capital flows. More procyclical policy stances should be also associated with a higher elasticity of spending to the supply of external finance. As before, I proxy the latter as the total net capital outflows from the three main capital exports of the late 19th century (Britain, France, and Germany), all denominated in sterling (or gold) and measured in terms of deviations from a log-linear trend. The results are reported in columns (3) and (4) in Table 3. Regardless of whether one uses current or one-year-lagged values of the explanatory variable, the group averages reported at the bottom of the table suggest that crash countries tended to display a more responsive fiscal behavior to the "push" of international capital flows. While the estimated coefficients are not as large nor as statistically significant

as before, these regressions again suggest that currency-crash countries tended to be more procyclical overall.

Such procyclicality tended to heighten currency risk by inducing looming fiscal imbalances during cyclical upswings. This can be seen from Figure 10, which contrasts the fiscal behavior (again measured in terms of the ratio of public expenditure to revenues) between currency crash events and non-crash ones. Noting that t=0 corresponds to the year immediately before the downturn in capital inflows, it is apparent that fiscal imbalances rose and were much larger on average in the subset of countries in which SSs were accompanied by currency crashes. Likewise, the during- and post-shock contrast is no less striking: while the fiscal stance appears to be notably contractionary and hence procyclical among crash countries, non-crash countries engaged in a mild expansionary—and hence counter—cyclical—fiscal behavior. By imparting a further impulse to absorption during cyclical upswings, fiscal procyclicality tends to exacerbate imbalances which in turn call for a real exchange rate depreciation and/or a sufficiently large drop in absorption. Given the more limited reserve coverage of the monetary base in those countries (see below) as well as the presence of nontrivial nominal rigidities even in that earlier period (as discussed in Catão and Solomou, 2005), the nominal exchange rate would emerge as a natural candidate to shoulder the burden of the adjustment. One would thus expect this fiscal expenditure to revenue imbalance ("g/t gap") to be a significant predictor of currency crashes, and this is precisely what the probit results of Table 2.

Finally, there is the channel related to the coverage of paper money in circulation (Mo) with hard currency reserves (mostly gold at the time). The bottom panel of Figure 10 indicates that, on average, non-crash countries entered the capital inflow cycle with twice as high reserve coverage than their crash-prone counterparts. While the standard error bands are strikingly large for non-crash countries (reflecting the ratios of bank gold reserves to paper money above 200 percent in the large gold-producing economies of Australia and New Zealand), median comparisons which play down such outliers tell a similar story (25 percent versus 56 percent in the year just before the SS). The non-crash countries clearly counted on a much larger reserve cushion against the capital account outflow. In addition, the behavior of the reserve coverage ratio during SS events in the non-crash countries suggests that their respective monetary authorities appear to have played more closely by the so-called rules of the game: absolute reserve losses were accompanied by a roughly concomitant drop in currency in circulation, so that the reserve coverage ratio of Mo remained about stable on average. By contrast, countries with initially lower reserve coverages, and which also missed the opportunity of the boom in capital inflows to prop up their coverage ratios, saw the latter drop by nearly one-half (from 38 to 17 percent) between the year preceding the capital inflow peak (t=-1) and the second year after the SS (t=3). To the extent that reserve accumulation is inversely related to fiscal and domestic credit expansion as in first - generation currency - crisis models à la Krugman (1979), the procyclicality of the domestic fiscal and monetary stances shows up again as a key culprit.

V. CONCLUSION

As with the post–Bretton Woods era, international capital flows in the pre–World War I world were anything but smooth. This paper has shown that all net capital - importing countries—for which the relevant annual data exist—experienced sporadic but often large and abrupt reversals in foreign capital inflows during 1870–1913. These "sudden stops" hit countries with widely disparate per capita GDPs, levels of financial development, and exchange rate regimes, as well as countries with low and high gold reserve coverages of their domestic currencies. This suggests that none of these factors can prevent a capital importer from being hit by a large capital account reversal—even though deeper financial markets, exchange rate flexibility, and high levels of precautionary reserves should help mitigate the associated side-effects on economic activity, as the recent literature on SSs indicates (Calvo, Izquierdo and Mejía, 2004; Edwards, 2004).

The data set assembled in this paper also allows us to highlight other striking parallels between SSs now and SSs then. One is the large magnitude of drops in net foreign capital inflows during these episodes, averaging about 5 percent of GDP (measured peak-to-trough) over the various cross-country episodes. The other is the relatively lengthy period it takes for capital inflows to fully recover (four years on average). A third similarity is the time bunching of such events. We have seen above that sudden stops bunched around the early to mid 1870s, the early 1890s, and 1906–07. As is well-known from the late 19th century and early 20th century economic historiography, all these sub periods were characterized by financial crises and a higher incidence of sovereign defaults (Kindleberger, 1978; Lindert and Morton, 1988; Kelly, 1998; Eichengreen, 2003). While in principle these SSs could have been triggered by country-specific factors in capital importers (such as the U.S. railway bankruptcies of 1873 or Argentina's mortgage bond repayment crisis of early 1890) which then irradiated to other "emerging markets" possibly via mechanisms highlighted in the international financial contagion literature (Eichengreen, Rose, and Wyplosz, 1996), the evidence provided in this paper points to one common factor in all these events—preceding hikes in central bank discount rates in the core capital exporting countries, typically with a one- to two-year lag. Once again, this has striking parallels with the post-1970 evidence, in that changes in U.S. interest rates appear to be a main driver of capital flows to developing countries (Calvo, Leiderman, and Reinhart, 1993; Fernandez-Arias, 1996) and of shifts in overall emerging market risk (Catão and Kapur, 2006). This obviously does not imply that domestic or regional factors (including wars and other political conflicts) have been unimportant during the period in some countries, but simply that monetary tightening in the core countries of the world economy played a significant role, sometimes reinforcing those country-specific effects.

Against this background, a main question addressed in this paper is why such SSs led to currency crashes in some countries but not in others. Consistent with the evidence just discussed, the probit regression results of Section III indicate that SSs in capital exports from core countries to the rest of the world, together with lagged international interest rates, did raise the likelihood of a currency crises generally, all else constant. But the same regressions also show that country - specific factors related to money growth, reserve coverage of domestic currency, and fiscal imbalances played a no less significant role. Countries where

money growth was both highly responsive to cyclical conditions and grew well in excess of aggregate income and international reserves during upswings were the ones in which the worst currency crashes followed. Unsurprisingly, these are countries for which, historical literature finds the strongest evidence of prevalence of loose regulations on banks of issues, institutional obstacles to loan recovery, and high credit elasticity to cyclically sensitive collateral values. Conversely, economies with seemingly better-regulated banks and deeper financial markets typically had a smoother broad money multiplier and also managed to maintain a consistently higher backing of domestic bank liabilities or paper money with international (gold) reserves; they were the ones that managed to overcome the SS shock while sticking to their currency pegs. This evidence brings back to fore Whale's (1937) and Ford's (1962) earlier views—grounded on a much slimmer data set and limited econometric apparatus—on the importance of the domestic financial imperfections in propagating capital account shocks and accounting for cross-country differences in macroeconomic adjustment during the classic gold standard era.

Similar considerations apply to the role of fiscal policy in affecting currency risk. Countries where fiscal deficits were higher on average and real government spending more procyclical typically witnessed a juxtaposition of SSs and currency collapses. The channels through which fiscal imbalances affect the exchange rate are well-known from the currency - crisis literature and, as discussed above, the above probit results are broadly consistent with the prediction of first-generation currency - crisis models (Krugman, 1979) about the role of fiscal deficits in currency crashes: countries where government expenditure typically grew significantly faster than the tax base during upswings experienced reserve losses and large real exchange rate appreciations that called for sharp correction when capital inflow suddenly dried up. As discussed in Catão and Solomou (2005), non-negligible nominal rigidities combined with limits to the necessary decline in absorption and a low elasticity of capital flows to domestic interest rates implied that the nominal exchange rate would bear much of the burden of adjustment in these cases.

What implications or lessons can be drawn from this evidence? A first lesson is that history often repeats itself, and the documented patterns of SSs over the past two decades have some striking similarities with those in the past. Thus, they can be regarded as "stylized facts" about SSs more broadly, which indicate that high capital mobility need not automatically translate into stabilizing cross-border financial flows and greater consumption smoothing. Then, as now, individual countries' capacity to reap benefits and minimize the risk of capital mobility to degenerate into disruptive currency crashes and competitive devaluations rests most critically on fiscal and monetary management and the resilience of countries' domestic banking systems. Those in which the monetary transmission mechanism and fiscal policies are more procyclical—be it because of the kind of "voracity" effects discussed in Tornell and Lane (1998) or other political imperfections (Végh and Talvi, 2000) that discourage both public saving and reserve accumulation during "good times"—are more likely to face greater exchange rate instability and disruptive currency drops as a result.

Two other salient policy implications also should be briefly mentioned. Time bunching in SSs implies that country insurance type of contracts are likely to be more effective, if not only feasible, when drawn between net capital exporters and net capital importing countries,

since the latter tend to be badly hit about the same time thus limiting the scope for risk sharing among them. Last but not least, to the extent that SSs take place in the wake of monetary tightening in core advanced countries, this suggests that a high international reserve coverage of domestic monetary liabilities when world interest rates start creeping up is an important ingredient for minimizing the risk of abrupt and often contractionary currency drops. This underscores the importance of precautionary reserve accumulation at the earlier upswing stage of the international investment cycle.

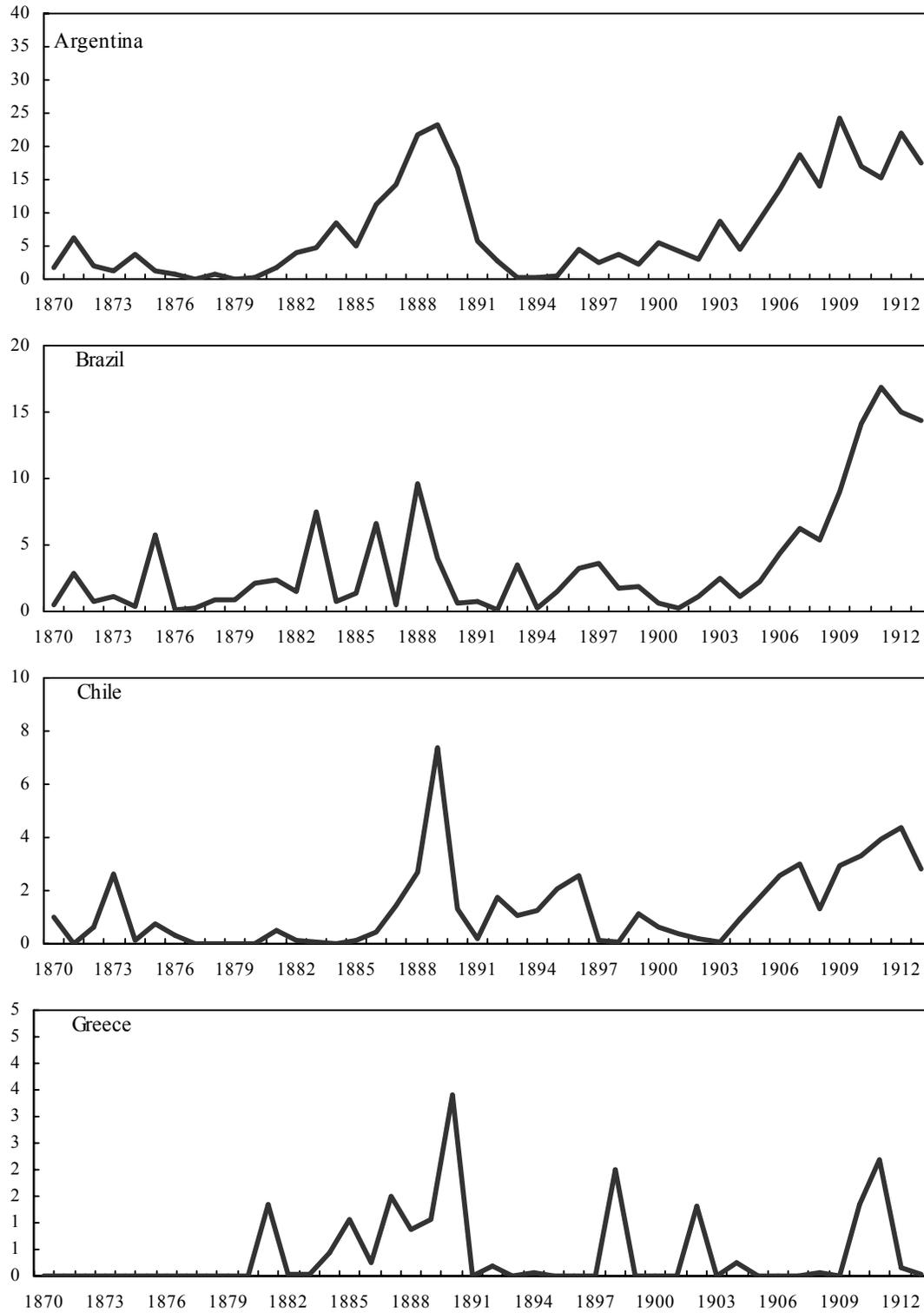**Figure 1. Net Foreign Capital Inflows**
(million pounds)

Latin America

Peripheral Europe
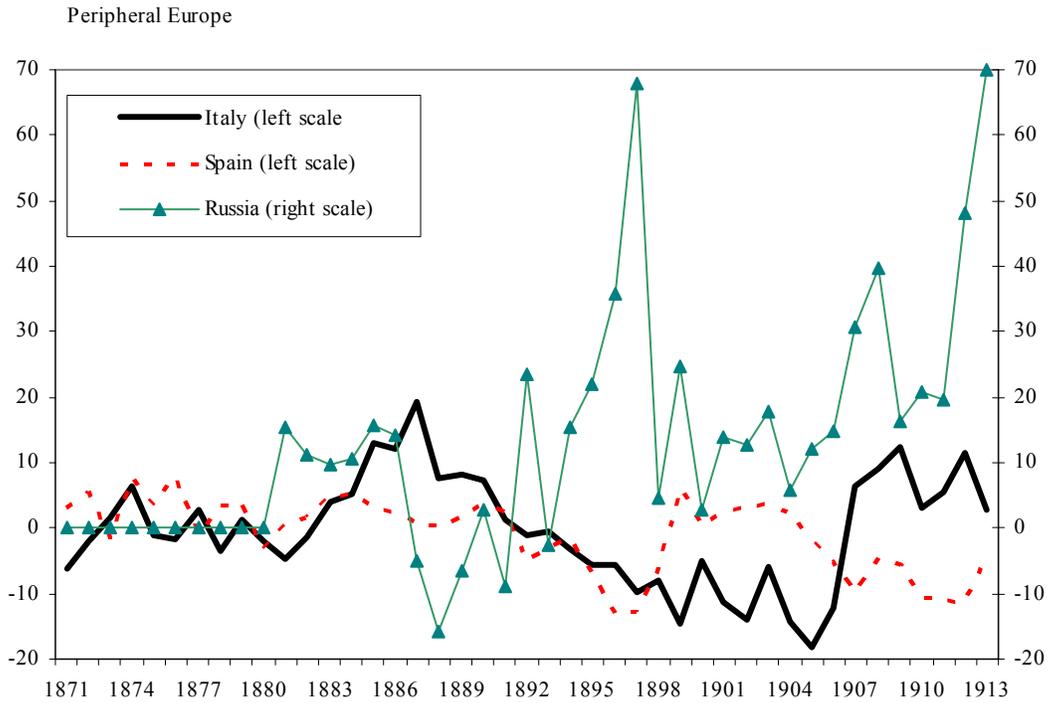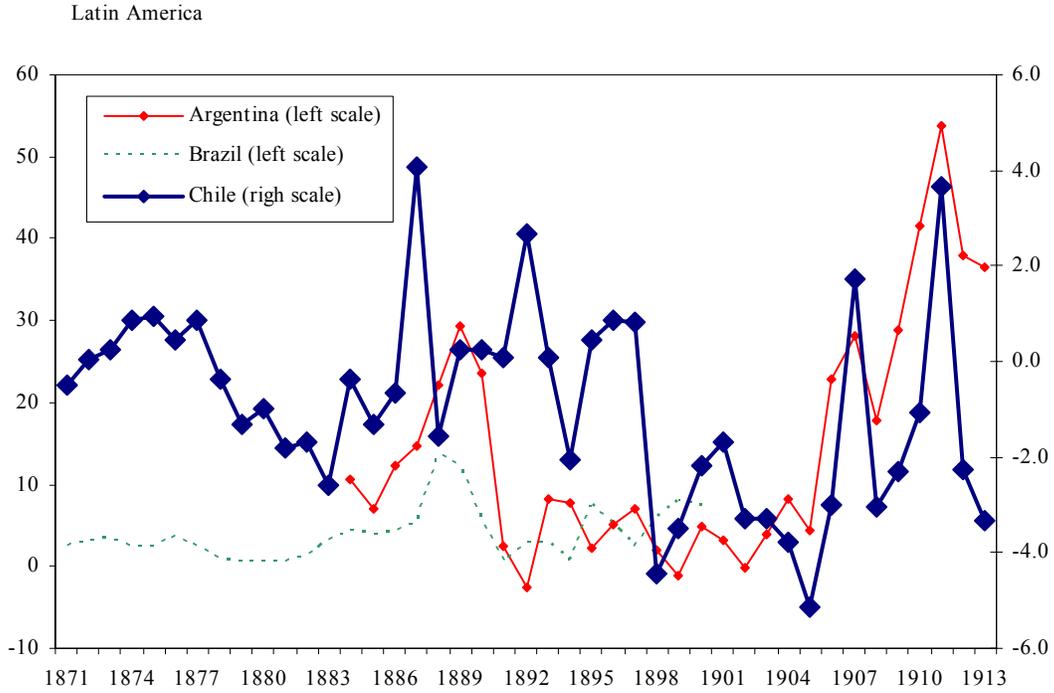
Source: See Appendix II.

Figure 1 (cont.). Net Foreign Capital Inflows
(million pounds)

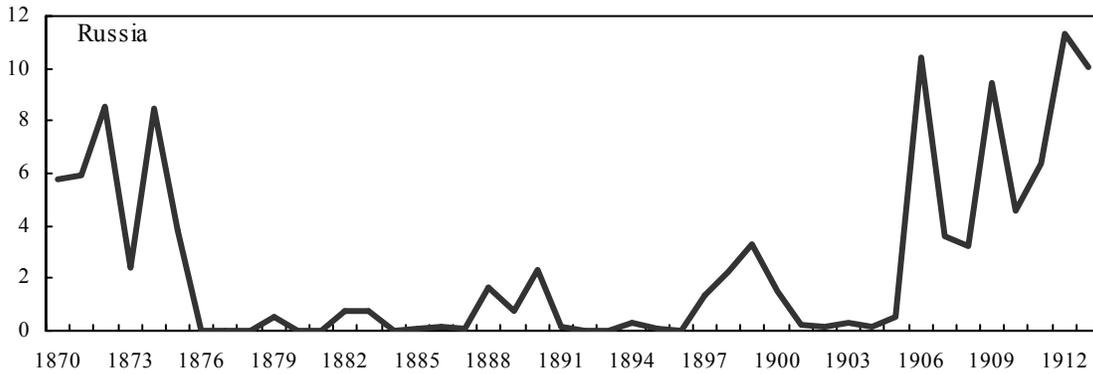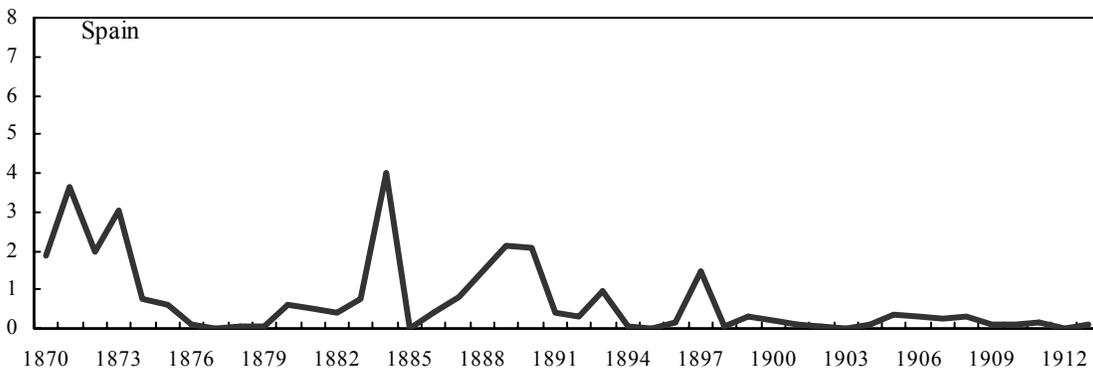North America and Australia

Scandinavia
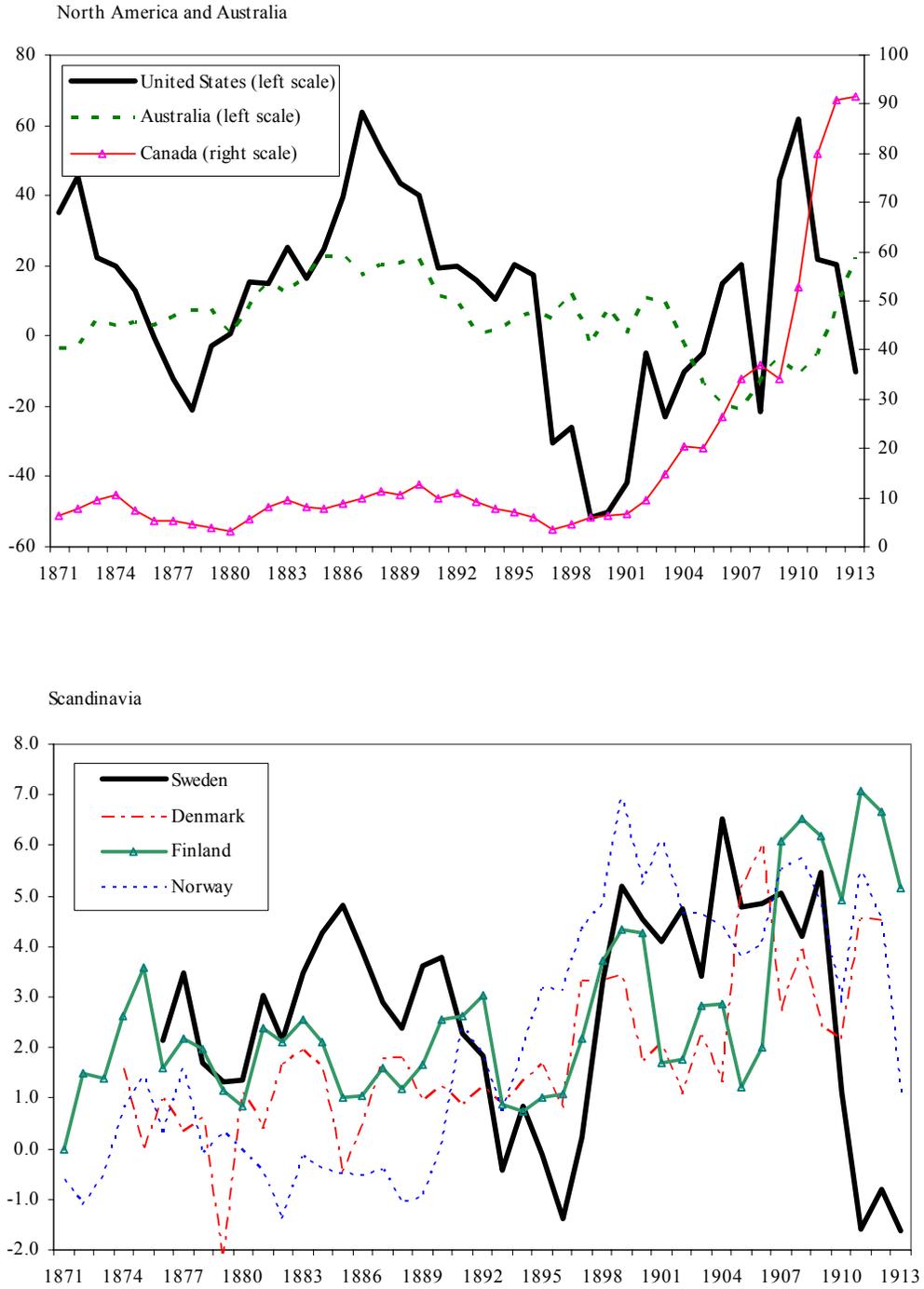
Source: See Appendix II.

Figure 2. Gross Portfolio Calls on London
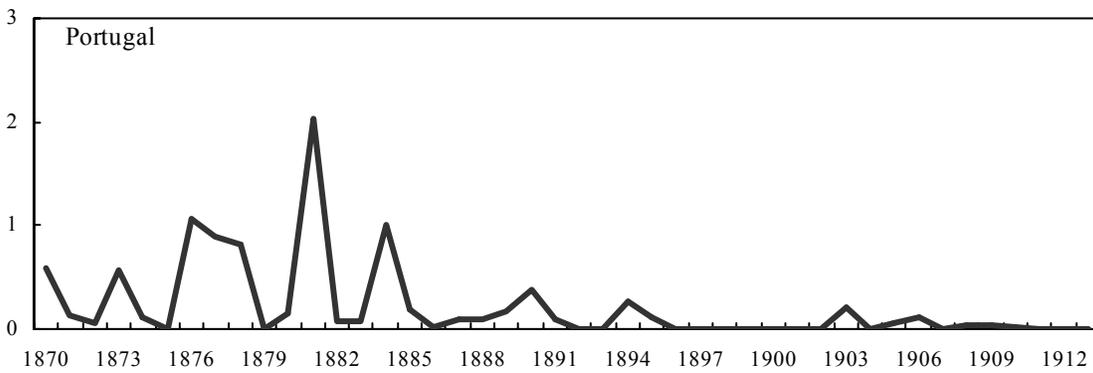(million pounds)

Source: Stone (1999).

Figure 2 (cont). Gross Portfolio Calls on London
(million pounds)
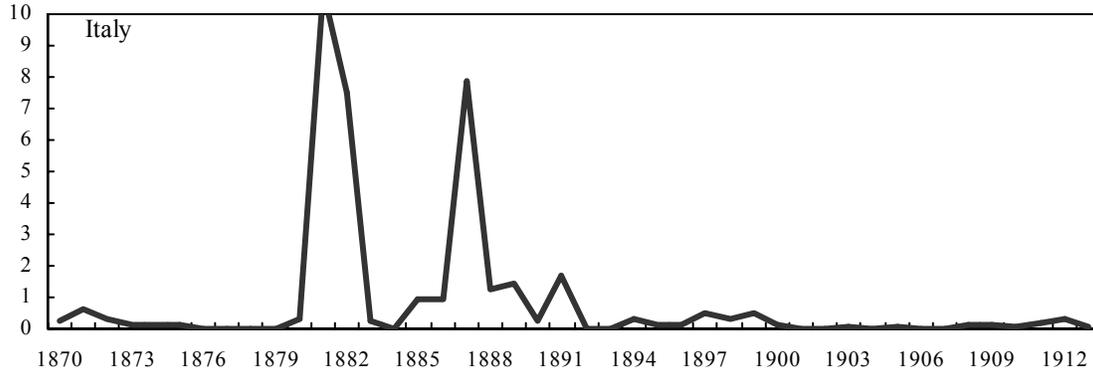
Source: Stone (1999).

Figure 2 (cont.) Gross Portfolio Calls on London
(million pounds)
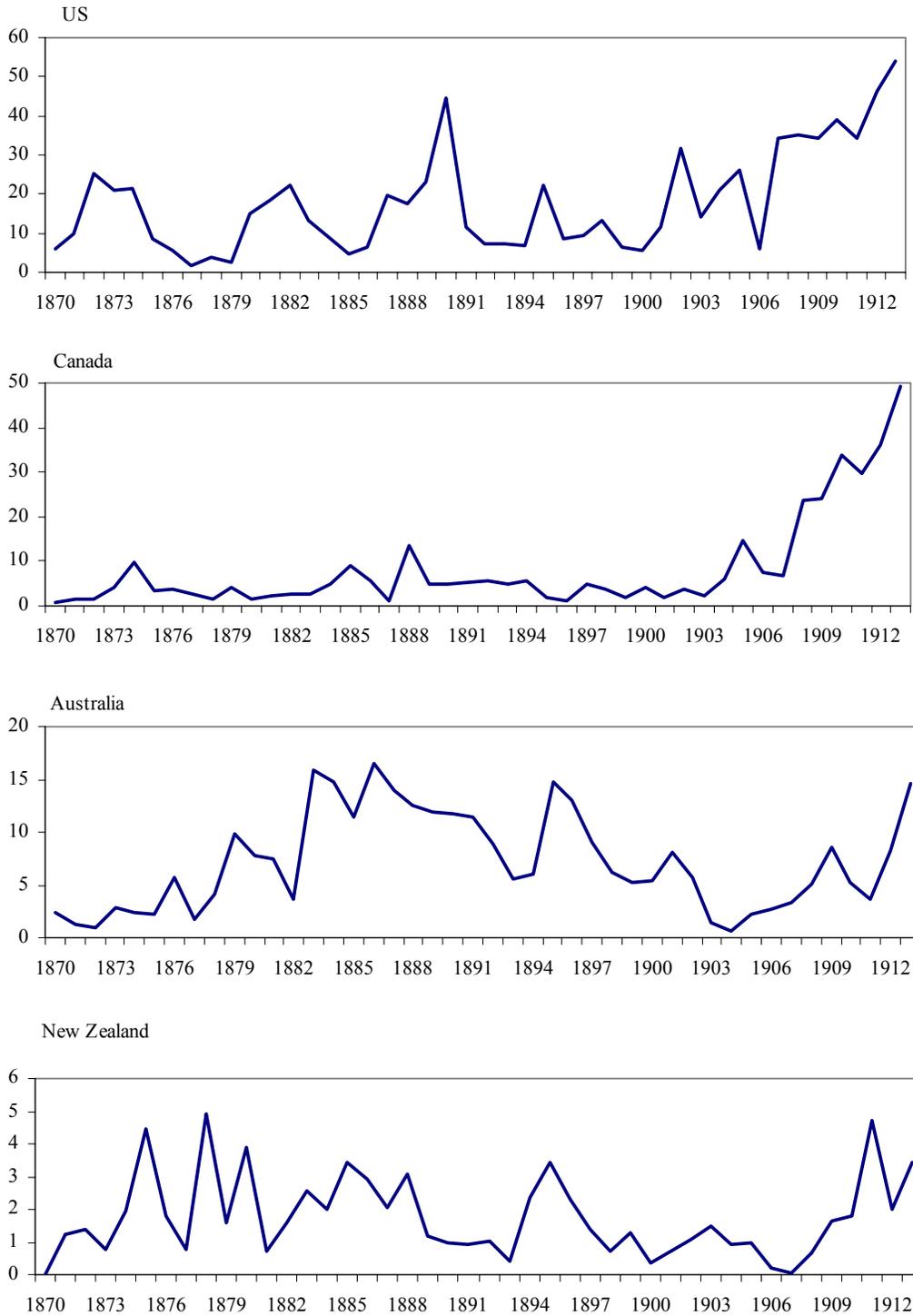
Source: Stone (1999).

Figure 3. Frequency Distribution of Sudden Stops

Net Capital Flow Measure

Gross Flow (London Portfolio Calls) Measure
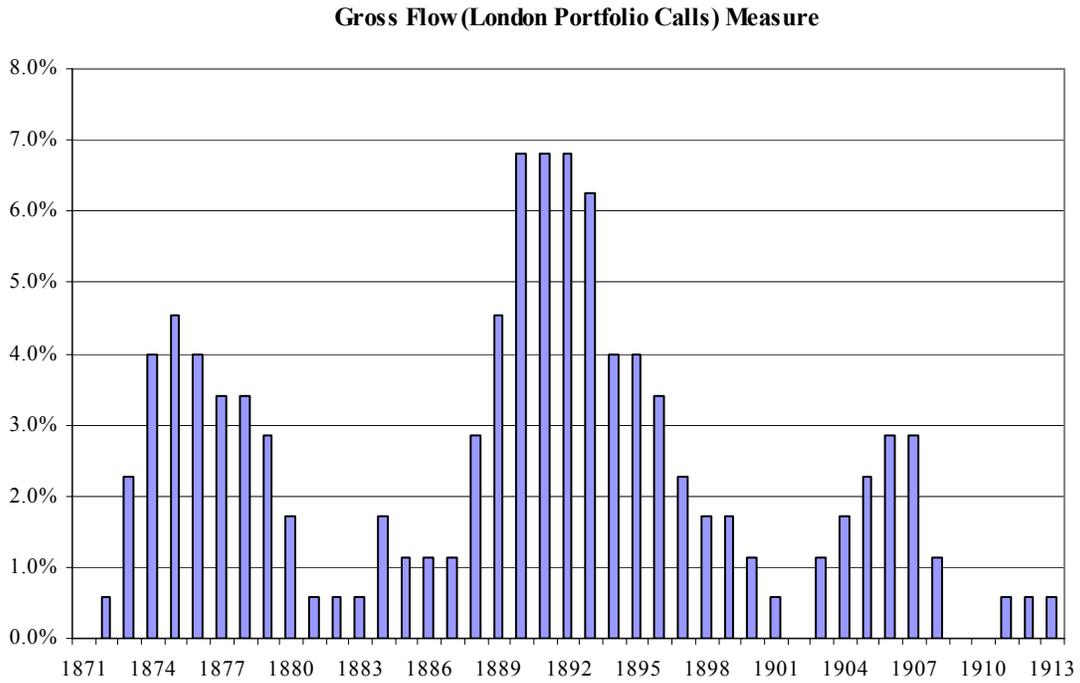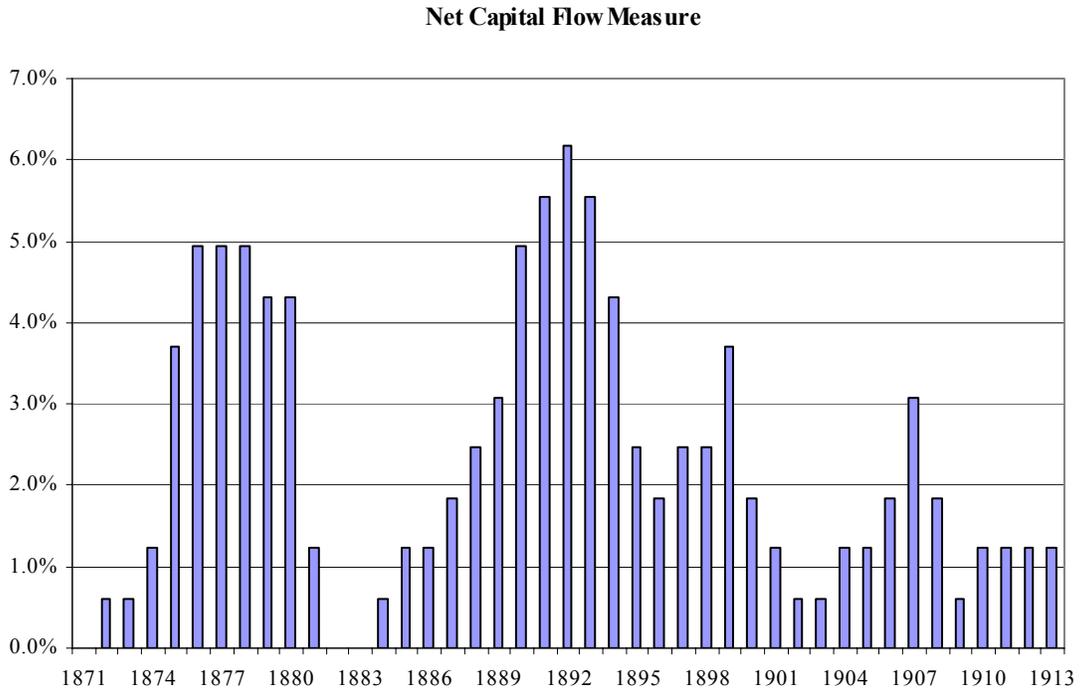
Source: See Appendix II.

Figure 4. Core Countries: Net Capital Exports and Interest Rates

Net Foreign Investment (million pounds)

Central Bank Discount Rates (percent)
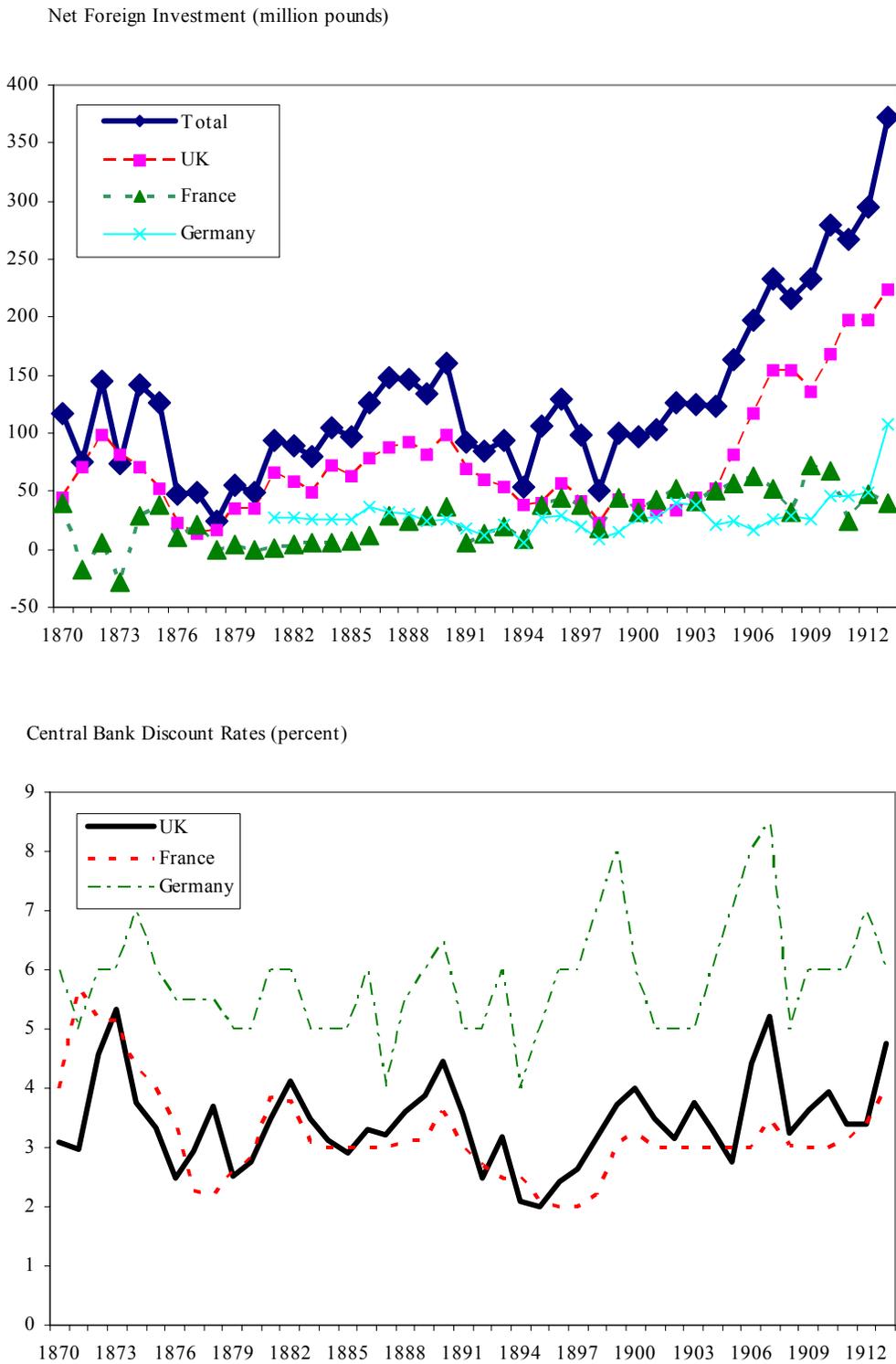
Source: See Appendix II.

Figure 5. Ratio of Net Capital Inflows to GDP
(percent)

Latin America

Europe

Source: See Appendix II.

Figure 5 (cont.) Ratio of Net Capital Inflows to GDP
(percent)

North America and Australia

Scandinavia
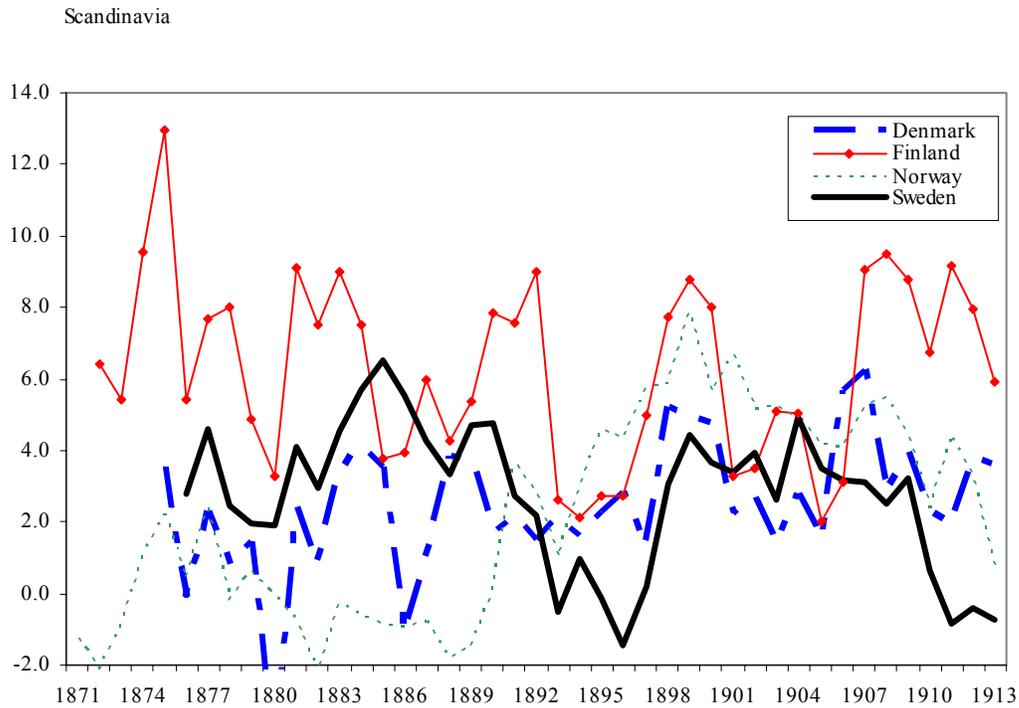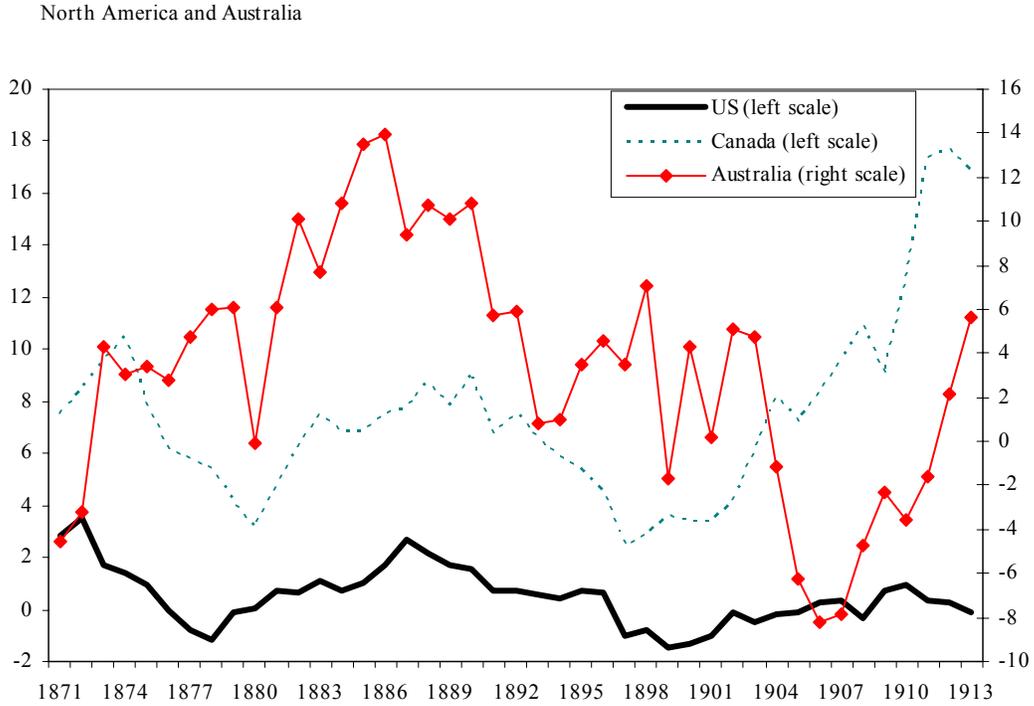
Source: See Appendix II.

Figure 6. Nominal Exchange Rates in Currency Crisis Countries
(pound sterling/domestic currency, 1900=100)

Latin America

Europe

Europe (cont.)
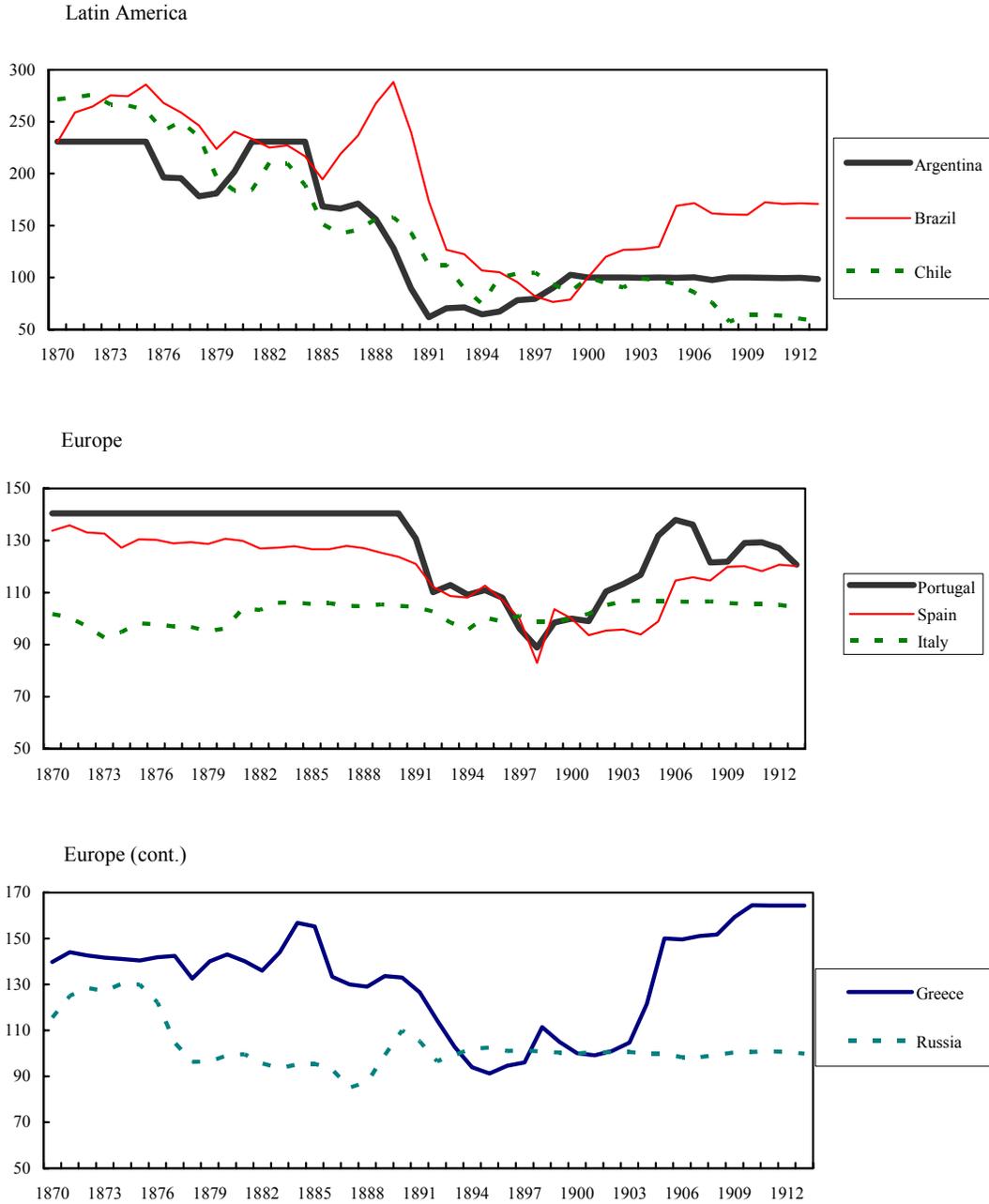
Figure 7. Monetary and Fiscal Indicators in Currency-Crash Countries
(currency crashes in shaded areas)

Argentina

Brazil

Chile

Greece
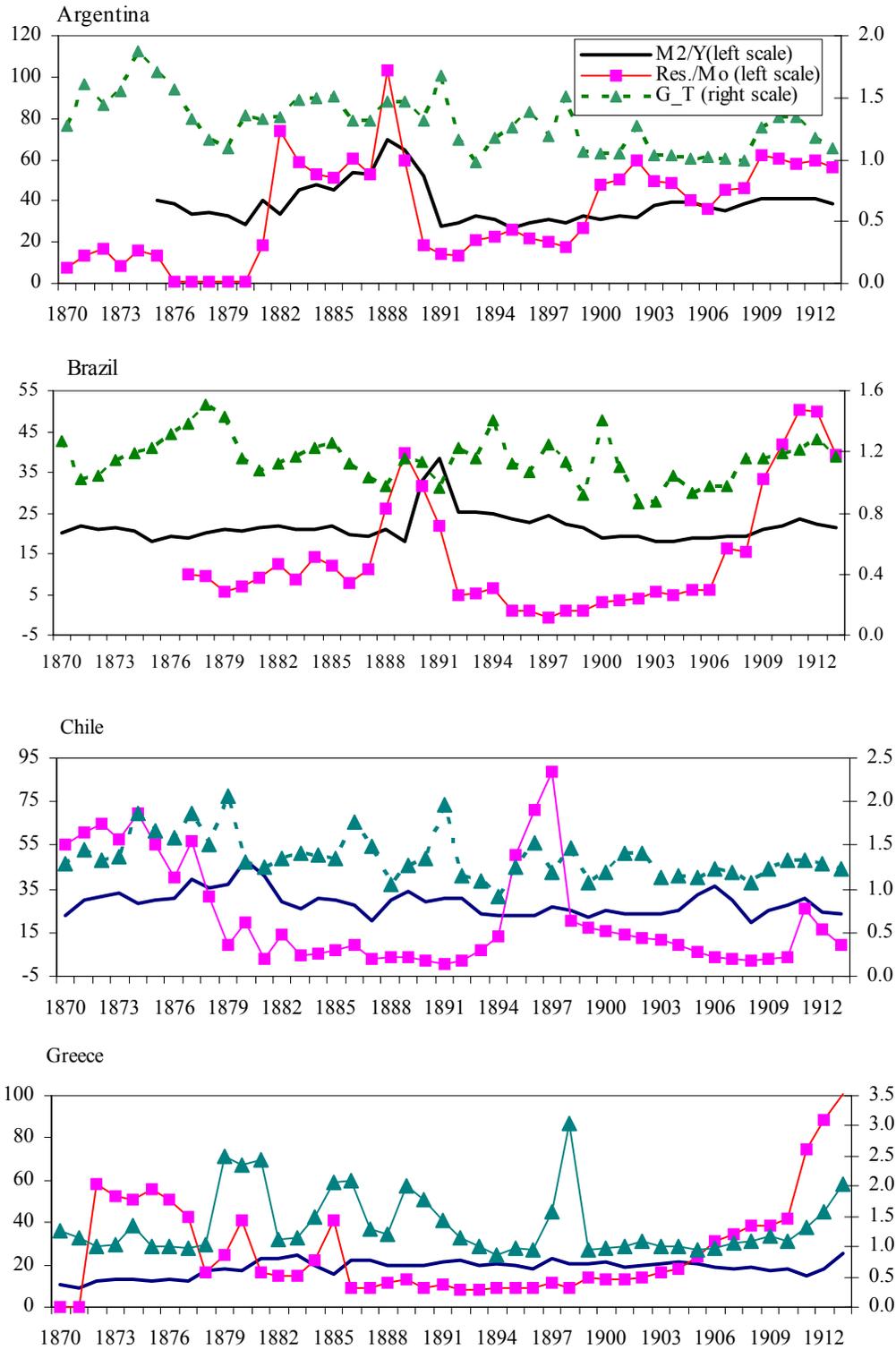
Source: See Appendix II.

Figure 7 (cont.). Monetary and Fiscal Indicators in Currency-Crisis Countries
(currency crashes in shaded area)

Italy

Portugal

Spain

Russia
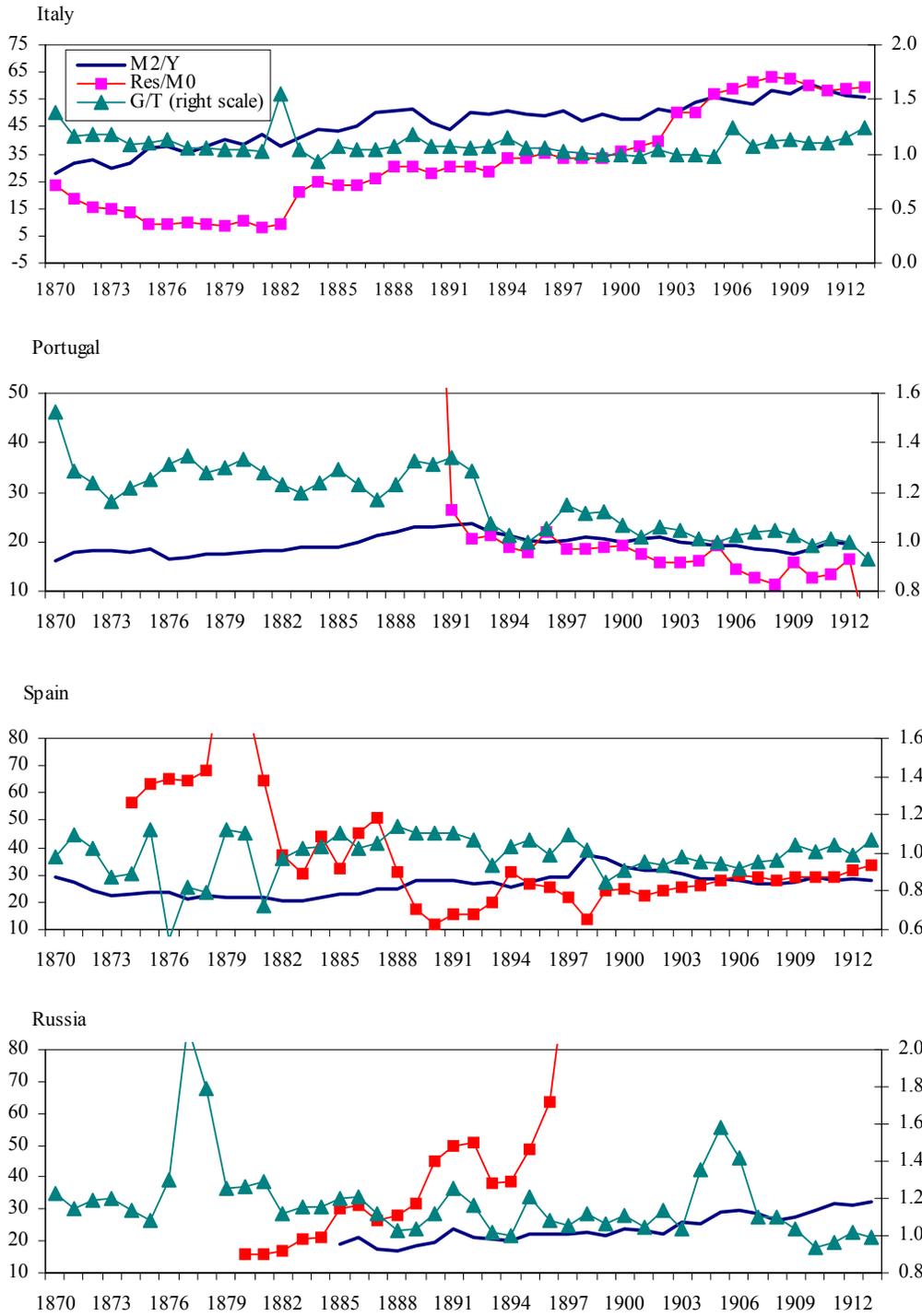
Source: See Appendix II.

Figure 8. The M2 Multiplier

Currency-Crisis Countries

Other Countries
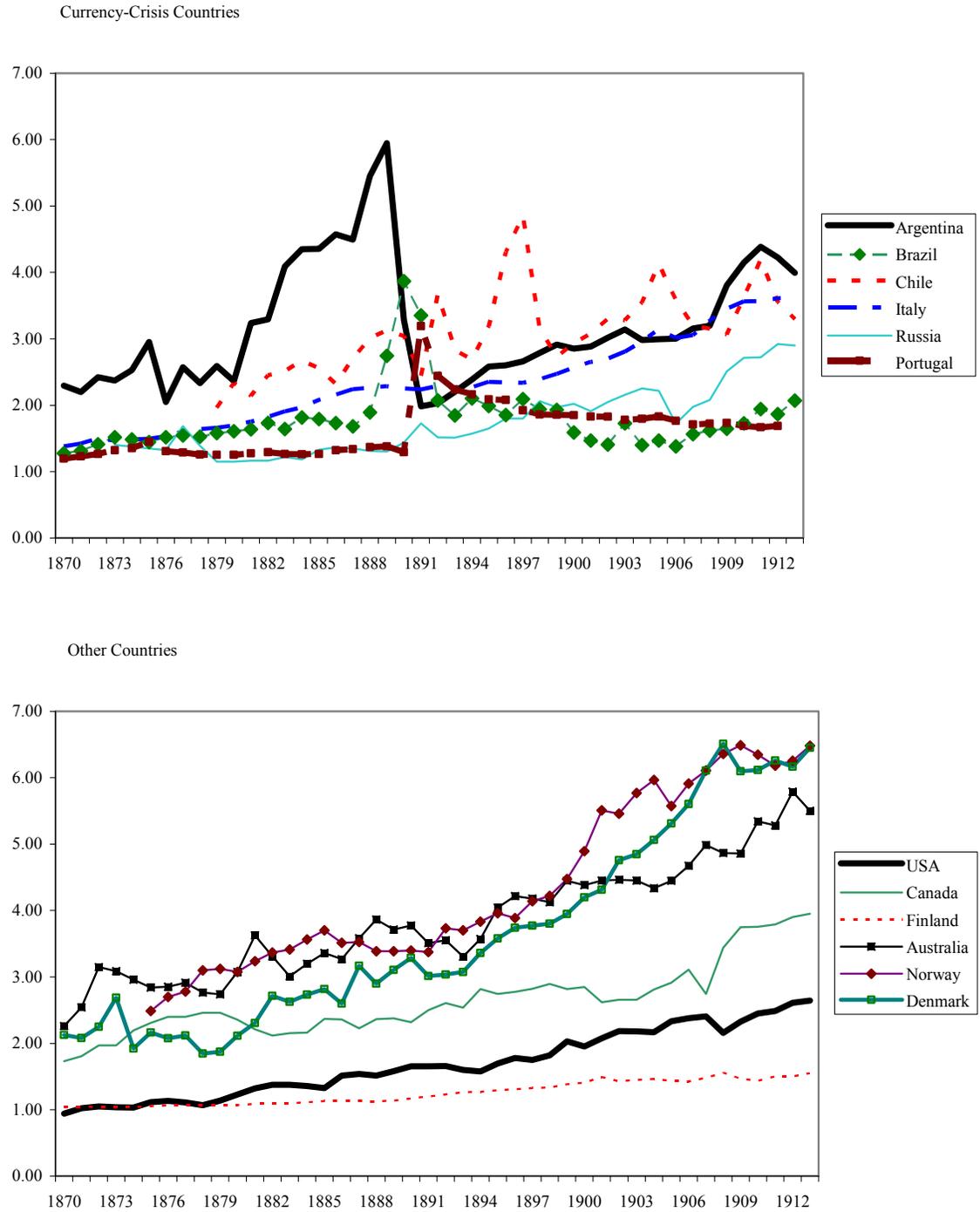
Sources: See Appendix II.

Figure 9. Fiscal Indicators: Country Averages over 1870-1913

Government Expenditure-to-Revenue Ratios

Public Debt to GDP Ratios
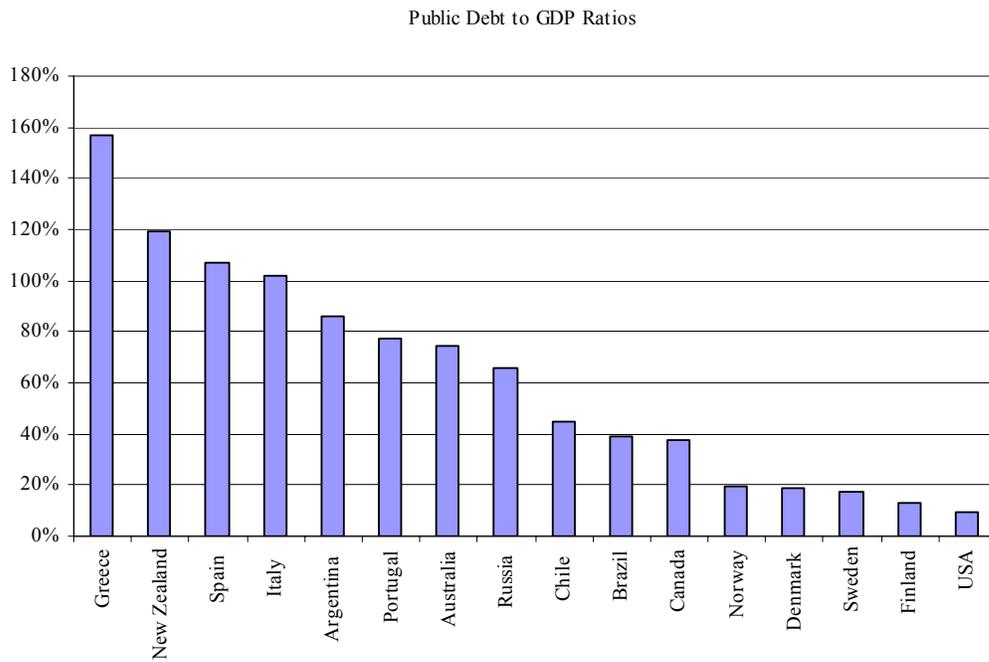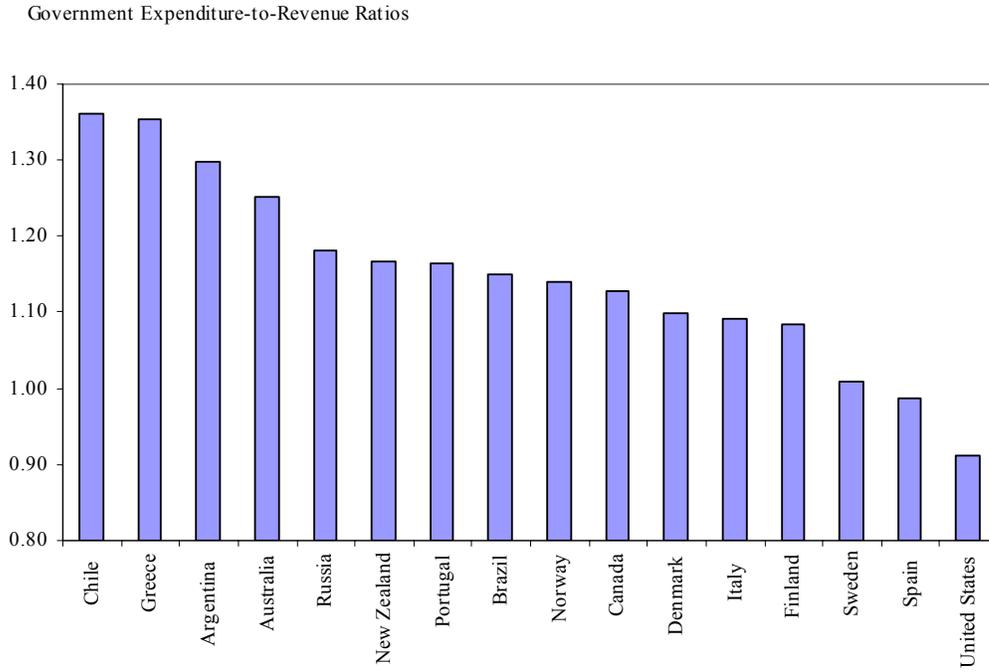
Sources: See Appendix II.

Figure 10. Fiscal and Reserve Positions around Sudden Stops

I. Sudden Stops cum Currency Crashes:
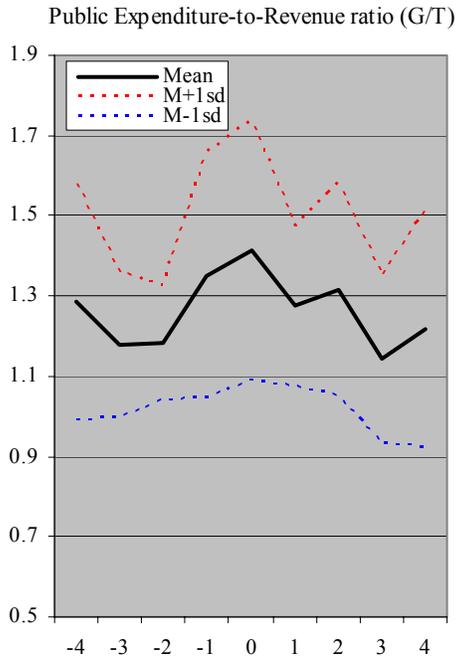
II. Sudden Stops without Currency Crashes:

Public Expenditure-to-Revenue ratio (G/T)

Public Expenditure-to-Revenue ratio (G/T)
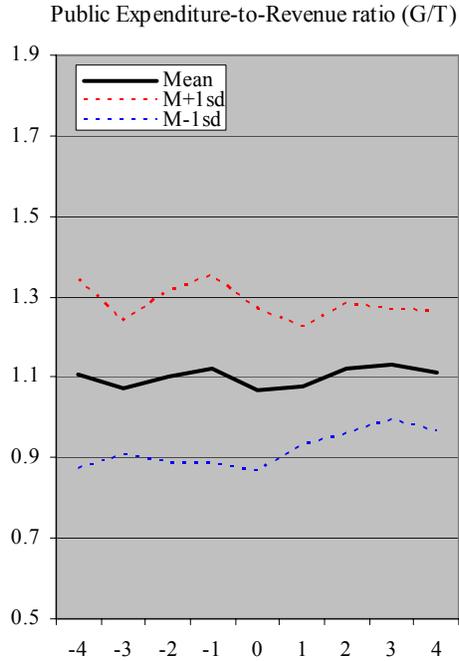
International Reserves-to-Mo ratio (%)
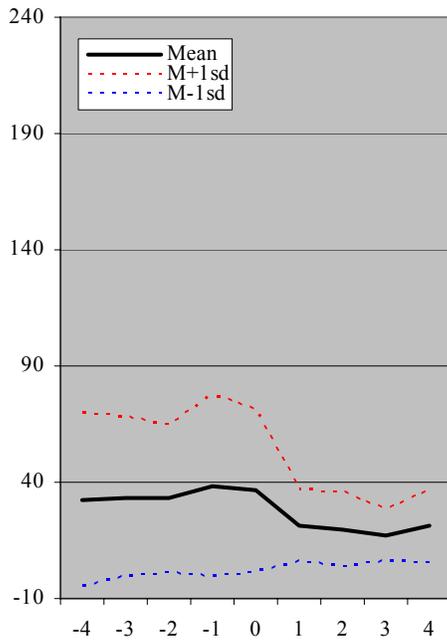
International Reserves-to-Mo ratio (%)
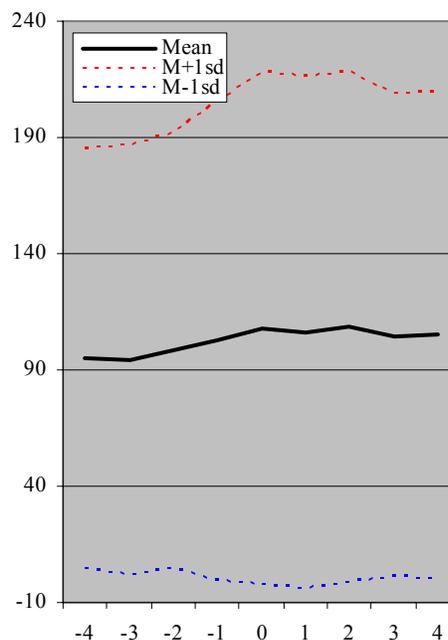
Sources: See Appendix II.

Table 1. The Chronology of Sudden Stops and Currency Drops

	Sudden Stops		Currency Drops
	NKF definition	GKF definition	
Argentina	---	1874-1879	1876-1878
	1889-1895	1889-1895	1885-1886
			1889-1891
Brazil	1876-1880	1875-1879	1876-1880
	1888-1894	1888-1894	1890-1898
Chile	1875-1881	1873-1880	1876-1880
	---	---	1885-1886
	1891-1893	1889-1893	1891-1894
	1897-1899	1896-1898	1898-1899
	1907-1908	1907-1908	1907-1908
Greece			---
	---	1890-1897	1886-1887
	---	1911-1913	1891-1895
Italy	1874-1881	1881-1884	---
	1887-1899	1887-1892	1892-1894
Portugal	---	1873-1875	---
	---	1878-1880	---
	---	1884-1886	---
	---	1890-1893	1891-1898
	---	---	1907-1908
Spain	1876-1880	1873-1877	---
	---	1884-1885	---
	1890-1896	1889-1895	1892-1894
	1904-1907	---	1897-1901
Russia	---	1874-1878	1876-1878
	1885-1888	1890-1992	1891-1892
	1897-1900	1899-1901	---
	---	1906-1908	---
Australia	1890-1894	1886-1893	None
	1898-1899	1895-1899	None
	1903-1907	---	None
Canada	1875-1880	1874-1880	None
	1890-1897	1888-1896	None
Denmark	1875-1880	---	None
	1884-1886	---	None
	1906-1908	---	None
Finland	1875-1880	---	None
	1883-1885	---	None
	1892-1894	---	None
	1899-1901	---	None
New Zealand	---	1888-1893	None
	---	1895-1900	None
	---	1903-1907	None
Norway	1899-1902	---	None
Sweden	1890-1893	---	None
	1909-1913	---	None
United States	1872-1878	1872-1877	None
	1887-1994	1890-1894	None
	1907-1908	1905-1906	None
	1910-1913	---	None

Table 2. Probit Estimates of the Determinants of Currency Crises								
(coefficients refer to marginal effects at mean, robust z-statistics in parentheses)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta\ln(M2)_t$	3.37	2.50	2.56	2.52	4.29	4.30	5.28	2.45
	(4.76)***	(5.10)***	(5.29)***	(5.83)***	(6.02)***	(6.32)***	(5.75)***	(7.27)***
$\Delta\ln(Yreal)_t$	-2.47	-1.45	-1.49					
	(-1.44)	(-1.12)	(-1.10)					
$TOTgap_{t-1}$	0.58	0.17						
	(0.13)	(0.31)						
$\ln(yreal/n)_{t-1}-\ln(yreal*/n*)_{t-1}$	-0.15	-0.11	-0.12	-0.12	-0.16	-0.15	-0.16	-0.10
	(-3.18)**	(-4.12)***	(-4.09)***	(-4.28)***	(-2.97)***	(-2.83)***	(-2.77)***	(-3.65)***
G/T gap$_{t-1}$	1.34	1.22	1.22	1.40	1.74	1.64	1.88	1.42
	(3.49)***	(4.03)***	(4.06)***	(4.19)***	(3.14)***	(3.93)***	(4.39)***	(5.13)***
$\Delta\ln(World\ K\ flows)_t$	-1.32	-1.00	-0.77	-1.05	-1.37	-1.3	-1.57	-1.02
	(-6.11)***	(-5.06)***	(-5.05)***	(-5.01)***	(-4.35)***	(-4.52)***	(-4.45)***	(-5.32)***
$\Delta(res/M0)_t$	-2.34	-1.34	1.13	-1.39	-1.94	-1.82	-2.17	-1.37
	(-4.73)***	(-4.25)***	(-4.97)***	(-6.74)***	(-5.24)***	(-4.93)***	(-5.16)***	(-6.86)***
$(i-i*)_{t-1}$	0.01							
	(1.55)							
$i*_{t-1}$		0.24	0.18	0.26	0.25	0.42	0.38	0.25
		(1.82)*	(1.71)*	(1.73)*	(1.49)	(1.59)	(1.69)*	(1.84)*
$\ln(Ext.Debt/X)_{t-1}$					-0.17			
					(-0.92)			
$\ln(Total\ Debt/Y)_{t-1}$						-0.08		
						(-0.42)		
$\ln(Ext.Debt/Total\ Debt)_{t-1}$							0.11	
							(0.27)	
$\ln(X/M)_{t-1}$								0.27
								(0.81)
Observations	471	559	559	559	468	497	467	559
Pseudo R^2	0.49	0.47	0.46	0.46	0.49	0.49	0.48	0.46
% correctly classified (p=0.5)	97.88	97.67	97.5	97.67	98.08	98.19	98.07	97.85
% correctly classified (p=0.2)	96.60	96.60	96.42	96.06	96.37	97.78	96.36	96.06

*significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. OLS Regression Measures of Fiscal Procyclicality (Dependent Variable: Real Government Expenditure Cycle)				
	(1) Output gap$_t$	(2) Output gap$_{t-1}$	(3) Kinflow gap$_t$	(4) Kinflow gap$_{t-1}$
Argentina	1.138 (4.46)***	1.127 (4.33)***	0.037 (0.60)	0.089 (1.15)
Brazil	0.943 (6.11)***	0.903 (5.28)***	0.157 (2.85)***	0.155 (2.69)***
Chile	1.938 (3.55)***	1.807 (3.21)***	0.323 (4.02)***	0.248 (2.76)***
Greece	2.284 (5.17)***	1.930 (3.97)***	0.050 (0.39)	-0.029 (-0.22)
Italy	-0.039 (-0.14)	-0.118 (-0.41)	0.057 (1.67)*	0.073 (2.08)**
Portugal	1.097 (9.49)***	1.090 (8.54)***	0.030 (0.82)	0.047 (1.26)
Spain	0.130 (0.62)	0.316 (1.54)	-0.018 (-0.71)	-0.018 (-0.69)
Russia	0.369 (0.98)	1.023 (3.06)***	-0.110 (-1.96)**	-0.110 (-1.89)*
Australia	1.249 (6.68)***	1.299 (7.30)***	-0.093 (-1.47)	-0.060 (-0.91)
Canada	1.026 (4.21)***	1.236 (5.30)**	0.177 '(2.72)*	0.169 (2.51)**
Denmark	0.669 (1.16)	0.933 (1.60)	0.044 (0.84)	0.113 (2.18)
Finland	0.235 (0.27)	0.227 (0.27)	0.054 '(0.59)***	0.039 (0.41)
New Zealand	1.571 (5.34)***	1.687 (6.60)***	0.052 (0.75)	-0.006 (-0.09)
Norway	0.005 (0.01)	1.035 (1.48)***	-0.241 (-5.63)***	-0.230 (-5.10)***
Sweden	-0.043 (-0.18)	0.098 (0.39)	0.040 (1.64)*	0.034 (1.33)
United States	-0.644 (-1.80)*	-0.853 (-2.54)**	-0.027 (-0.62)	-0.050 (-1.17)
Mean: Crash Countries	0.982	1.010	0.066	0.057
Mean: Non-Crash Countries	0.508	0.708	0.001	0.001

*significant at 10%;   ** significant at 5%;   *** significant at 1%

A Model of Nominal Exchange Rate Determination

This appendix briefly outlines the benchmark model of nominal exchange rate determination that guides the empirical analysis of currency crashes provided in the main text. The model assumes that prices are sticky in the short-run and that risk-adjusted uncovered interest parity (UIP) holds, so that the expected change in the log of spot exchange rate (Δe^e_{t+1}) responds to the nominal short-term interest rate differential between onshore (i_t) and offshore (i^*_t) asset markets adjusted by a time-varying country risk premium (δ_t):

$$\Delta e^e_{t+1} = i^*_t - i_t + \gamma \delta_t \tag{2}$$

where positive values for Δe_{t+1} denote an appreciation between t and t+1, and $0 < \gamma \le 1$.[25] Thus, when the country risk premium rises (or equivalently foreign finance supply drops), and in the absence of arbitrage failures, a fixed exchange ($\Delta e_{t+1} = 0$) can only be expected if the short-run domestic interest rate rises relative to the foreign rate. Otherwise, the exchange rate would "overshoot" at time t, depreciating beyond its long-run equilibrium (to be defined below); only in this case could the home country investor be compensated for the rise in country risk by an expected currency appreciation between t and t+1. By the same asset market equilibrium condition, the only way that a rise in the foreign interest rate would be compatible with a fixed exchange rate under unchanged domestic interest rates is if the country risk premium drops: only in this case would equilibrium be maintained without entailing an expected exchange rate change.

In the long run, the exchange rate has to converge to a level which is consistent with goods market equilibrium. As is standard in the literature, sticky prices imply that the adjustment process is expected to eliminate differences between actual and equilibrium exchange rate levels gradually:

$$\Delta e^e_{t+1} = -\theta(e_t - \overline{e}_t) + E(\Delta \overline{e})_t . \tag{3}$$

where $\overline{e}$ is the log of the long-run equilibrium nominal exchange rate, and θ characterizes the speed of adjustment, $0 < \theta < 1$. This implied adjustment dynamics can be shown to be consistent with rational expectations under sticky prices (Frankel, 1979).

Combining (2) and (3) yields:

$$e_t = \overline{e}_t + \frac{1}{\theta}[(i_t - i^*_t) - E(\Delta \overline{e}_t)] - \frac{\gamma}{\theta}\delta_t . \tag{4}$$

---

[25] The risk premium is thus being broadly defined to include bank failure or any confiscation risk that affects the representative asset holding.

Equation (4) postulates that at any given point in time the nominal exchange rate moves along its long-run equilibrium level, adjusted upwards (downwards) by any positive (negative) short-term interest rate differential between home and abroad, a decline (increase) in the country risk premium, and expected changes in the *equilibrium* nominal exchange rate.

The second pillar of the model hinges on what determines $\bar{e}$. In the long-run, PPP may not necessarily hold so that the equilibrium real exchange rate is possibly time-varying:

$$\bar{rer}_t = \bar{e}_t + \bar{p}_t^* - \bar{p}_t \tag{5}$$

where p and p^* are the domestic and foreign price indices, respectively. Using the foreign price as the numeraire and since long-run world price inflation under a gold standard should be negligible, it follows that:

$$\Delta \bar{rer}_t = \Delta \bar{e}_t + \Delta \bar{p}_t \tag{6}$$

Given long-run price flexibility, the standard log linear version of the Keynes-Hicks money market equilibrium condition allows us to map long-run domestic price inflation onto the behavior of money supply and output aggregates assuming a log-linear trend in secular velocity:

$$E(\bar{\pi})_t = \Delta \bar{m}_t - \phi \Delta \bar{y}_t + \vartheta, \tag{7}$$

where π is the inflation rate, y and m are the logs of the domestic real output and money stock, respectively; ϑ is the trend growth rate in money velocity and $\phi > 0$.

Substituting (5), (6), and (7) into (4) yields:

$$e_t - \bar{e}_t = \frac{1}{\theta}[i_t - i_t^* - \gamma \delta_t] + \frac{1}{\theta} E(\Delta \bar{rer}_t) - \frac{1}{\theta}(\Delta \bar{m}_t - \phi \Delta \bar{y}_t + \vartheta) \tag{8}$$

Equalizing long-run to actual values in money and output as is commonly done in empirical applications (see Frankel and Rose, 1995), and assuming that expected changes in the real exchange rate are directly proportional to preceding deviations of terms of trade, international productivity differentials, and fiscal positions from their respective long-run trends, this yields:

$$e_t - \bar{e}_t = \mu - \frac{1}{\theta}(\Delta m_t - \phi \Delta y_t) + \alpha(tot - \bar{tot})_{t-1} + \phi(\bar{y}_{pc} - \bar{y}_{pc}^*)_{t-1} - \eta(g/t - \bar{g/t})_{t-1} + \frac{1}{\theta}(i_t - i_t^*) - \gamma \delta_t + \varepsilon_t \tag{9}$$

where $\mu = -\vartheta/\theta$.

The final step is to characterize what determines the country risk premium δ. As in Jeanne and Rose (2002), this is modeled as proportional to the external inflow of liquidity. As

discussed in the main text, such an effect is bound to be directly related to the "push" of capital exports from the core advanced economies (Δb^*) net the degree to which domestic authorities or the banking system can offset changes in capital inflows with changes in the foreign exchange reserves to money ratio (Δres). This yields the benchmark equation that guides the empirical analysis in the main text:

$$e_t - \bar{e}_t = \mu - \frac{1}{\theta}(\Delta m_t - \phi \Delta y_t) + \alpha(tot - \overline{tot})_{t-1} + \phi(\bar{y}_{pc} - \bar{y}^*_{pc})_{t-1} - \eta(g/t - \overline{g/t})_{t-1} + \frac{1}{\theta}(i_t - i^*_t) + \upsilon(\Delta b^* + \psi \Delta res)_t + \varepsilon_t \qquad (10)$$

Data Construction and Sources

Argentina

Net Foreign Capital Inflow: Obtained by the difference of changes in specie reserves in domestic banks and the balance on the external current account provided in della Paolera and Taylor 2003, data appendix.

Foreign Trade and External Terms of Trade: see Catão and Solomou, Appendix 2 (2005).

Gold Reserves: 1870–1882: bank specie reserves from della Paolera (1988, 1992).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: della Paolera and Taylor (2003), op. cit.

Money: Money in circulation (M0) from della Paolera (1992). Broad money (M2) computed by splicing the Baiocco's 1870–1883 series with that computed by Gerardo della Paolera, both of which reported in della Paolera and Taylor (2003).

Exchange Rate: della Paolera and Taylor (2003).

Domestic Interest Rate: Average annual yields on domestic mortgage bonds provided in della Paolera (1988), op. cit.

Domestic Price Index: Catão and Solomou (2005).

GDP: della Paolera and Taylor (2003).

Population: Maddison (2003).

Brazil

Net Foreign Capital Inflow: Franco (1988).

Foreign Trade and External Terms of Trade: IBGE (1986).

Gold Reserves: 1870–1900 from Franco (1988); extended through 1913 based on linear interpolation between 1900 and 1905 and using data from Neuhaus (1975).

Central Government Expenditures and Revenues: IBGE (1986).

Central Government Debt: Foreign debt from IBGE (1986). Domestic debt obtained from Levy (1995).

Money: M0 and M2 both from IBGE (1986).

Exchange Rate: IBGE (1986).

Domestic Interest Rate: kindly provided by Bill Summerhill and Gail Triner based on primary data on domestic prices of 5 percent and 6 percent domestic perpetual bonds ("polices").

Domestic Price Index: see Catão and Solomou (2005).

GDP: Contador and Haddad (1975). 1900–1913 from Haddad (1978).

Population: Maddison (2003).

Chile

Net Foreign Capital Inflow: Derived by difference between changes in specie reserves in the banking system and the external current account balance estimated in Braun and others (2000).

Foreign Trade and External Terms of Trade: Braun and others (2000).

Specie Reserves: Llona Rodriguez (1990).

Central Government Expenditures and Revenues: Braun and others (2000).

Central Government Debt: Braun and others (2000).

Money: 1870–78: M0 based on outstanding bank notes from Llona Rodriguez (1990), Tables 73 and 75, then spliced with the currency in circulation series provided in Mitchell (1998). M2 adds total deposits to these series using Llona Rodriguez's estimates provided in the same source.

Exchange Rate: Braun and others (2000).

Domestic Interest Rate: short-term average loan interest rate charged by domestic banks from Braun and others (2000).

Domestic Price Index: see Catão and Solomou (2005).

GDP: Braun and others (2000).
Population: Maddison (2003).

Greece

Net Foreign Capital Inflow: NA.

Foreign Trade and External Terms of Trade: Foreign Trade data from Mitchell (2001). Terms of trade series kindly furnished by Jeffrey Williamson.

Specie Reserves: Lazaretou (1993).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: Lazaretou (1993).

Money: Lazaretou (1993)

Exchange Rate: Catão and Solomou (2005).

Domestic Price Index: GDP deflator, as provided in Kostelenos and others (forthcoming)..

GDP: Kostelenos and others.

Population: Maddison (2003).

Italy

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance reported in Tattara (2001).

Foreign Trade and External Terms of Trade: Foreign Trade data from Mitchell (2001). *International Historical Statistics: Europe.*

Specie Reserves: Fratianni Spinelli (1984).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: Zamagni (1998).

Money: Fratianni and Spinelli (1984).

Exchange Rate: Catão and Solomou (2005).

Domestic Price Index: Maddison (1991).

GDP: Maddison (1991).

Population: Maddison (2003).

Portugal

Net Foreign Capital Inflow: N.A.

Foreign Trade and External Terms of Trade: Lains (1995). The figures used are based on the author's revision of the respective official series.

Specie Reserves: Mata and Valério (1994).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: Mata and Valério (1994)..

Money: Fratianni and Spinelli (1984)

Exchange Rate: Catão and Solomou (2005).

Domestic Price Index: See Catão and Solomou (2005).

GDP: das Neves (1994).

Population: ibid.

Russia

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance reported in Gregory (1982).

Foreign Trade and External Terms of Trade: Export and import values from Mitchell (2000). Terms of Trade series kindly provided by Jeffrey Williamson.

Specie Reserves: Flandreu and Zulmer (2004).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: Flandreu and Zulmer (2004).

Money: Mo from Crisp (1976). M2 adds M0 to bank deposits taken from Mitchell (2001).

Exchange Rate: Catão and Solomou (2005).

Domestic Price Index: See Catão and Solomou (2005).

GDP: In the absence of a GDP series, the net national product estimate provided in Gregory(1982), Table 3.1, pp. 56–7, ("variant 1") was used.

Spain

Net Foreign Capital Inflow: Unpublished estimates by Leandro Prados, kindly provided by the author.

Foreign Trade and External Terms of Trade: Prados (1988).

Specie Reserves: Carreras and Tafunell (1988). Aceña and Jaime (2000).

Central Government Expenditures and Revenues: Mitchell (2001).

Central Government Debt: Carreras and Tafunell (1988).

Money: Aceña, op.cit.

Exchange Rate: Aceña and Reis (2000).

Domestic Price Index: The deflator for private consumption from Prados (2003), Table A. 13.5, pp. 681-82.

GDP: Prados (2003), Table A. 13.5, pp. 681-82.

Population: ibid.

Australia

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001). The database is available at: http://www.nber.org/databases/jones-obstfeld. The Butlin series was chosen for the estimates reported in this paper, since the new current account estimates which completely exclude gold flows yield surprisingly high absolute levels of net capital inflows to GDP in the early 1890s. Both series yield, however, similar inferences on the timing and magnitude of *changes* in net capital inflows to GDP.

Foreign Trade and External Terms of Trade: Trade values from Mitchell (2002). TOT from Bordo and Rockoff (1996).

Specie Reserves: Jones and Obtseld (2001).

Central Government Expenditures and Revenues: Mitchell (2002).

Central Government Debt: Obstfeld and Taylor (2003).

Money: Mitchell (2002).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Obstfeld and Taylor (2003).

GDP: Obstfeld and Taylor (2003).

Population: Maddison (2003).

Canada

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance from Urquart and Buckley (1965).

Foreign Trade and External Terms of Trade: Trade values from Mitchell, B.M, 2002, International Historical Statistics: Asia and Oceannia, London. TOT from Urquart, M.C. and Buckley, op.cit.

Specie Reserves: Jones and Obtsfeld ((2001).

Central Government Expenditures and Revenues: Mitchell ((2002).

Central Government Debt: Obstfeld and Taylor (2003).

Money: Mitchell (2001).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Obstfeld and Taylor (2003).

GDP: Obstfeld and Taylor (2003).

Population: Maddison (2003).

Denmark

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001). The database is available at: http://www.nber.org/databases/jones-obstfeld.

Foreign Trade and External Terms of Trade: Trade values from Mitchell (2002). TOT from Olgaard (1993).

Specie Reserves: Jones and Obtsfeld (2001).

Central Government Expenditures and Revenues: Mitchell (2002).

Central Government Debt: Flandreau and Zulmer (2004).

Money: Mitchell (2002).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Obstfeld and Taylor (2003).

GDP: nominal GDP from Obstfeld and Taylor (2003). Real GDP from Maddison (2003).

Population: Maddison (2003).

Finland

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001). The database is available at: http://www.nber.org/databases/jones-obstfeld.

Foreign Trade and External Terms of Trade: Trade values from Mitchell (2001).

Specie Reserves: Jones and Obstfeld (2001).

Central Government Expenditures and Revenues: Mitchell (2002).

Central Government Debt: Flandreau and Zulmer (2004).

Money: Mitchell (2002).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Obstfeld and Taylor (2003).

GDP: Hjerppe (1989).

Population: Maddison (2003).

New Zealand

Net Foreign Capital Inflow: N.A.

Foreign Trade and External Terms of Trade: Mitchell (2002). Terms of Trade kindly provided by Jeffrey Williamson.

Specie Reserves: Reserves (coins and bullions) in trading banks from Bloomfield, G.I. 1984, *New Zealand: A Handbook of Historical Statistics*, G.K. Hall & Co. Boston Mass, Table IX.1, pp.386–87

Central Government Expenditures and Revenues: Mitchell (2002).

Central Government Debt: Obstfeld and Taylor (2003).

Money: Sum of currency in circulation from Mitchell (2002) and deposits in trading banks Rankin (1992).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Obsfeld and Taylor (2003).

GNP: Rankin (1992).

Population: Maddison (2003).

Norway

Net Foreign Capital Inflow: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001). The database is available at: http://www.nber.org/databases/jones-obstfeld.

Foreign Trade and External Terms of Trade: Trade values from Mitchell (2002). Terms of trade from Edison and Klovland (1988).

Specie Reserves: Jones and Obtsfeld (2001).

Central Government Expenditures and Revenues: Mitchell (2002).

Central Government Debt: Flandreau and Zulmer (2004).

Money: Mitchell (2002).

Exchange Rate: Obstfeld and Taylor (2003).

Domestic Price Index: Mitchell (2001).

GDP: Nominal GDP from Obstfeld and Taylor (2003). Real GDP from Maddison (2003).

Population: Maddison (2003).

Sweden

<u>Net Foreign Capital Inflow</u>: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001). The database is available at: http://www.nber.org/databases/jones-obstfeld.

<u>Foreign Trade and External Terms of Trade</u>: Trade values from Mitchell (2001?) Terms of Trade and Foreign Trade Prices from Fridlizius (1963).

<u>Specie Reserves</u>: Obtsfeld and Jones, op.cit.

<u>Central Government Expenditures and Revenues</u>: Mitchell (2001? or 2002).

<u>Central Government Debt</u>: Flandreau and Zulmer (2004).

<u>Money</u>: Mitchell (2002).

<u>Exchange Rate</u>: Obstfeld and Taylor (2003).

<u>Domestic Price Index</u>: Maddison (1995).

<u>GDP</u>: Nominal GDP from Obstfeld and Taylor, op. cit. Real GDP from Maddison (2003).

<u>Population</u>: Maddison (2003).

United States

<u>Net Foreign Capital Inflow</u>: Calculated as the difference between changes in specie reserves in the banking system and the current account balance underlying Jones and Obstfeld (2001).

<u>Foreign Trade and External Terms of Trade</u>: Trade values from Mitchell (2001?). Terms of Trade from Williamson (1964).

<u>Specie Reserves</u>: Obtsfeld and Jones, op.cit.

<u>Central Government Expenditures and Revenues</u>: Mitchell (2001?)

<u>Central Government Debt</u>: Obstfeld and Taylor (2003).

<u>Money</u>: Mitchell (2001?)

<u>Exchange Rate</u>: Officer (2001).

<u>Domestic Price Index</u>: Balke and Gordon (1989).

<u>GDP</u>: Jones and Obstfeld (2001).

<u>Population</u>: Maddison (2003).

European Core Countries

<u>Central Bank Discount Rates</u>: Bank of England's discount rate from Mitchell (1988).Bank of France's discount rate from Lévy-Leboyer and Bourguignon (1985). German discount rate from Homer and Sylla (1991).

<u>Capital Exports</u>: UK data from Stone (1999); French data from Lévy-Leboyer and Bourguignon (1985); German data from Bloomfield (1968).

REFERENCES

Aceña, Pedro M., and Reis Jaime, 2000, *Monetary Standards in the Periphery. Paper, Silver and Gold, 1854–1933* (London and New York: St. Martin's Press).

Balke, Nathan and Robert J. Gordon, 1989, "The Estimation of Prewar Gross National Product: Methodology and New Evidence, *Journal of Political Economy,* Vol. 97, pp. 38-92.

Bayoumi, Tamim, and Barry Eichengreen, 1995, "Restraining Yourself: The Implications of Fiscal Rules for Economic Stabilization," *Staff Papers*, International Monetary Fund, Vol. 42, No.1, pp.32–48.

Blattman, Chris, Jason Hwang, and Jeffrey Williamson, 2003, "Terms of Trade and Economic Performance in the Periphery 1870-1940," NBER Working Paper No. 9940 (Cambridge, Massachusetts: National Bureau of Economic Research).

Bloomfield, Arthur, 1968, "Patterns of Fluctuation in International Investment before 1914," Princeton Studies in International Finance No. 21 (Princeton: New Jersey).

Bloomfield, GI, 1984, "New Zealand: A Handbook of Historical Statistics, G>K. Hall & Co.. (Boston: Massachusetts) Table IX. 1, pp. 386-87.

Bordo, Michael, and Roberto Cortés-Conde, eds., 2001, *Transferring Wealth and Power from the Old to the New World: Monetary and Fiscal Institutions in the 17th through the 19th century* (New York: Cambridge University Press).

Bordo, Michael, Christopher Meissner, and Angela Redish, 2003, "How Original Sin was Overcome: The Evolution of External Debt Denominated in Domestic Currency in the United States and British Dominions," NBER Working Paper No. 9841 (Cambridge, Massachusetts: National Bureau of Economic Research).

Bordo, Michael, and Hugh Rockoff, 1996, "The Gold Standard as a 'Good Housekeeping Seal of Approval,'" *Journal of Economic History,* Vol. 56, No. 2, pp. 384–428.

Braun, Juan, Matías Braun, Ignacio Briones, José Diaz, Rolf Lunders and Gert Wagner, 2000, "Economía Chilena 1810-1995: Estadísticas Históricas, Documento de Trabajo No. 187, Catholic University of Chile, Instituto de Economía.

Caballero, Ricardo, Kevin Cowan, and Jonathan Kearns, 2004, "Fear of Sudden Stops: Lessons from Australia and Chile," NBER Working Paper No. 10519 (Cambridge, Massachusetts: National Bureau of Economic Research).

Calvo, Guillermo, Alejandro Izquierdo, and Luis Fernando Mejía, 2004, "On the Empirics of Sudden Stops: The Relevance of Balance Sheet Effects," NBER Working Paper No. 10520 (Cambridge, Massachusetts: National Bureau of Economic Research).

Calvo, Guillermo, Leonardo Leiderman, and Carmen Reinhart, 1993, "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors," *IMF Staff Papers*, International Monetary Fund, Vol. 40, No. 1, pp. 108–51.

Cameron, Rondo, 1972, ed. *Banking and Economic Development. Some Lessons from History* (New York: Oxford University Press).

Carreras, A. and X. Tafunell, 1988, "Estadíisticas Históricas de España. Siglos XIX y XX, Madrid, Fundación Banco Exterior.

Catão, Luis A.V., and Sandeep Kapur, 2006, "Volatility and the Debt Intolerance Paradox," *Staff Papers*, International Monetary Fund, Forthcoming.

_____, and Solomos Solomou, 2005, "Effective Exchange Rates and the Classical Gold Standard Adjustment," *American Economic Review*, Vol. 94, pp. 1259–75.

Contador, Claudio and Claudio Haddad, 1975, Produto Real, Moeda e Preços: A Experiência Brasileira no Período 1861–1970," *Revista Brasileira de Estatística*, Jul./Set. pp. 407–440; 1900–1913 from Haddad, C. 1978, *O Crescimento do Produto Real Brasileiro*, 1900–47, Rio de Janeiro.

Crisp, Olga, 1976, Studies in the Russian Economy Before 1914, London, Macmillan, pp.138–39.

das Neves, João Luís César, 1994, *The Portuguese Economy: A Picture in Figures: XIX and XX Centuries with Long Term Series*, (Lisbon: Portugal).

della, Paolera, Gerardo, 1988, *"How the Argentine Economy Performed During the International Gold Standard: A Re-Examination , 1883—1913* (Chicago: University of Chicago), pp. 173, col. 3.

———, 1992, "*The Performance of the Argentine Economy During the International Gold Standard, 1860—1930",* paper presented at the conference "Long-Run Economic Growth in Argentina, Brazil and Mexico," (London: United Kingdom).

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 and National Bureau of Economic Research).

———, *2003 A New Economic History of Argentina* (Cambridge, Massachusetts).

DeLong, J. Bradford, 1999, "Financial Crises in the 1890s and the 1990s: Must History Repeat?" *Brookings Papers on Economic Activity*: 2, pp. 253–94, Brookings Institution.

Dornbusch, Rudiger, Ilan Goldfajn, and Rodrigo Valdes, 1995, "Currency Crises and Collapses", *Brookings Papers on Economic Activity*: 2, Brookings Institution.

Edelstein, Michael, 1982, *Overseas Investment in the Age of High Imperialism* (New York: Columbia University Press).

Edison, Hali J. and Jan Tore Klovland, 1988, "A Quantitative Reassessment of the Purchasing Power Parity Hypothesis: Evidence from Norway and the United Kingdom," *Journal of Applied Economics*, 1987, Vol. 2, pp.309–33.

Edwards, Sebastian ,1989, *Real Exchange Rates, Devaluation and Adjustment: Exchange Rate Policy in Developing Countries* (Cambridge, Massachusetts: MIT Press).

——, 2004, "Thirty years of Current Account Imbalances, Current Account Reversals, and Sudden Stops," *Staff Papers*, International Monetary Fund, Vol. 51.

Eichengreen, Barry,1992, "The Gold Standard Since Alec Ford," in *Britain in the International Economy 1870–1939*, ed. by S.N. Broadberry and N.F.R. Crafts, pp. 47–79 (Cambridge, Massachusetts: National Bureau of Economic Research).

Eichengreen, Barry, Andrew Rose and Charles Wyplosz, 1996, "Contagious Currency Crises," *Scandinavian Journal of Economics*, Vol. 98.

Eichengreen, Barry, and Ricardo Haussman, 1999, "Exchange Rate Regimes and Financial Fragility," NBER Working Paper No. 7418 (Cambridge, Massachusetts: National Bureau of Economic Research).

——, 2003, *Capital Flows and Crises* (Cambridge, Massachusetts: MIT Press).

Fernandez-Arias, Eduardo, 1996, "The New Wave of Private Capital Inflows: Push or Pull?" *Journal of Development Economics*, Vol. 48, pp.389–418.

Fernandez-Arias, Eduardo, and Andrew Rose, 1996, "Currency Crises in Emerging Markets: An Empirical Treatment," *Journal of International Economics*, Vol. 41, pp. 351–66.

Fishlow, Albert, 1989, "Conditionality and Willingness to Pay: Some Parallels from the 1890s," in *The International Debt Crisis in Historical Perspective*, ed. by Barry Eichengreen and Peter H. Lindert (Cambridge, Massachusetts: MIT Press).

Flandreau, Marc, and F. Zulmer, 2004, *The Making of Global Finance 1880-1913*, OECD, Paris.

Ford, A.G., 1962, *The Gold Standard 1880–1914: Britain and Argentina* (Oxford: Clarendon Press).

Franco, Gustavo, 1988, "*O Balanco de Pagamentos do Brasil: Novas Estimativas," 1870–1896*, Discussion paper 201, PUC (Rio de Janeiro: Brazil).

——, 1990, "*A Década Republicana: O Brasil ea Economia Internacional, 1888-1900,*" (Rio de Janeiro: IPEA).

Frankel, Jeffrey, 1979, "On the Mark: A Theory of Floating Exchange Rates Based on Real Interest Differentials," *American Economic Review*, Vol. 69, No. 4, pp.610–22.

Frankel, Jeffrey, and Andrew Rose, 1995, "A Survey of Empirical Research on Nominal Exchange Rates," in *Handbook of International Economics*, ed. by Kenneth Rogoff and Gene Grossman (Amsterdam: North-Holland).

———,1996, "Currency Crises in Emerging Markets: An Empirical Treatment," *Journal of International Economics*, Vol. 41, pp.351–66.

Fratianni, Michele, and Franco Spinelli, 1997, *A Monetary History of Italy* (New York: Cambridge University Press).

———, 1984, "Italy in the Gold Standard Period, 1861-1914," in *A Retrospective of the Classical Gold Standard 1821–1931*, ed. by Michael D. Bordo and Anna J. Schwartz, Chicago.

Fridlizius, Gunnar, 1963, "Sweden's Exports 1850–1960," Economy and History II, pp.38–96.

Fritsch, Winston, 1988, *External Constraints on Economic Policy in Brazil, 1889–1930* (London: Macmillan).

Gavin, Michael, and Roberto Perotti, 1997, "Fiscal Policy in Latin America," *NBER Macroeconomics Annual*, pp.11–61 (Cambridge, Massachusetts: National Bureau of Economic Research).

Giuseppe, Tattara, 2001, "Was Italy Ever on Gold?," in *Monetary Standards in the Periphery. Paper, Silver and Gold, 1854–1933*, ed. by Aceña, P.M. and Jaime Reis, 2000, London.

Goldsmith, Raymond,1986, *Desenvolvimento Financeiro sob um Século de Inflação*. Rio de Janeiro, Bamerindus and MacGraw Hill.

Gregory, Paul R., 1982, *Russian National Income, 1885–1913,* Cambridge.

Gustavo, Franco, 1988, *O Balanco de Pagamentos do Brasil: Novas Estimativas, 1870–1896*, Discussion paper 201, PUC, Rio de Janeiro.

Haber, Stephen, 1997, "Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation, and Industrial Structure in Brazil and Mexico, 1840-1930," in *How Latin American Fell Behind. Essays in the Economic Histories of Brazil and Mexico*, ed. by S. Haber (Stanford: Stanford University Press).

Haddad, C., 1978, *O Crescimento do Produto Real Brasileiro*, 1900–47, Rio de Janeiro.

Hansen, Per H., 1991, "From Growth to Crisis: The Danish Banking System from 1850 to the Interwar Years," *Scandinavian Economic History Review*, Vol. 39, No. 3, pp. 20–40.

Hjerppe, Riitta, 1989, "The Finnish Economy, 1860–1985: Growth and Structural Change, Bank of Finland, Helsinki, pp. 259–60.Bank of Finland, Helsinki, pp. 259–60.

Homer, Sidney and Richard Sylla, 1991, *A History of Interest Rates*, Rutgers.

IBGE, 1986, *Estatisticas Historicas do Brasil*, Rio de Janeiro.

Jeanne, Olivier and Andrew Rose, 2002, "Noise Trading and Exchange Rate Regimes," *Quarterly Journal of Economics*, Vol. 117, No. 2, pp. 537–69.

Jones, Matthew T. and Maurice Obstfeld, 2001,"Saving, investment, and Gold: A Reassessment of Historical Current Account Data," in *Money, Capital Mobility and Trade: Essays in Honor of Robert A. Mundell,* ed. by Guillermo A. Calvo, Maurice Obstfeld and Rudiger Dornbusch, MIT Press.

Jonker, Joost, 1997, "The Alternative Road to Modernity: Banking and Currency, 1814–1914," in *A Financial History of the Netherlands*, ed. by M. Hart, J. Jonker, and J. Van Zanden, pp. 94–123 (Cambridge; New York: Cambridge University Press).

Jonung, Lars, 1984, "Swedish Experience under the Classical Gold Standard 1873-1913", in M.D. Bordo and A. Schwartz (red.), The Classical Gold Standard in Retrospective. University of Chicago Press/National Bureau of Economic Research..

Kaminsky, Graciela and Carmen Reinhart, 1999, "The Twin Crises: The Cause of Banking and Balance of Payments Problems," *American Economic Review*, Vol. 89, No. 3, pp. 473–500.

Kaminsky, Graciela, Carmen Reinhart, and Carlos Végh, 2004, "When it Rains it Pours: Procylical Capital Flows and Macroeconomic Policies," NBER Working Paper No. 10780 (Cambridge, Massachusetts: National Bureau of Economic Research).

Kelly, Trish, 1998, "Ability and Willingness to Pay in the Age of the Pax Britannica, 1890–1914," *Explorations in Economic History*, Vol. 35, No. 1, pp. 31–58.

Kindleberger, Charles P., 1978, *Manias, Panics, and Crashes* (New York: Basic Books).

Kiyotaki, N., and J. Moore, 1997, "Credit Cycles," *Journal of Political Economy,* Vol. 105, No. 2, pp. 211–48.

Kostelenos, G., S. Petmezas, D. Vasileiou, E. Kounaris, M. Sfakianakis, 2006, *Gross Domestic Product 1830-1939, Sources of Economic History of Modern Greece, Quantitative Data and Statistical Series 1830-1939*, Historical Archives of the National Bank of Greece, Athens, forthcoming.

Krugman, Paul, 1979, "A Model of Balance of Payments Crisis," *Journal of Money, Credit and Banking*, Vol. 11, pp. 311–25.

Lains, Pedro, 1995, *A Economia Portuguesa no Século XIX. Crescimento Económico e Comércio Externo*, Lisbon, Imprensa Nacional.

Lazaretou, Sophia, 1993, "Monetary and Fiscal Policies in Greece: 1833-1914," *Journal of European Economic History*, Vol. 22, No. 2, pp. 285–311.

Levy, Maria Barbara, 1995, "The Brazilian Public Debt—Domestic and Foreign, 1824–1913," in *The Public Debt in Latin America: a Historical Perspective*, ed. by Reinhard Liehr, Frankfurt.

Lévy-Leboyer and Bourguignon (1985); German data from Bloomfield (1968).

Lewis, W.A., 1978, *Growth and Fluctuations, 1870–1913* (London; Boston: G. Allen & Unwin).

Lindert, Peter H., 1969, "Key Currencies and Gold, 1900-1913", Princeton Studies in International Finance No. 24 (Princeton: New Jersey).

Lindert, Peter H., and Peter J. Morton, 1989, "How Sovereign Debt Has Worked," in *Developing Country Debt and Economic Performance*, ed. by Jeffrey Sachs, (Chicago: National Bureau of Economic Research).

Llona Rodriguez, Agustín, 1990, "Chilean Monetary Policy: 1860–1925," PhD dissertation, Boston University.

———, 2000, "Chile During the Gold Standard: A Successful Paper Money Experience," in *Monetary Standards in the Periphery: Paper, Silver and Gold, 1854–1933*, ed. by Aceña, P.M. and Reis, J. (London and New York: St. Martin's Press).

Maddison, Angus, 2003, *The World Economy: Historical Statistics*, OECD, Paris.

Mauro, Paolo, Nathan Sussman, and Yishay Yafeh, 2002, "Emerging Market Spreads: Then versus Now," *Quarterly Journal of Economics*, Vol. 117, No. 2, pp. 695–733.

Meissner, C., 2005, "A New World Order: Explaining the International Diffusion of The Gold Standard, 1870–1913", *Journal of International Economics*, Vol. 66, pp.385–406.

Milesi-Ferretti, Gian Maria, and Assaf Razin, 2000, "Current Account Reversals and Currency Crises: Empirical Regularities," in *Currency Crises*, ed. by P. Krugman (Chicago: University of Chicago Press).

Mitchell, BR., 1988, British Historical Statistics, Cambridge; Bank of France's discount rate from Lévy-Leboyer, M. and François Bourguignon, 1985, *L'Economie Française au* XIXe Siécle, Paris; German discount rate from Homer, Sidney and Richard Sylla, 1991, *A History of Interest Rates*, Rutgers.

Mitchell, Brian, 2001, "*International Historical Statistics,*" The Americas, London.

———, 2002, "International Historical Statistics: Asia and Oceania", London.

Neuhaus, Paulo, 1975, *História Monetária do Brasil*, Rio de Janeiro.

Obstfeld, Maurice, and Kenneth Rogoff, 1996, *Foundations of International Macroeconomics* (Cambridge, Massachusetts: MIT Press).

Obstfeld, Maurice, and Taylor, Alan M., 2003, "Sovereign Risk, Credibility and The Gold Standard: 1870–1913 versus 1925–31," *Economic Journal*, Vol. 113, No. 487, pp. 241–75.

———, 2004, *Global Capital Markets. Integration, Crisis, and Growth* (New York: Cambridge University Press).

Officer, Lawrence, 2001, "Exchange rate between the United States dollar and the British pound, 1791-2000: Source Notes," Economic History Services, EH.Net, 2001. URL: http://www.eh.net/hmit/exchangerates/poundsource.html.

Olgaard, 1993, "The Danish Terms of Trade in Foreign Trade, 1875–1963," in *The Economic Development of Denmark and Norway since 1870* ed. by Persson, Karl Gunnar, Hants, England.

Persson, Karl G., ed., 1993, *The Economic Development of Denmark and Norway since 1870* (Aldershot: E. Elgar).

Prados, Leandro, 1988,

———, 2003, *El Progreso Economico de España, 1850-2000* (Madrid: Fundación BBVA).

Reis, Jaime, 2000, "The Gold Standard in Portugal 1854–91," in *Monetary Standards in the Periphery. Paper, Silver and Gold, 1854–1933*, ed. by Aceña, P.M. and Jaime Reis (London and New York: St. Martin's Press).

Stone, Irving, 1999, *The Global Export of Capital from Great Britain, 1865-1914* (New York: St. Martin's Press).

Tattara, Giuseppe, and M. Volpe, 1997, "Italy, The Fiscal-Dominance Model, and The Gold-Standard Age," in *Monetary Standards and Exchange Rates*, ed. by Marcuzzo, M.C., Officer, L.H. and Rosselli (London: Routledge).

Tornell, Aaron, and Philip Lane, 1998, "Are Windfalls a Curse?: A Non-Representative Agent Model of the Current Account," *Journal of International Economics*, Vol. 44, No. 1, pp. 83–112.

Triner, Gail, 2000, *Banking and Economic Development: Brazil, 1889-1930* (New York: Palgrave).

Végh, Carlos, and Ernesto Talvi, 2000, "Tax Base Variability and Procyclical Fiscal Policy," NBER Working Paper No. 7499 (Cambridge, Massachusetts: National Bureau of Economic Research).

Whale, Philip B., 1937, "The Working of the Prewar Gold Standard," *Economica* 6, pp. 18–32.