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ABSTRACT

The Mother of All Sudden Stops: Capital Flows and Reversals in Europe, 1919-1932*

We present new data documenting European capital issues in major financial centers from 1919 to 1932. Push factors (conditions in international capital markets) perform better than pull factors (conditions in the borrowing countries) in explaining the surge and reversal in capital flows. In particular, the sharp increase in stock market volatility in the major financial centers at the end of the 1920s figured importantly in the decline in foreign lending. We draw parallels with Europe today.

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Keywords: capital flows, Europe, Great Depression and sudden stop

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1. Introduction

From 2001 through 2008 one half of Europe received enormous capital inflows from the other half of Europe and the rest of the world. Starting in 2009, the recipients then experienced a sudden stop, a capital-account reversal, and an economic and financial crisis. From 1924 through 1928 one half of Europe received enormous capital inflows from the other half of Europe and the rest of the world. Starting in 1929, the recipients then experienced a sudden stop, a capital-account reversal, and an economic and financial crisis.

The fact that there are parallels between the economic and financial crises in Europe in the interwar years and today is invoked frequently, if mainly at an anecdotal level. And while there exist a number of empirical studies of the determinants of capital flows in Europe following the creation of the euro (see e.g. Ahearne, Schmitz and von Hagen 2008, Lane and Pels 2012), there are few comparable analyses of capital movements in the 1920s and 1930s. In this paper we fill this gap with a new analysis of the determinants of capital flows and capital-account reversals between the wars. While we mainly seek to shed light on interwar experience, we hope in addition that our analysis will provide new perspective on the financial crisis in Europe today.

Interwar capital flows have of course been studied before. Contemporary accounts like Harris (1935) focused on the German case and argued that foreign lending in the 1920s was perverse, unproductive and unsustainable.[1] Nurkse (1944) generalized the point, arguing that capital movements were erratic in the 1920s and destabilizing in the 1930s, although he was not always explicit about what he meant by erratic and destabilizing.[2] The parallels with ex-post

[1] And, more recently, Ritschl (2012). We consider his analysis below.
[2] See Nurkse (1944), p.16 and passim. Other studies of interwar capital flows include Feinstein and Watson (1995) and James (1992, 2002).

indictments of capital flows to peripheral Europe in the years leading up to the 2008-9 financial crisis are evident.

Despite this, a systematic analysis of European capital flows in the 1920s and early 1930s does not appear to exist. Such analysis might address questions like the following. How large were the capital surge and reversal compared with the recent eurozone episode? What was the relative importance of private versus official flows? What were the main drivers of observed capital movements? To what extent did changes in borrowing countries' conditions and in global capital markets' conditions affect the direction and volume of flows?

In this paper we seek to address these questions. Our data on gross long-term private capital issues on account of European countries are drawn from an unpublished compendium of capital movements in Europe in the Mudd Library at Princeton University and evidently authored by Ragnar Nurkse (1943).[3] In addition, we provide some analysis of net capital flows. Our framework is in the spirit of recent analyses of the retrenchment of capital flows at the time of the 2008-9 financial crisis such as Milesi-Ferretti and Tille (2011).

We show that capital flows to the European recipients were large: in 1927, the aggregate current account deficit of Austria, Germany and Hungary was nearly 5% of their aggregate GDP. At the same time, however, this was smaller than the collective current account deficit of Greece, Ireland, Italy, Spain and Portugal in 2008 (6.7% of their collective GDP).[4] On the other hand, the subsequent reversal was even larger in the early 1930s: the shift in Central European countries' current account deficit between 1927 and 1931 represented 6.0% of their collective

[3] Some similar analysis appears in Nurkse's 1944 classic, *International Currency Experience*, published by the League of Nations. The Financial Section and Economic Intelligence Service of the League, for which Nurkse worked, was transferred to Princeton following the outbreak of World War II. Private capital flows include League of Nations-sponsored loans as well as loans extended in conjunction with the Dawes and Young Plans, since these were underwritten by private investment banks and placed with private investors.

[4] Computed by aggregating current account deficits and GDP at market exchange rates. Unless otherwise stated this is our convention throughout.

GDP, whereas between 2008 and 2011, by comparison, Greece, Ireland, Italy, Portugal and Spain experienced a current account contraction amounting to "only" 3.2 per cent of their aggregate GDP. The much larger provision of official financing in the more recent episode largely accounts for this difference. In other words, net private capital outflows from European debtors were in fact larger in 2011 than in 1931 but they were also compensated by much larger inflows of official capital.

We find further that push factors (conditions in international capital markets) do better than pull factors (conditions in the borrowing countries) in explaining the surge and reversal. In particular, the sharp increase in stock market volatility in the major financial centers at the end of the 1920s figured importantly in the decline in foreign lending. In parallel with the recent episode of flows from Northern to Southern Europe, analyses attributing the surge of lending and then its reversal to policy distortions in the borrowing countries capture only part of the story. This pattern is strikingly like that detected by Milesi-Ferretti and Tille in the run-up to the recent crisis.

In Section 2 we describe the data. Section 3 then uses them to characterize the lending surge and reversal periods. Sections 4 and 5 focus on pull and push factors in turn, while Section 6 provides a detailed analysis of the capital-flow-reversal episode. Section 7, concluding, returns to implications for today.

2. Data

Our analysis of the determinants of capital flows employs new estimates of private bond issues in six major financial centers: New York, London, Paris, Amsterdam, Stockholm and

Zurich.[5] These estimates, spanning the period 1919 to 1932, were compiled from an anonymous, typewritten, pencil-annotated memo in the Ragnar Nurkse papers at Princeton University's Mudd Library.[6] This document, dated June 1943 and entitled "Europe's Capital Movements, 1919-1932: A Statistical Note," was prepared for the League of Nations. Nurkse was almost certainly its author or at least contributed substantially to its making.[7] The memo contains detailed yearly information on the total volume of bond issues on account of European countries. Data are broken down by recipient country and type of borrower (central and provincial governments/municipalities/corporations). The memo covers 28 European countries and comprises, it would appear, the population of European bond issues in the six centers. Detailed commentary indicates that much careful work was done to place new issues in different financial centers on a comparable basis and thus address the inconsistency problems of other sources.[8]

Whereas other contemporary and historical studies of international capital movements rely on estimates of net capital flows computed from balance-of-payment statistics, we work here mainly with gross primary issues. Gross as opposed to net capital flows have several advantages. First, reliable balance-of-payments statistics for the pre-World War II period only exist for a few countries. Second, the capital account is constructed as the residual item of the balance of payments and is therefore subject to reliability problems.[9] Third, focusing on net capital flows can cause one to miss important parts of the story. Fostel and Kaminsky (2007) note that net capital flows say little about countries' ability to "tap international capital markets,"

[5] Thus, we exclude official capital flows and short-term credits extended by central banks and governments.
[6] The full reference to this document is Princeton University, Mudd Library, MC173, Series 1, Box 8, Folder 3. Feinstein and Watson (1995), p. 106, refer to a copy of this memo (found in the library of Nuffield College) as one of the sources for their descriptive study of European capital flows during the interwar period. They write that this copy "has a note that it was received from the Princeton Institute of Advanced Studies".
[7] Nurkse worked for the League of Nations from 1934 to 1945.
[8] On the inconsistency problems in question see Royal Institute of International Affairs (1937).
[9] Among other things, this gives rise to discrepancies depending on whether estimates are constructed from the balance-of-payments statistics of debtor or creditor countries; see Feinstein and Watson (1995).

as a zero net flow might very well reflect a large (gross) inflow counterbalanced by a large (gross) outflow. They therefore recommend using international primary issuance as an indicator of access to foreign finance. Broner et al. (2013), Milesi-Ferretti and Tille (2011), Fratzscher (2012), and Forbes and Warnock (2012) also stress the importance of considering gross capital flows in sudden-stop episodes as a way of distinguishing the behavior of foreign and domestic investors. While there is a handful of studies of gross long-term capital issues in the nineteenth century (Clemens and Williamson, 2004, Catao, 2007, Esteves, 2007), we are not aware of similar work for the interwar years. Moreover, work on the classical gold standard has focused on capital issues in one or two financial centers.[10] Our data, in contrast, track European bond issues in all major financial centers in the 1919-1932 period.[11]

Naturally our data also have limitations. Most importantly, they exclude short-term capital movements.[12] Short-term loans constituted a non-negligible part of capital flows and were used extensively in financing trade.[13] Then there was the steady amortization (retirement) by previous borrowers of their outstanding obligations. There was also some repatriation of foreign securities to investors in the issuing countries; Lary (1943) and Bloomfield (1950) observe that with the normalization of economic conditions in Europe in the second half of the 1920s, securities issued abroad by governments and corporations became more attractive to

[10] Clemens and Williamson (2004) focus on primary issues on the London market in the 1865-1913 period, using the data collected by Jenks (1927) and Simon (1968), and later updated by Stone (1999). Esteves compares the determinants of capital issues in Britain and Germany, using original data for the German Stock Exchange assembled from a range of primary sources. Catao (2007) and Bordo, Cavallo and Meissner (2010) have also explored the determinants of sudden stops during the 1880-1913 period using alternatively London gross primary capital issues and net capital inflows.

[11] Anon (1943), p. 25 notes that long-term bond and share issues outside the six centers in our data base were minimal. For example, it is estimated that 97.7 per cent of Germany's long-term loans were floated on these six markets.

[12] Limited direct evidence is available on the magnitude and direction of short-term capital flows, the best discussion of which we are aware being Conolly (1936).

[13] Such as, in the U.S. case, the short-term instrument known as trade acceptances, a considerable fraction of which was purchased by foreign investors in the 1920s (see Lary 1943 and Eichengreen and Flandreau 2012).

domestic investors.[14] Finally, there was opportunistic repatriation starting in 1931 of foreign bonds in default that were bought back at deep discounts. These transactions were economically and diplomatically contentious; by their nature little is known about their extent.[15] Only for a small handful of countries do we have reasonable reliable estimates of short-term capital flows, amortization and secondary market transactions. For the United States, for example, studies undertaken for the U.S. Department of Commerce show amortization payments as running at 20 to 30 per cent of new issues in the boom period 1924-28.[16] Transactions in outstanding foreign securities in U.S. markets ran at lower levels, typically half those of amortization, prior to 1930-1. Data on short-term capital movements are derived mainly from reports on foreign deposits by U.S. banks and brokers, coverage of which is incomplete, rendering the resulting series volatile and of uncertain reliability. For other countries the picture is even more fragmentary.[17]

For these reasons, we supplement our data for primary bond issues with net capital inflows obtained from balance-of-payment statistics. Net capital inflows are calculated by adding the accumulation of gold and foreign exchange reserves to the current account deficit. The country sample is more limited and less representative, but analysis of net capital flows nonetheless provides a useful check.

We also construct variables designed to capture potential determinants of capital flows. Pull factors are proxied by recipient country characteristics: GDP, GDP per capita, GDP growth, public debt, central government's budget balance, volume of international reserves, etc. We add

[14] There were also some purchases by Americans of outstanding U.S. bonds in the hands of European investors, but these appear to have been concentrated in the first two or three post-World War I years (being a continuation of wartime transactions) and thus fall outside our sample period. See Lary (1943).
[15] Although some estimates are available in the German case. See Klug (1993).
[16] Lary (1943), Appendix Table III.
[17] In addition, our data do not include share issues. This is a minor problem, however, as shares accounted for at most ten per cent of the total of gross capital issues for foreign residents in the six financial centers under study. Anon (1943), table 3C, estimates that total share issues on account of European countries reached $642 M. (current) over 1919-1932, whereas bond issues amounted to $5,889 M. over the same period.

dummy variables for whether countries were exporters of primary products and for whether they were on the gold standard.[18] Push factors include source country real GDP, the volatility of stock market returns, and long-term interest rates. Finally, we add variables accounting for overall macroeconomic conditions: GDP growth and trade openness at the aggregate European level.[19] Table 1 provides summary statistics for the variables in the dataset, while full details on sources are given in appendix A.

3. Capital Surges and Reversals

We begin by describing interwar capital-flow surges and reversals and contrasting them with recent experience. Figures 1 and 2 show the value of long-term bonds floated by European countries in six major financial centers from 1919 to 1932 in millions of 1990 US dollars. Issues are broken down by financial center in Figure 1 and by borrower type (public vs. private sector) in Figure 2. The surge and stop are both evident. Gross capital exports to European countries rose sharply starting in 1924 and peaked in 1927. Of all bond issues in the 1924-1928 period, New York accounts for the largest share (66 per cent), but in addition other markets like London (16 per cent), Amsterdam (8 per cent), and to a lesser extent Stockholm (5 per cent) played significant roles. Starting in 1926, private borrowers were responsible for the greatest share of capital issues.

That new issues in New York on behalf of European borrowers and new European issues in the major financial centers fell already in 1928 may surprise readers who associate the decline in lending with the collapse of the New York Stock Exchange and the associated deterioration in

[18] Primary exporters are defined as countries whose exports were composed of 75% of primary products at least.
[19] These are constructed using the real GDPs (in constant 1990 dollars) of 15 European countries as well as their nominal exports converted at market exchange rates and deflated using the US Consumer Price Index (see appendix A).

U.S. economic and financial conditions. In fact, that the falloff in lending to Europe began earlier was noted by earlier specialists (viz. Mintz 1951). We see in Figure 1 that the phenomenon was not limited to New York and that it disproportionately affected public-sector borrowers. We return to potential explanations below.

New bond issues declined by 64 per cent in real terms in 1929. This was followed however by a recovery in 1930, due mostly to loans to the German government and corporations (in particular, the Young Plan loans). In 1931 gross long-term capital exports collapsed again; in 1932 no new European issues were recorded in New York or London. While almost all major financial centers participated in this sudden stop, there were a few exceptions. The volume of bond issues actually rose in Paris and Stockholm between 1927 and 1931, for example. Whereas Paris had been only a marginal player in the capital-flow surge of the 1920s, it overtook New York as the leading market for bond issues in the early years of the Great Depression.[20] Twenty-five per cent of all European bonds issued in 1929-1932 were floated in Paris. As the New York and London capital markets dried up in 1929-1932, European governments and firms evidently turned to Paris and Stockholm to issue new debt. This partial substitution between the main financial centers attenuated the effects of the sudden stop insofar as all sources of external funding did not dry up at the same time. This also suggests that the shift in capital flows was partly driven by factors specific to different financial centers rather than simply to questions about the solvency of the recipients. Section 5 of the paper will shed some light on the identity of these financial-center-specific factors.

Figures 3 to 5 compare the capital surge and sudden stop in the European periphery during 1925-1932 and 2006-2011. Figure 3 first juxtaposes the aggregate ratio of current account deficit to GDP for the largest (net) capital importers of the two periods: Austria, Germany, and

[20] Albeit by a relatively small margin.

Hungary in 1925-1932 and Greece, Ireland Italy, Portugal and Spain (the GIIPS) in 2006-2011.[21] We set year zero, the peak year for current account deficits, as 1927 and 2008 respectively. The figure shows that the GIIPS ran larger current account deficits at the peak of the recent boom than the Central European countries in 1927. However, the subsequent current account adjustment was more severe in the Great Depression than in peripheral Europe after 2008. Between 1927 and 1931, the decline in the aggregate current account deficit of Austria, Germany and Hungary represented 6.0 per cent of their 1927 collective GDP and these countries even ran current account surpluses as of 1931. By contrast, the current account adjustment experienced by the GIIPS between 2008 and 2011 was "only" 3.2 per cent of their aggregate 2008 GDP and these countries still ran current account deficits in 2011. However, the most recent estimate for 2012 suggests that the GIIPS' current account deficit contracted further in that year so the adjustment might eventually be of the same magnitude as in Central Europe during the Great Depression.

A large part of the explanation for the differences in current account adjustments between the two periods is the extent to which official capital inflows compensated for private outflows. In the early 1930s official flows took the form of loans for Germany, Austria and Hungary from foreign governments as arranged by the Bank for International Settlements (BIS) and central bank finance of the balance of payments (central bank purchases and sales of gold and foreign exchange).[22] After 2007 they took the form of rescue loans for Greece, Ireland and Portugal from foreign governments and arranged through the European Financial Stability Facility and transfers to the affected countries' central banks through TARGET2, the European Union's real-time interbank payment system. The analogy, obviously, is direct.

[21] These two groups correspond to the largest (net) importers of capital of the 1925-1930 and 2004-2008 period respectively.
[22] On the BIS loans, see Toniolo (2005).

Figures 4 and 5 show the aggregate ratios of net private and official capital inflows to GDP for the main European debtors in 1925-1932 and 2002-2011.[23] They confirm that the reversal in the direction of net private flows was dramatic in both periods. In contrast to gross capital inflows, net private capital inflows to Central European countries did not rebound in 1930. This indicates that the temporary increase in external loans to German borrowers, in particular, was outweighed by an increase in capital outflows.[24] By 1931 and 2010, net capital inflows to the European debtors were strongly negative, reflecting capital flight.[25] Evidently, the decline in private capital inflows to Greece, Ireland, Italy, Portugal and Spain in 2008-2011 was larger than that experienced by Central European countries in 1927-1931.[26] However, the rise in official inflows was also larger, making the resulting current account adjustment less severe for the capital importers (at least until 2011). In 2011 indeed, net official inflows to the GIIPS amounted to 12.4% of their collective GDP and more than compensated for net private outflows (8.3% of GDP). This explains how these countries could continue to run current account deficits, at least temporarily, despite the crisis. In 1927-31, in contrast, net official inflows to Austria,

[23] In Figure 5, official inflows include TARGET2 positions, loans granted by the IMF, EFSF, EFSM and other EU governments and changes in the central bank's reserve assets (see Boeckx, 2012). Note that, since errors and omissions are excluded, the sum of private and official capital inflows to the GIIPS does not exactly match the figure for their current account deficit.

[24] This is evidence that Germany experienced a growing problem of capital flight, associated with political instability, the poorly received Austro-German customs union proposal and the Brüning government's bellicose stance on the reparations question, well before full-blown financial crisis erupted in 1931. Whether this was capital flight mainly by foreigners excited by the reparations conflict, as argued by Ferguson and Temin (2003), or by residents concerned with the condition of domestic banks, as concluded by Schnabel (2004), is not something on which our data shed light.

[25] In their recent study of capital flow waves since the 1980s, Forbes and Warnock (2012) distinguish between four types of episode: - surges (large increases in gross capital inflows); - stops (large decreases in gross capital inflows); - flights (large increases in gross capital outflows); and - retrenchment (large decreases in gross capital outflows). According to this typology, the European capital importers of the 1920s faced a combination of a stop and a flight in the years 1931 and 1932.

[26] The decline in aggregate net private capital inflows to the Austria, Germany and Hungary between 1927 and 1931 represented 8.4% of their 1927 collective GDP. The decline in aggregate net private capital inflows to the GIIPS between 2008 and 2011 represented 10.1% of their 2008 collective GDP. The sudden stop experienced by Central European countries in the early 1930s is comparable to that endured by Latin America in the early 2000s. Calvo and Talvi (2008), table 8.1, find that net capital inflows declined by 8 per cent on average for seven Latin American countries between 1998 and 2002. The decline was particularly acute for Argentina (19.5 per cent) and Venezuela (17.4 per cent). See also Calvo, Izquierdo and Talvi (2004).

Germany and Hungary amounted to 3.4% of their collective GDP and did not compensate for the net private outflows (4.2% of GDP). These countries therefore had to shrink their current account deficits much more severely and, by 1931, transform those deficits into surpluses.[27]

The decline in private capital inflows to the debtor countries was associated in both periods with a decline in capital outflows from the European creditors. France, the Netherlands and Switzerland (the largest capital exporters of the 1925-1930 period) became net importers of capital in 1931, registering a net private capital inflow of 5.7% of their collective GDP. But this private capital inflow was offset by an outflow of official capital (change in international reserves and BIS loans) of 4.4% of their collective GDP. In contrast, Germany (the largest European capital exporter in the early 2000s) has remained a net exporter of private capital in 2008-2011, but the volume of its private capital exports has declined steadily. And, again, the decrease in private outflows from Germany has been partly offset by the increase in official outflows.

To some extent, then, the Eurosystem has provided collective insurance against sudden stops. In 1929-31, in contrast, Central European countries were forced to rely on their individual insurance against sudden stops (in the form of international reserves), together with much more limited international emergency support. These official inflows, although non-negligible, were not enough to compensate for the private capital outflows.

4. Pull Factors

Studies of the determinants of capital flows typically distinguish factors specific to the lending countries and the global financial system ("push" factors) on the one hand and factors

[27] Austria, Germany and Hungary all reacted by introducing capital controls in the summer and fall of 1931.

specific to the recipient countries ("pull" factors) on the other.[28] While much of the literature has concentrated on pull factors, recent experience has refocused attention on push factors as determinants of both capital-flow surges and sudden stops (see e.g. Milesi-Ferretti and Tille, 2011, Fratzscher, 2011, Forbes and Warnock, 2012).

We start with pull factors. Our dependent variable for this portion of the analysis is the (log of the) total amount of borrowing by a given country in all markets in a given year (in millions of 1990 US dollars). We control for the recipient countries' economic size (real GDP), macroeconomic performance (real GDP growth suitably lagged), economic development (lagged GDP per capita), fiscal and monetary policies (lagged inflation, lagged ratios of public debt to fiscal revenues, of government budget balance to fiscal revenues, and of international reserves to imports, along with a gold standard dummy), and position in world trade (primary product exporter).

Ritschl (2002, 2012) has argued that a special set of pull factors were present in the German case, encouraging private capital inflows before 1929 and discouraging them thereafter. Under the Dawes Plan, private foreign lending enjoyed what was known as "transfer protection." The mechanism through which reparations were transferred effectively gave commercial credits first claim on the available foreign exchange and seniority over reparations. That made private lending to Germany more attractive. Under the Young Plan, which succeeded the Dawes Plan in 1929, this hierarchy of seniority was inverted, making private lending less attractive and contributing to the sudden stop. To take this argument into consideration, we add a pair of dummy variables for Germany for the Dawes Plan years (1924-1928) and Young Plan years (1929-1932). Reflecting the emphasis in Decorzant and Flores (2012) on the role of the League

[28] See Fratzscher (2012) for a recent illustration.

of Nations in European countries' access to external capital in the 1920s, we also add a dummy variable for whether a country previously borrowed under the auspices of the League of Nations.

Our econometric results focus on the period 1924-1932.[29] We include year dummies in all regressions in order to control for time-varying, supply-side factors common to all receiving countries (push factors).[30] Our dependent variable has a large proportion of zeros (33 per cent of the country-year observations), and a log-linear specification would lead one to omit these observations.[31] A first option for dealing with this problem is to add a small constant (k=1) to the dependent variable and then to estimate the model with OLS. We report results obtained with this procedure below. Santos Silva and Tenreyro (2006) suggest however that OLS estimates of log-linearized models are unreliable and recommend using the Poisson pseudo-maximum likelihood estimator instead. This estimator provides a simple way to deal with the zeros in the dependent variable and is well behaved even when the proportion of zeros in the dependent variable is large (Santos Silva and Tenreyro, 2011).[32]

Table 2 reports results for an unbalanced panel of 20 countries and nine years estimated using both procedures, OLS and Poisson, although the latter is preferred. We report results obtained for the full 1924-1932 period as well as sub-periods corresponding to the surge (1924-

[29] Most of the covariates being unavailable before 1924.

[30] We exclude the UK from the sample of recipient countries since the British government and firms did not seem to rely significantly on international capital markets as a source of funding in this period. Over the 1919-1932 period, only very small amounts of bonds ($2 million or less) were floated (in 1924, 1927, 1928 and 1929) by British corporations on the Amsterdam market. No government debt issues were recorded and the data tables for other financial centers do not include a "United Kingdom" line. We cannot rule out purchases by foreigners of securities on the London market itself, but we lack data on this.

[31] The choice of a log-linear model is justified by the fact that, when expressed in level, the (non-censored part of the) dependent variable is not normally distributed. By contrast, when expressed in log, the (non censored part of the) dependent variable is normally distributed.

[32] We also estimated the regressions using Tobit and Box-Cox Tobit model (following Han and Kronmal, 2004). The results were similar to those obtained with OLS. However, the Tobit model is not appropriate when the zeros in the dependent variable are not due to actual censoring. Santos Silva and Tenreyro (2006) show that Tobit estimates of log-linear model suffer from the same biases as OLS.

1928) and the stop (1929-1932). Finally, column VII reports results obtained for the 1929-1932 period when the Young Loans to Germany are excluded from the sample.[33]

Estimates for 1924-1932 suggest that only a few of the standard pull factors were significant drivers of gross capital flows. We find no evidence that stronger economic growth, lower inflation, lower budget deficits, or higher international reserves were positively associated with capital inflows. We only find weak evidence of an association between capital flows and maintenance of the gold standard (column IV). This result is consistent with the findings of Obstfeld and Taylor (2003), although it is inconsistent with earlier accounts such as Lary (1943) which emphasize the facilitating role of gold convertibility in the 1924-28 period.[34] There is a small negative relationship between capital flows and lagged economic growth in column IV, as if countries having experienced more severe economic disruptions in the past received more capital thereafter.[35] Exporters of primary products also appear to have enjoyed favorable access to international capital markets.[36] By contrast, we find no evidence that countries that previously issued bonds under the auspices of the League of Nations received more capital in the following years, other things equal. While the coefficient on the Germany/1929-1932 dummy varies depending on whether the Young Loans are included in the sample, the results do not seem to indicate that Germany was a positive outlier before 1929 or a negative outlier thereafter.

Comparing the results for the two sub-periods, it would appear that the negative association between capital flows and economic growth is only present during the capital surge

[33] Information on the amount of the Young Loans is taken from *The Economist*, 14 June 1930, "Reparations Loans".
[34] Note that some of our regressions focus specifically on this 1924-28 period and still find no impact of gold-standard membership.
[35] The coefficient implies that a 1% increase in a country's (lagged) economic growth is associated with a 5% decrease in its bond issues. We return to the question of whether this is true for the period as a whole.
[36] Previous authors from Nurkse (1944) to Feinstein and Watson (1995) emphasize the role of improving terms of trade in attracting capital inflows in 1924-28 and of deteriorating terms of trade in discouraging them thereafter. While Nurkse's focus is global, Feinstein and Watson consider specifically the agricultural exporters of Central and Eastern Europe. We also ran the regressions including the (lagged) change in borrowing countries' terms of trade as an explanatory variable but find no association between terms of trade and capital movements.

(1924-1928). A large, negative and significant coefficient on public debt in column VII suggests that investors discriminated against heavily indebted countries during the sudden stop (1929-1932) but not during the surge (1924-1928).[37] Evidently investors only grew seriously concerned with debt levels when liquidity dried up and growth rates declined (and turned negative). Additional evidence of this effect can be found in the breakdown of European bond issues by Moody's rating categories (Table 3). The share of borrowing countries, whose governments were rated in the top two categories (Aaa and Aa) increased in all financial centers in 1929-1932 relative to 1924-1928. This is suggestive evidence that riskier, lower-rated borrowers were being rationed out of the market during the sudden stop.[38] There is a parallel here with recent trends in the eurozone: spreads on the bonds of high-and low-debt European countries were compressed in 2001-8, the period of the recent capital-flow surge, but investors discriminated very sharply between high- and low-debt countries after 2008 when liquidity evaporated and growth collapsed.

We also find that international reserves were *negatively* associated with capital inflows in 1924-1928. In that period governments borrowed on international capital markets in order to purchase gold and foreign exchange reserves for the purpose of stabilizing their currencies. However, international reserves were of little help when the global crisis erupted; there is no evidence that they attenuated the sudden stop of 1929-1932.

In Table 4 we distinguish between public and private sector borrowers. Pull factors mattered even less for private than public borrowers. In particular, we find no association

[37] The coefficient implies that a one standard deviation decrease in a country's ratio of public debt to fiscal revenues is associated with a doubling of bond issues on account of this country.

[38] Ratings data are from Flandreau, Gaillard and Packer (2011). These authors find that the level of governments' external debt is a strong predictor of ratings. We also ran regressions including ratings as an explanatory variable but the results were inconclusive.

between economic growth, international reserves or being an exporter of primary products on the one hand and private-sector borrowing on the other hand.

Although several interesting findings emerge from this analysis, pull factors do not perform very well overall. Many coefficients in Tables 2 and 4 are insignificant at conventional confidence levels. Only a handful of country-specific variables successfully predict capital inflows.[39] By contrast, after controlling for the pull factors in the regressions run over the 1924-1932 period, we still find evidence of an effect of the year dummies. Figure 6 plots the coefficients on the year dummies estimated using the Poisson model (Table 3, column IV). The figure distinguishes between the statistically significant coefficients (at the 5% level, dark-gray bars) and the statistically insignificant coefficients (light-gray bars). All coefficients are to be interpreted relative to 1932, which is the omitted category in the regressions. These year dummies control for supply-side factors common to all countries in the regressions (push factors). Thus, the size and significance of the coefficients on the year dummies on Figure 6 suggest an important role for push factors in accounting for the capital-flow surge and subsequent sudden stop.

We now turn to a more detailed investigation of the push factors in question.

5. Push Factors

Whereas Section 4 focused on the *destination* of long-term capital flows, we now ask what drove the *volume* of capital exports from the financial centers. Our dependent variable for this part of the analysis is the log of the value of bonds floated in a given financial center in a given year, again in millions of 1990 US dollars.

[39] The R-square of the OLS regressions in columns I-III is low as well. However, this might be because ordinary least squares are not appropriate to analyze censored data.

Studies of post-1980 sudden stops have emphasized changes in risk perception and interest rates as determinants of global capital flows.[40] To assess whether a similar dynamic was at play in the 1920s and 1930s, we include long-term interest rates and a proxy for risk in the six financial centers.[41] Long-term interest rates are measured as the yield on long-term domestic government bonds in each center.[42] In the spirit of the recent literature, we use the volatility of stock market returns (i.e. the annualized standard deviation in monthly returns) as a proxy for risk. We control for the source country's size (real GDP), for Europe's overall economic growth, and for its openness to trade.[43]

Table 5 presents regressions run on a balanced panel of six financial centers and twelve years (1921-1932). Columns I and II report simple pooled estimates, while Columns III and IV add financial-center fixed effects. Columns II and IV include year dummies to control for time-varying factors common to all financial centers.

Push factors perform better than pull factors in explaining capital flows in this period. Many of the coefficients in Table 5 are significant at high levels of confidence. After controlling for time and financial center fixed effects, the model in column IV accounts for 69 per cent of the variance in the dependent variable. There is no evidence that European growth or openness to trade boosted bond issues. In contrast, conditions in the major financial centers were strong

[40] See, for example, Milesi-Ferretti and Tille (2011), Fratzscher (2012) and Forbes and Warnock (2012).
[41] We estimated the same equations using short-term interest rates and obtained essentially the same results.
[42] Ideally we would include a measure of ex ante (expected) real interest rates. However, constructing one requires a measure of inflation expectations over the same period (often ten or more years until the bond matures). No such measure is readily available. The plausible proxies, such as forward foreign exchange rates and commodity futures prices, are for much shorter horizons. It is also plausible that under the gold standard that characterized this period price levels were expected to follow a random walk (Barsky and Summers 1985), in which case nominal rates are a perfectly fine stand-in for real interest rates.
[43] European growth and trade openness are constructed based on a sample of fifteen continental European countries (see appendix A). European GDP growth is measured as the annual growth rate of these countries' aggregate real GDP (in per cent). European trade openness is measured as the ratio of their aggregate exports to their aggregate GDP (in %). Milesi-Ferretti and Tille (2011), p. 314 also control for global growth and trade openness in their time-series analysis of global capital flows. Forbes and Warnock (2012) include global growth in their list of the global factors explaining extreme capital flow events.

drivers of capital flows. In particular, we find a strongly negative and statistically significant relationship between capital issues on the one hand and stock market volatility and interest rates on the other. Evidently, risk perceptions and the cost of capital in international capital markets mattered importantly for the volume of new bonds issued. These effects are also large. Earlier studies (e.g. Royal Institute of International Affairs 1937, Lary 1943, Bloomfield, 1950) placed considerable emphasis on the influence of these interest rates; by comparison, we have been able to find less commentary on the role of volatility.

Including a dummy variable for New York in 1929 does not alter the estimates; these results are not driven entirely by the peak in stock market volatility experienced in the US in that year. Excluding 1921 through 1923, when exceptional postwar conditions prevailed, similarly does not alter the results. The relationships we document are not, therefore, an artifact of the early 1920s, when international capital markets and European economies were still recovering from the war.[44]

These results point to three explanations for the sudden stop of the late 1920s: higher interest rates in the main financial centers (New York and London), increased stock market volatility, or a combination of the two. Figures 7 and 8 show the evolution of long-term interest rates and stock market volatility from 1921 to 1932 in the three largest markets: New York, London and Paris. Although interest rates rose slightly in both London and New York in 1929 as a consequence of increases in the Bank of England's and Federal Reserve's discount rates, Figure 7 suggests that US and UK interest rates were not the principal explanation for the sudden stop in gross inflows. Long-term interest rates in New York and London declined again in 1930 and remained at low levels in 1931-1932, relative to the experience of the preceding decade,

[44] The exceptional nature of capital flows in the immediate postwar period is emphasized by Holtfrerich (1986) and Feinstein and Watson (1995). Lary (1943) provides a detailed narrative of foreign lending by the United States, the principal creditor in this period.

when capital flows from these two markets remained at a stop. That said, high interest rates may help to explain the limited participation of Paris in the lending boom of 1924-1928. Because France was struggling to stabilize its currency for much of this period, Paris experienced high interest rates relative to New York and London, handicapping its efforts to become a major financial center. Only after the franc was stabilized in 1926-8 did interest rates decline and Paris begin competing seriously with other international financial centers.

If interest rates have limited ability to explain the stop in new issues in New York and London in 1929-1932, heightened perceptions of risk, as captured by stock market volatility, are a better candidate. The volatility of returns rose sharply in both New York and London in 1929, coincident with the collapse in lending to European countries. At the same time, stock-return volatility in Paris declined, causing bond issues to be redirected there. After a temporary decline in 1930, stock market volatility increased everywhere in 1931. This increase coincided with the final collapse of lending.

The relationship between stock market volatility and capital flows was particularly pronounced for the United States. The simple correlation between the volatility of the S&P index and new foreign issues in New York, in annual data for 1919-1932 is -0.67. Volatility thus appears to have been the key driver of movements in the value of new capital issues for European borrowers in the United States. This result resembles findings for the recent period: Milesi-Ferretti and Tille (2011) and Forbes and Warnock (2012) both conclude that global risk perceptions have been important determinants of capital flow surges and reversals in the past 30 years. As in 2008, increased risk aversion brought capital flows to a sudden stop after 1928 and helped to precipitate a global financial crisis.

This result also sheds light on contemporary perceptions of foreign lending. Both Harris (1935) and Nurkse (1944) expressed strong skepticism about international capital flows, arguing that they were economically and financially destabilizing on balance. Their conclusions were informed by this interwar experience when, our results suggest, debtor countries were first inundated by and then starved of foreign capital, due as much to changing conditions in international capital markets as any changes in local economic circumstances and policies.

6. The Capital Flow Reversal

The preceding evidence suggests that the sudden stop in gross capital inflows to European countries was accompanied by capital flight from the borrowers. This phenomenon peaked in 1931, when the earlier capital importers became large net capital exporters. In this section we ask whether the magnitude of the reversal in European private capital flows was related to country-specific characteristics and whether countries could successfully insulate themselves from the reversal. Given that data on net capital flows are limited to a subset of countries, we attempt only a simple bivariate analysis. The capital flow reversal is measured as the change in net private capital inflows between 1930 and 1931 as a percentage of 1930 GDP. We relate this dependent variable to the average ratio of net capital inflows to GDP between 1925 and 1930, 1930 real GDP growth, the government budget balance as a share of fiscal revenues, and the ratio of public debt to fiscal revenues.

Few of these variables are good predictors of the severity of the 1931 reversal. Faster GDP growth and smaller budget deficits appear to have done nothing to ameliorate the severity of the reversal. We find a weak *positive* correlation between the magnitude of the 1931 reversal and the level of public debt. This reflects the large public debts of the capital exporters of the

1920s – the UK, Netherlands, Switzerland, and France – which were on the receiving end of the capital-flow reversal in 1931. Aside from France, these countries had little or no inflation in the first half of the 1920s, in contrast with the countries of Central and Eastern Europe, which had essentially eliminated their debts through high inflation at the beginning of the decade.[45] In contrast, the amount of foreign capital received during the surge years (1925-1930) is a good predictor of the magnitude of the 1931 reversal (Figure 9). Countries relying most heavily on foreign borrowing were most severely affected by the sudden stop in 1931, in other words.

Finally, we can juxtapose the magnitude of the reversal against the ratio of international reserves to imports in 1930 and the percentage change in international reserves in 1931. Figure 10 indicates that reserves did not provide much insurance against sudden stops, confirming what we found for gross capital flows. However, the strong positive relationship between the change in reserves and the capital-flow reversal in Figure 11 indicates that countries confronted to the sudden stop reacted by massively selling international reserves in 1931.[46] This confirms the finding by Accominotti (2011) that the capital importing countries of the 1920s experienced significant exchange market pressure during the global financial crisis of 1931, while capital exporters faced upward pressure on their currencies.

The overall picture is that there was little a country could do to insulate itself from the capital flow reversal. Once the reversal was underway, governments and central banks could attempt to finance it by selling reserves, and the more reserves they had the more they could finance before being forced to pull the plug and devalue, default and/or impose exchange controls. Finally, the extent of previous foreign borrowing was strongly correlated with the

[45] The present result is to be contrasted with our previous finding for gross capital flows. Those results showed that public debts were negatively associated with gross capital inflows in the 1929-1932 period. The contrast suggests that while low levels of public debt may have been perceived positively by foreign investors, this did not prevent domestic investors from engaging in capital flight in 1931.

[46] Whereas countries to which capital flows were redirected accumulated reserves.

severity of the 1931 reversal. One policy lesson from this interwar episode is therefore that countries more dependent on capital inflows are also more vulnerable to their sudden stops and reversals.

7. Conclusion

The parallels between capital flow surges and reversals in Europe in the periods leading up to the two great financial crises of the modern era, the Great Depression and the Global Credit Crisis, are more than skin deep. In both periods there was a flood of capital from one half of Europe to the other, as well as to the continent's recipient half from the rest of the world. There was neglect by lenders of public debt burdens and their implications for credit worthiness during the boom and then the sudden rediscovery of sovereign risk once capital dried up. In both periods, countries that imported foreign finance most liberally during the boom suffered the largest reversal and most serious dislocations when the surge of capital inflows came to an end.

But recipient-country characteristics explain only a part of trends and fluctuations in private long-term capital flows in the 1920s and early 1930s. At least as important were conditions in international capital markets. Among the important factors there was the level of interest rates, as emphasized in a host of earlier studies, but also perceptions of the riskiness of the investment environment, as captured by the volatility of equity prices, the same proxy utilized in studies of the recent period.

Interwar experience thus underscores the extent to which global factors largely exogenous to conditions in the borrowing countries shaped the capital inflows and outflows to which European countries were subject. This was a precedent of which European countries in the period leading up to subprime/global credit crisis of 2007-8 could have usefully taken heed.

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Table 1. Summary Statistics

	Nb of countries	Years	Unit	Obs.	Mean	St. Dev.	Minimum	Maximum
Capital Flows								
Gross Bond Issues (by receiving country)	28	1919-1932	Mio 1990 USD	392	114.39	341.02	0.00	3655.08
Gross Bond Issues (by financial center)	6	1919-1932	Mio 1990 USD	84	533.81	868.43	0.00	3981.57
Borrowing country level								
Real GDP	20	1924-1932	Mio 1990 USD	173	47639.00	61150.32	4976.00	263367.00
Real GDP per capita (lagged)	20	1924-1932	Ratio	169	3125.20	1373.39	908.69	6331.68
Real GDP growth (lagged)	20	1924-1932	%	165	2.83	5.49	-18.53	25.76
Inflation (lagged)	20	1924-1932	%	177	3.34	20.48	-35.86	196.48
Public debt/fiscal revenues (lagged)	20	1924-1932	Ratio	151	3.94	2.82	0.65	15.62
Public budget balance/fiscal revenues (lagged)	20	1924-1932	Ratio	164	-0.10	0.20	-0.97	0.23
International reserves/imports (lagged)	20	1924-1932	Ratio	169	0.38	0.31	0.07	2.14
Gold standard	20	1924-1932	Dummy	180	0.61	0.49	0.00	1.00
Primary exporter dummy	20	1924-1932	Dummy	180	0.55	0.50	0.00	1.00
Financial center level								
Real GDP	6	1921-1932	Mio 1990 USD	72	199329.70	249341.00	15854.00	843334.00
Stock market volatility	6	1921-1932	%, annualized	72	14.95	10.13	2.44	56.49
Long-term interest rate	6	1921-1932	%	72	4.60	0.75	3.29	6.48
European level								
European GDP growth	-	1921-1932	%	72	2.33	4.40	-4.89	8.60
European trade openness	-	1921-1932	%	72	7.92	1.02	5.58	9.04

Sources: see text and appendix A.

Table 2. Pull Factors for European Capital Flows, 1924-1932

	OLS			Poisson			
	I: 1924-1932	II: 1924-1928	III: 1929-1932	IV: 1924-1932	V: 1924-1928	VI: 1929-1932	VII: 1929-1932 (excl. Young Loans)
Ln Real GDP	1.169***	2.294***	0.682	1.092***	1.712***	0.126	0.138
	(2.82)	(3.42)	(1.20)	(4.33)	(5.59)	(0.33)	(0.41)
Lagged Ln Real GDP per capita	0.636	-0.126	0.912	-0.059	-0.525	0.187	0.084
	(1.06)	(-0.13)	(1.18)	(-0.18)	(-1.22)	(0.35)	(0.18)
Lagged GDP growth	0.004	-0.056	0.039	-0.048**	-0.057**	-0.033	0.001
	(0.09)	(-0.83)	(0.62)	(-2.15)	(-2.08)	(-0.52)	(0.03)
Lagged Inflation	0.006	-0.021	-0.017	0.016	0.006	-0.014	-0.001
	(0.21)	(-0.58)	(-0.24)	(1.03)	(0.33)	(-0.28)	(-0.03)
Lagged Public Debt/Revenues	-0.057	-0.013	-0.283	-0.035	-0.019	-0.338*	-0.354**
	(-0.54)	(-0.10)	(-1.35)	(-0.81)	(-0.40)	(-1.78)	(-2.06)
Lagged Budget Balance/Revenues	-0.514	-0.298	-0.667	-0.076	-0.024	-0.341	-0.685
	(-0.41)	(-0.15)	(-0.41)	(-0.15)	(-0.04)	(-0.34)	(-0.74)
Lagged Reserves/Imports	-1.344	-6.473***	0.772	-2.015***	-4.365***	1.120	1.133
	(-1.57)	(-3.84)	(0.63)	(-2.63)	(-4.86)	(1.08)	(1.20)
Gold Standard	0.568	0.536	0.396	0.665*	0.903*	1.194	0.894
	(0.92)	(0.56)	(0.44)	(1.70)	(1.86)	(1.07)	(0.96)
Primary Exporter	1.269*	3.011***	0.669	0.887**	2.025***	-0.469	-0.592
	(1.85)	(2.66)	(0.74)	(2.05)	(4.21)	(-0.65)	(-0.95)
Germany 1924-1928	1.504	-0.040		0.441	-0.434		
	(0.97)	(-0.02)		(0.77)	(-0.67)		
Germany 1929-1932	0.426		1.021	0.571		1.716*	0.878
	(0.28)		(0.59)	(0.99)		(1.79)	(1.04)
League of Nations	0.534	1.488	0.126	0.169	0.344	-0.430	-0.485
	(0.90)	(1.51)	(0.16)	(0.55)	(1.04)	(-0.82)	(-0.99)
Constant	-16.168**	-18.089*	-13.290	-7.476**	-8.351*	0.466	1.809
	(-2.54)	(-1.81)	(-1.57)	(-1.97)	(-1.95)	(0.07)	(0.32)
N	139	65	74	139	65	74	74
Adjusted R^2	0.22	0.23	0.16				
Pseudo R^2				0.73	0.79	0.70	0.50

Dependent variable: Total amount of bonds issued by a given country in a given year. Columns I-III report OLS estimates (dependent variable in log) and columns IV-VII report estimates obtained using the Poisson pseudo-maximum likelihood estimator. All regressions include year dummies and exclude the UK. t and z-statistics in parentheses; *: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Table 3. Breakdown of European Bond Issues By Moody's Rating Categories, 1924-1932 (in %)

Financial Center/Rating	I: New York	II: London	III. Other	IV: All	V: All (excl. Young Loans)
			A. 1924-1928		
Non-rated	6.8	32.8	8.6	11.2	-
B	0.2	0.9	0.0	0.3	-
Ba	4.7	1.6	3.3	3.9	-
Baa	3.5	9.8	5.7	4.9	-
A	28.2	22.1	37.8	29.0	-
Aa	43.3	24.8	35.7	39.0	-
Aaa	13.4	8.0	8.9	11.7	-
Aaa and Aa	56.7	32.8	44.6	50.7	-
Total	100.0	100.0	100.0	100.0	-
			B. 1929-1932		
Non-rated	0.0	10.3	2.1	2.6	3.5
B	2.9	4.8	6.8	5.6	7.4
Ba	0.0	2.7	9.6	6.3	8.4
Baa	0.0	11.5	9.4	7.4	9.8
A	7.8	8.2	6.4	7.0	9.2
Aa	63.0	54.4	60.3	60.2	47.2
Aaa	26.3	8.2	5.4	10.9	14.4
Aaa and Aa	89.3	62.5	65.7	71.1	61.7
Total	100.0	100.0	100.0	100.0	100.0

Note: The table shows the breakdown of European bond issues in New York, London and Other (Paris, Amsterdam, Stockholm and Zurich) in percentages. Data for Moody's ratings were communicated by Marc Flandreau and Norbert Gaillard and are from Flandreau, Gaillard and Packer (2011).

Table 4. Pull Factors: Public vs. Private Sector Borrowers, 1924-1932

	Public sector		Private sector	
	I: OLS	II: Poisson	III: OLS	IV: Poisson
Ln Real GDP	0.520	1.331***	1.289***	0.898**
	(1.28)	(3.64)	(3.55)	(2.45)
Lagged Ln Real GDP per capita	0.778	-0.152	0.204	-0.233
	(1.32)	(-0.29)	(0.39)	(-0.74)
Lagged GDP growth	-0.043	-0.080*	0.033	-0.013
	(-0.94)	(-1.93)	(0.81)	(-0.52)
Lagged Inflation	0.034	0.013	0.024	0.019
	(1.13)	(0.53)	(0.89)	(0.93)
Lagged Public Debt/Revenues	0.017	-0.009	-0.042	-0.052
	(0.17)	(-0.13)	(-0.46)	(-0.91)
Lagged Budget Balance/Revenues	0.945	-0.061	-0.026	0.282
	(0.78)	(-0.08)	(-0.02)	(0.40)
Lagged Reserves/Imports	-1.925**	-4.331***	-0.811	-0.615
	(-2.30)	(-2.70)	(-1.08)	(-0.76)
Gold Standard	1.234**	1.182*	0.295	0.320
	(2.04)	(1.76)	(0.55)	(0.67)
Primary Exporter	1.786***	1.505**	0.793	0.223
	(2.65)	(2.52)	(1.32)	(0.31)
Germany 1924-1928	3.029**	-0.750	1.901	1.292
	(1.98)	(-0.92)	(1.39)	(1.78)
Germany 1929-1932	3.044**	0.790	-0.677	0.187
	(2.02)	(0.91)	(-0.50)	(0.27)
League of Nations	0.881	0.353	0.192	-0.083
	(1.51)	(0.84)	(0.37)	(-0.19)
Constant	-11.466*	-9.802*	-13.936**	-5.006
	(-1.83)	(-1.84)	(-2.49)	(-1.01)
N	139	139	139	139
Adjusted R^2	0.23		0.31	
Pseudo R^2		0.62		0.75

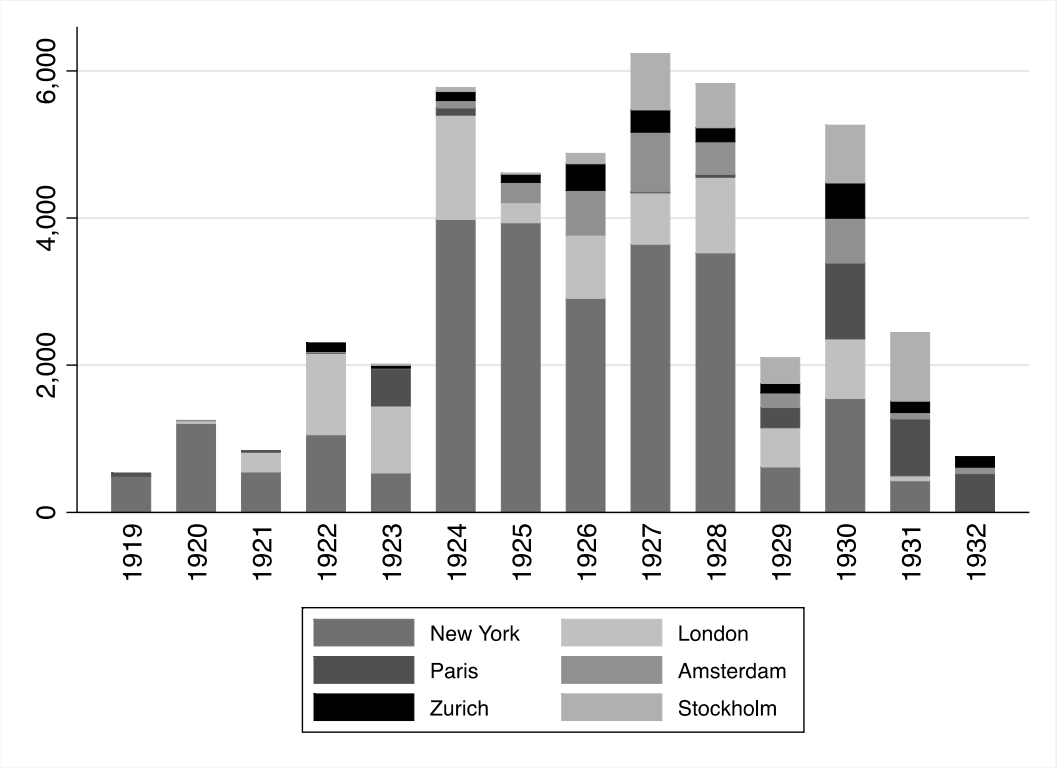
Dependent variable: Total amount of bonds issued by a) governments and municipalities (columns I and II) and b) corporations (columns III and IV) of a given country in a given year. Columns I and III report OLS estimate (dependent variable in log). Columns II and IV report estimates obtained using the Poisson pseud-maximum likelihood estimator. All regressions include year dummies and exclude the UK. t and z-statistics in parentheses; *: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Table 5. Push Factors for European Capital Flows, 1921-1932

	I	II	III	IV
Financial center-level variables				
Ln Real GDP	0.239*	0.256*	2.103	6.130
	(1.69)	(1.74)	(0.80)	(1.48)
Volatility of Stock Returns	-0.106***	-0.118***	-0.117***	-0.119***
	(-4.79)	(-4.37)	(-4.54)	(-3.43)
Long-Term Interest Rate	-1.891***	-1.831***	-1.794***	-1.796***
	(-6.64)	(-5.20)	(-4.48)	(-3.89)
European level variables				
European Real GDP Growth	-0.006		0.009	
	(-0.12)		(0.16)	
European Trade Openness	0.369*		0.174	
	(1.69)		(0.55)	
Constant	9.587**	11.692***	-10.409	-53.948
	(2.89)	(3.73)	(-0.36)	(-1.16)
Year dummies	No	Yes	No	Yes
Financial Center Fixed Effects	No	No	Yes	Yes
N	72	72	72	72
Adjusted R^2	0.64	0.64	0.62	0.69

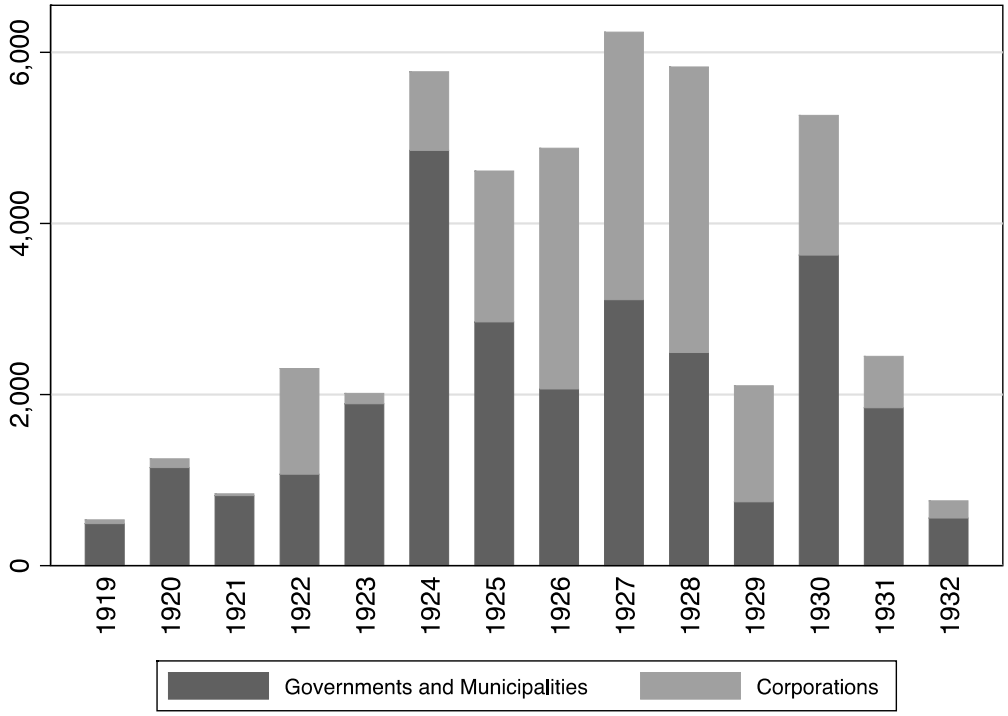
Dependent variable: (Log of) the total amount of European bonds issued in a given financial center and a given year. European trade openness and GDP growth are calculated on a sample of fifteen European countries (see appendix A). t-statistics in parentheses; *: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Figure 1. Bond Issues on Account of European Countries, 1919-1932
By Financial Center (In millions of 1990 constant US$)



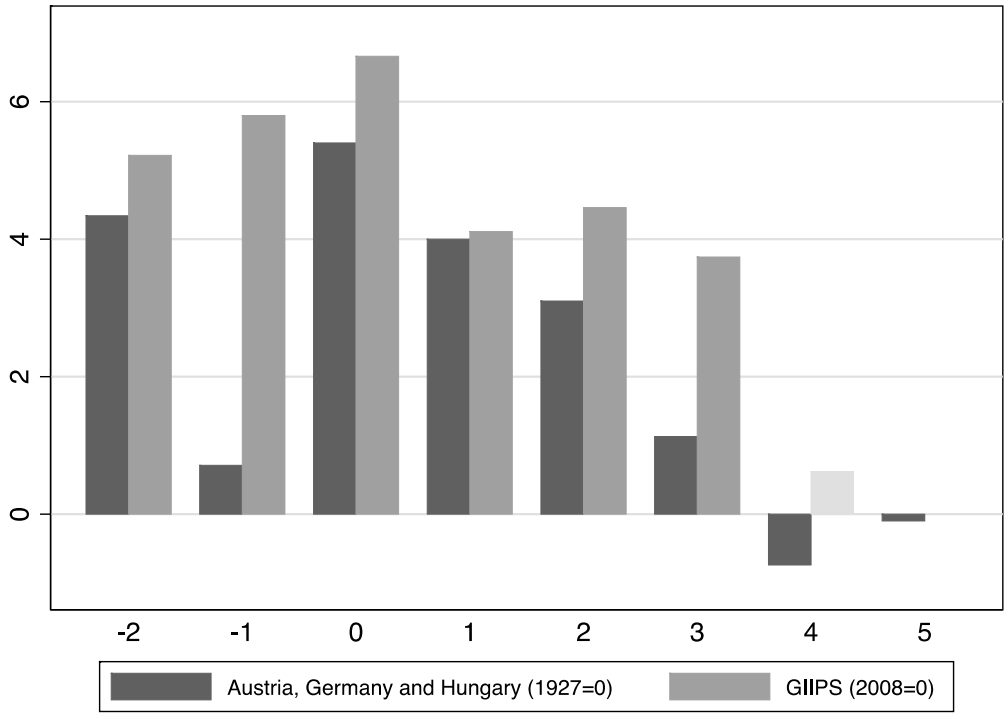
Source: Anon (1943), "League of Nations - Europe's Capital Movements, 1919-1932 – A Statistical Note", unpublished manuscript, Mudd Library, Princeton University.

Figure 2. Bond Issues on Account of European Countries, 1919-1932
By Class of Borrower (In millions of 1990 constant US$)



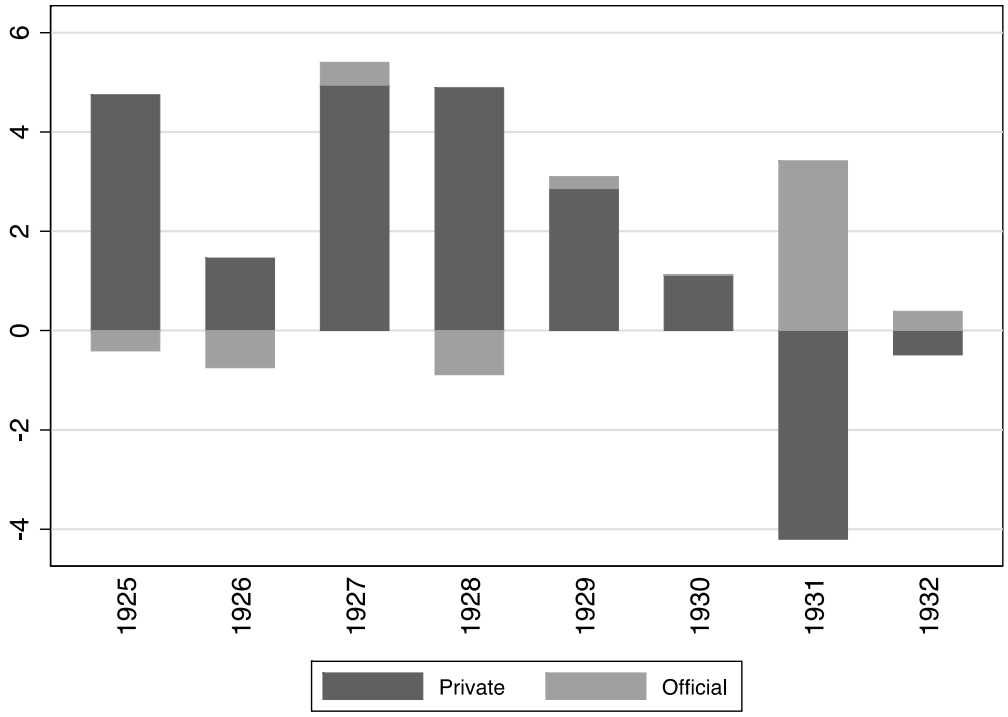
Source: Anon (1943), "League of Nations - Europe's Capital Movements, 1919-1932 – A Statistical Note", unpublished manuscript, Mudd Library, Princeton University.

Figure 3. Ratio of Current Account Deficit to GDP (in per cent)
1925-1932 vs. 2006-2012



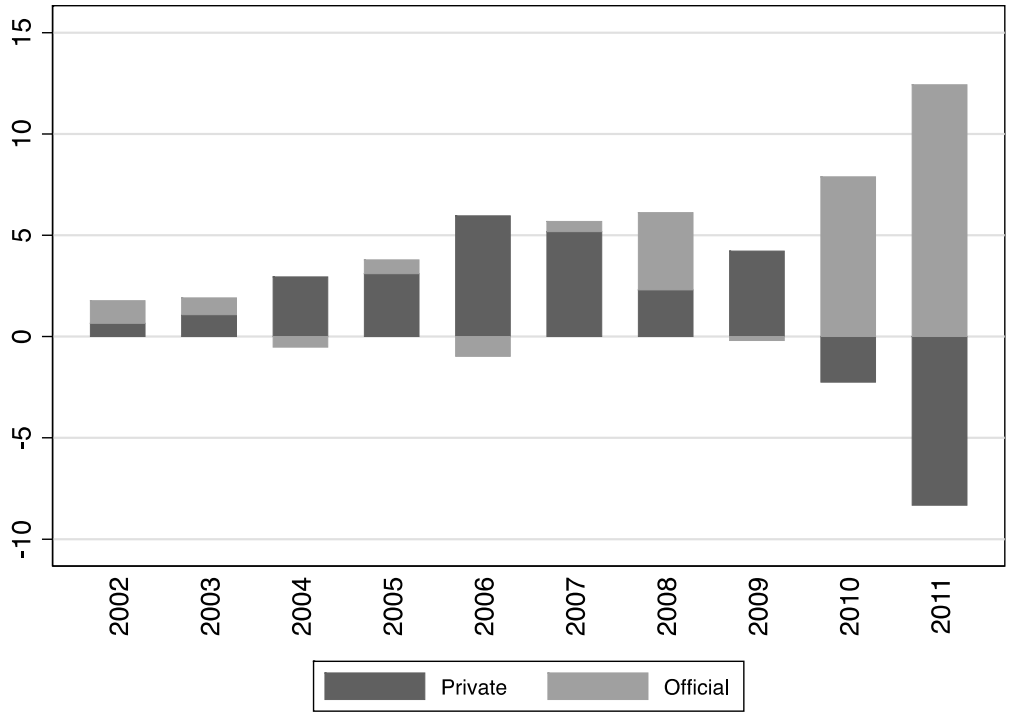
Note: The graph displays the ratio of aggregate current account deficit to aggregate GDP for Austria, Germany and Hungary (1925-1932) and Greece, Italy, Portugal, Spain and Ireland (2006-2012). Year 0 corresponds to 1927 and 2008 respectively for the two groups. The figure for the GIIPS' current account deficit in 2012 is an estimate. Sources: GIIPS: IMF World Economic Outlook Database, April 2013; Austria, Hungary and Germany: see appendix A.

Figure 4. Private and Official Capital Inflows, 1925-1932
Austria, Germany and Hungary (in % of aggregate GDP)



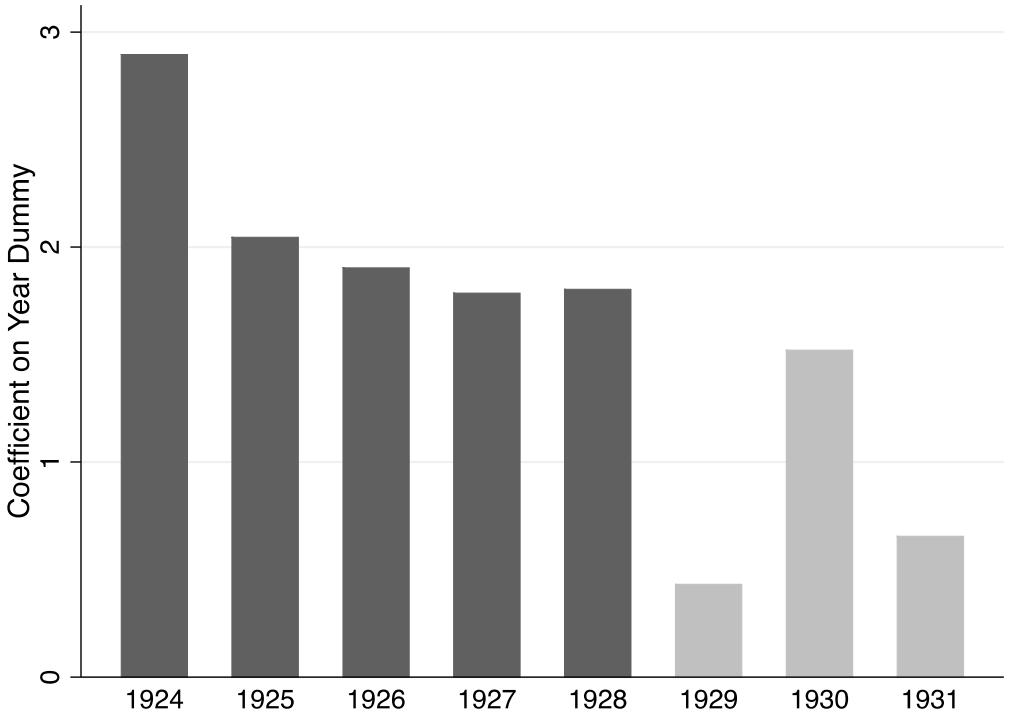
Source: See appendix A. The graph displays the aggregate ratios of net private and official capital inflows to GDP (in %) for Austria, Germany and Hungary. Private capital inflows correspond to the sum of the current account deficit and accumulation of gold and foreign exchange reserves. Official inflows correspond to international reserves outflows and loans arranged by the Bank for International Settlements.

Figure 5. Private and Official Capital Inflows, 2002-2011
GIIPS (in % of aggregate GDP)



Source: Data communicated by Jef Boeckx (originally from Thomson Datastream). The graph displays the aggregate ratios of net private and official capital inflows to GDP (in %) for Greece, Ireland, Italy, Portugal and Spain. Private capital inflows are calculated as the difference between the financial account and the net liabilities of the central bank and government reported under the "Other Investment" item of the balance of payment statistics (see Boeckx, 2012 for details). Official capital inflows correspond to a. TARGET2 liabilities; b. loans granted by the IMF, EFSF, EFSM, and other EU governments and c. changes in the central bank's reserve assets.

Figure 6. Coefficients on Year Dummies

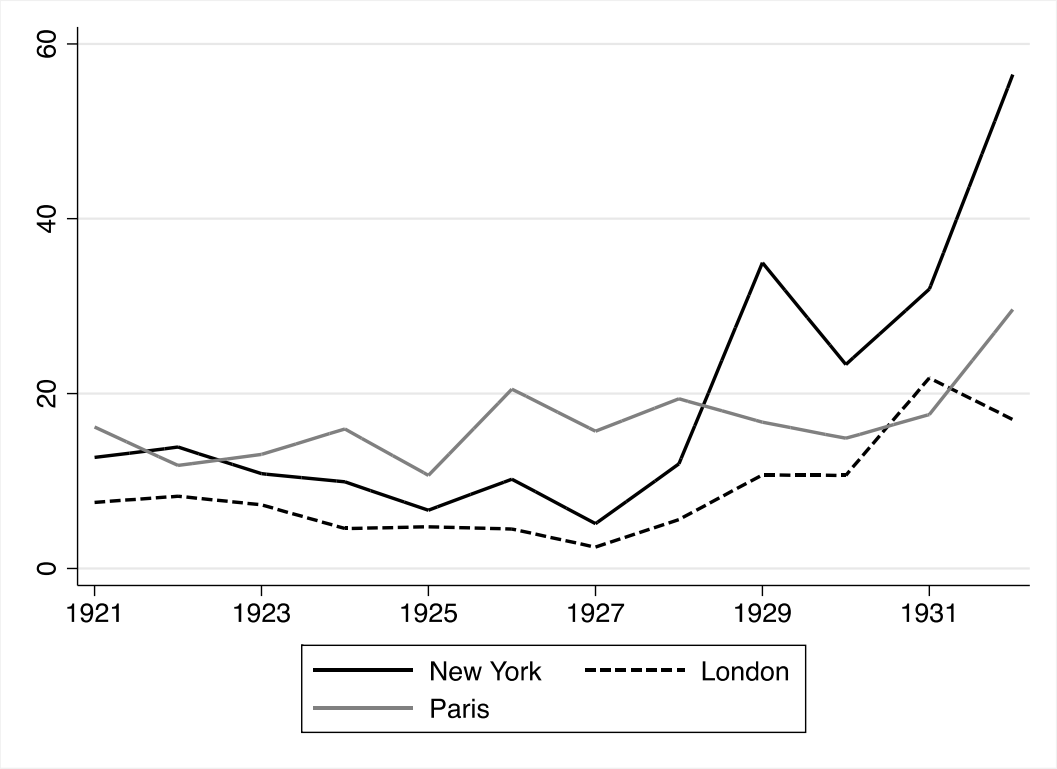


Note: The figure displays the coefficients on year dummies estimated using the Poisson model of table 3, column IV, after controlling for borrowing countries-specific variables. A dark gray bar indicates a statistically significant coefficient at the 5% level of confidence. A light-gray bar indicates a statistically insignificant coefficient at the 5% level of confidence.

Figure 7. Long-term interest rates in New York, London and Paris (in per cent) 1921-1932

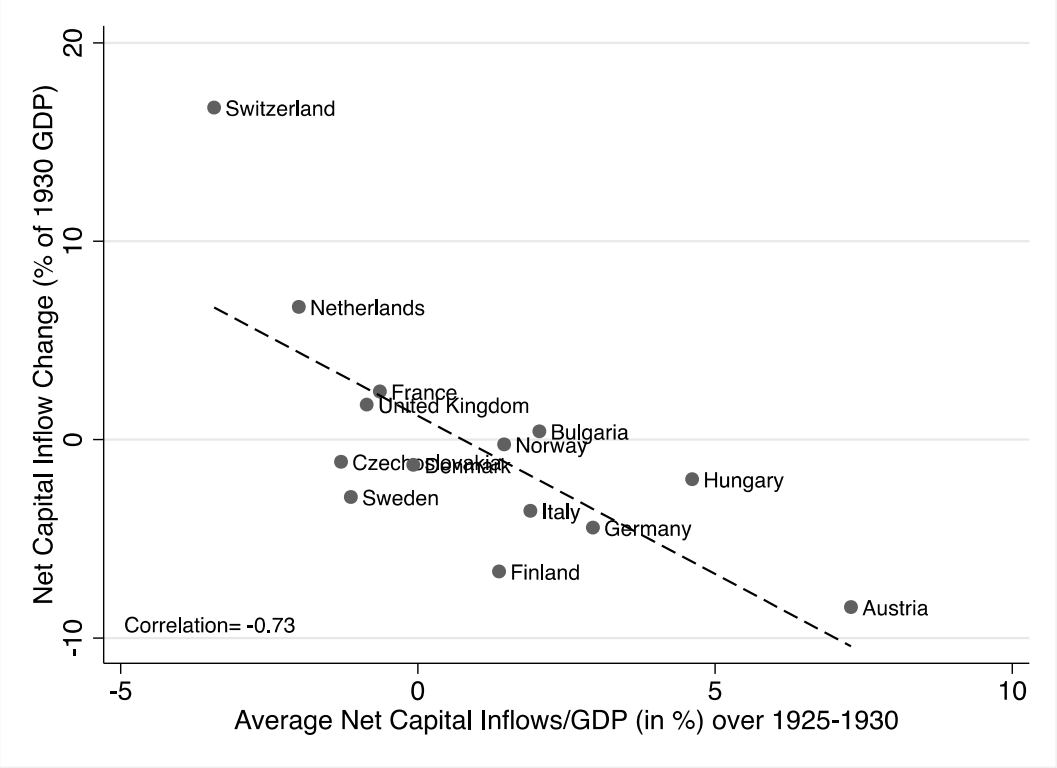
Note: New York: Yield on long-term US government bond; London: Yield on 2.5% consol; Paris: Yield on French 3% Rente perpétuelle. Sources: see appendix A.

Figure 8. Stock Market Volatility in New York, London and Paris (in per cent, annualized) 1921-1932



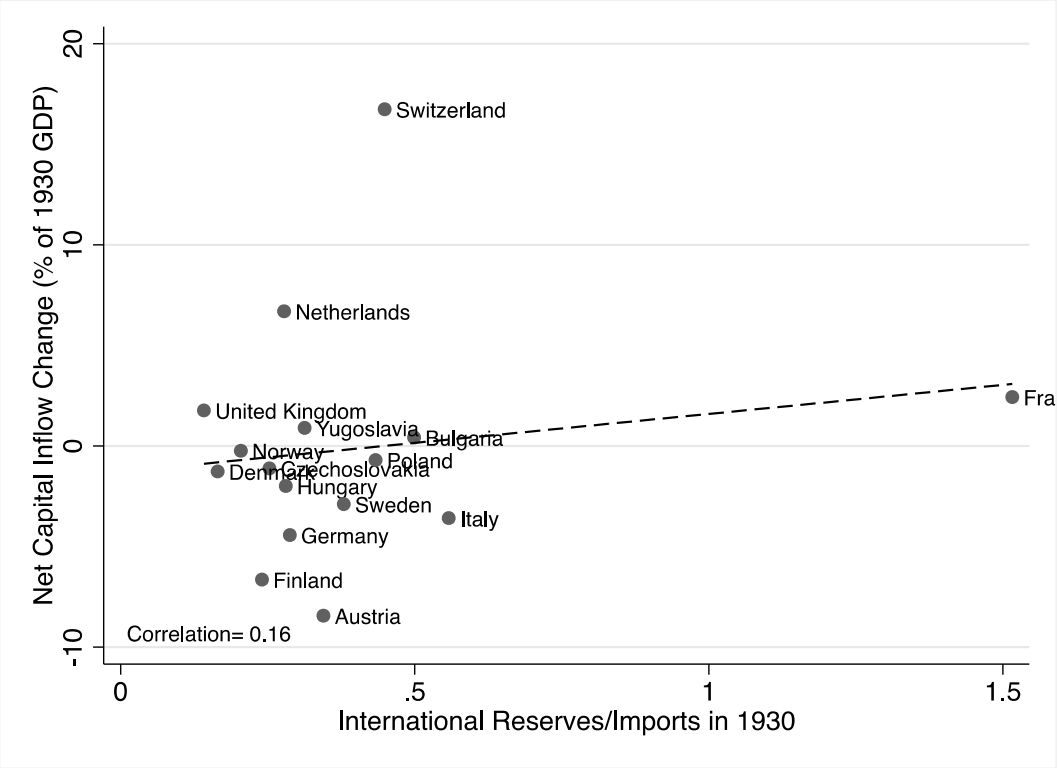
Note: Annualized standard deviation of monthly returns on the S&P, FTSE and Paris indices (in %). Sources: see appendix A.

Figure 9. 1931 Capital Flow Reversal and Average Ratio of Capital Inflows to GDP, 1925-1930



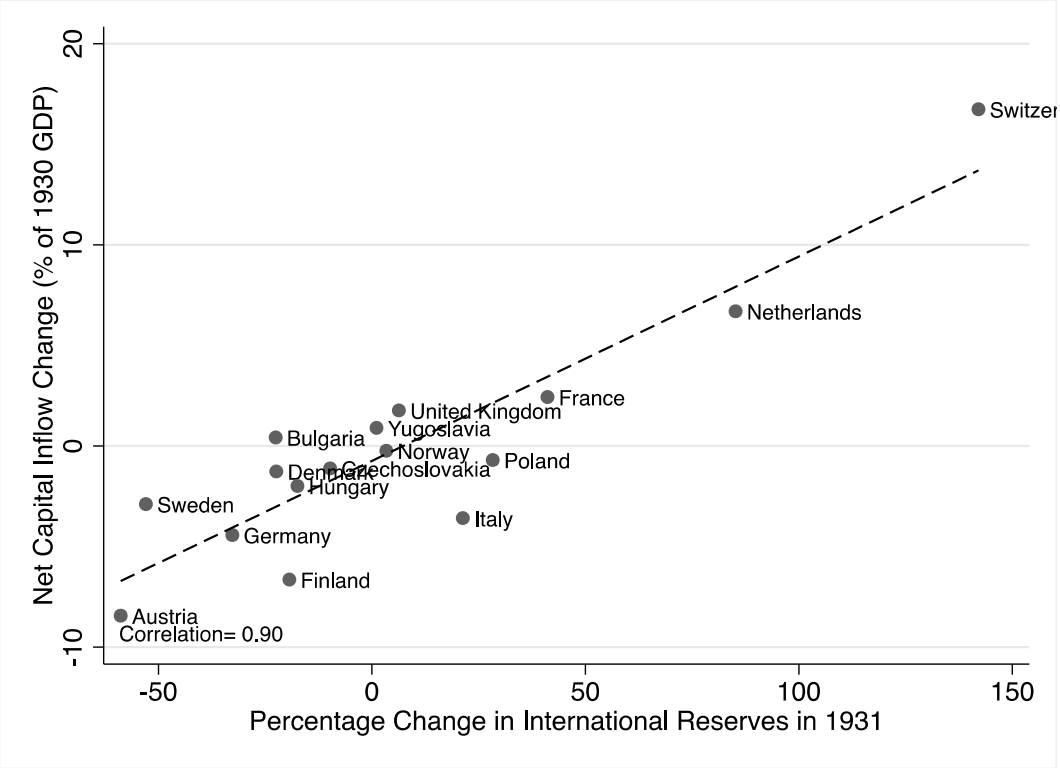
Note: y-axis: Change in net capital inflows between 1930 and 1931 as a percentage of 1930 GDP.
Sources: see text and appendix A.

Figure 10. 1931 Capital Flow Reversal and Level of International Reserves



Note: y-axis: Change in net capital inflows between 1930 and 1931 as a percentage of 1930 GDP.
Sources: see text and appendix A.

Figure 11. 1931 Capital Flow Reversal and Change in International Reserves



Note: y-axis: Change in net capital inflows between 1930 and 1931 as a percentage of 1930 GDP. Sources: see text and appendix A.

Appendix A: Data Sources and Definitions

Gross Long-Term Capital Flows

Gross long-term European bond issues in New York, London, Paris, Amsterdam, Stockholm and Zurich over 1919-1932 were computed from an anonymous memo in the Ragnar Nurkse papers at Princeton University's Mudd Library. The memo gives the total value of long-term bond issues on account of European countries in each financial center from 1919 to 1932. The frequency is annual. The data are reported in millions of current US Dollars and were converted into 1990 constant US Dollars using the US Consumer Price Index in Carter and Sutch (2006), series Cc2.

Twenty-eight countries stand among the list of European capital recipients in the source (Austria, Belgium, Bulgaria, Czechoslovakia, Danzig, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxemburg, Netherlands, Norway, Poland, Portugal, Rumania, Spain, Sweden, Switzerland, United Kingdom, Yugoslavia). However, regression results in tables 2 and 3 exclude Danzig, Estonia, Iceland, Ireland, Latvia, Lithuania and Luxemburg, covariates being unavailable for these countries. The UK is also excluded from the sample of capital recipients (see section 4). More details on the source for long-term capital flows are given in section 2.

Net Capital Flows (Official and Private)

- **1925-1931**

Annual net capital inflows (official and private) were computed from the different countries' balance-of-payments statistics and additional sources. For estimates of official flows in the 1920s and 1930s we combined the change in international reserves as described below with data on loans through the Bank for International Settlements from BIS Annual Reports and Toniolo (2005, pp. 108-109). Net private capital inflows were then defined as the sum of the current account deficit and official capital outflows. Sources for current account deficits are the following:

- Austria: The current account balance is from an internal database of the Austrian National Bank (data kindly communicated by Clemens Jobst);
- Bulgaria, Czechoslovakia, Denmark, Finland, Italy, Norway, Poland, Sweden: Mitchell (2007);
- France: Sicsic (1993);
- Germany: Ritschl (2002), completed by United Nations (1949) for 1924 (this source reports the balance of current account and gold);
- Hungary: Mitchell (2007), completed by United Nations (1949) for 1925;
- Netherlands: den Bakker et al. (1990), table 6, pp. 203-204;
- Switzerland: United Nations (1949);
- United Kingdom: Sayers (1976), vol. 3, appendix 32.

Net capital inflows (in Mio USD) were matched with the different countries' nominal GDPs, taken from the following sources:

- Austria, Bulgaria, Hungary, Yugoslavia: Mitchell (2007);
- Czechoslovakia, Poland: Kaser and Radice (1985);

- Denmark, Finland, France, Italy, Norway, Sweden, United Kingdom: Jones and Obstfeld (2001);
- Germany: Ritschl and Spoerer (1997);
- Netherlands: den Bakker et al. (1990);
- Switzerland: Siegenthaler (1996).

- **2002-2011**

Net private and official capital inflows to Germany, Greece, Ireland, Italy, Portugal and Spain during the recent period were computed using balance of payment statistics. The data were kindly communicated by Jef Boeckx and are originally from Thomson Datastream. We followed Boeckx (2012)'s methodology and defined net private capital inflows as the difference between the financial account and the net liabilities of the central bank and government (recorded under "Other investment"). We defined official inflows as the sum of the net liabilities of the central bank and government, IMF financing and reserve assets of the central bank.

In order to check our estimate, we also reconstructed the amounts of EU disbursements and bilateral loans to Greece, Ireland and Portugal (from the websites of the European Commission and European Financial Stability Facility, and national governments' sources). These amounts can be compared with the net liabilities of the government recorded under "other investment" in the IMF's balance-of-payment statistics and which includes official loans from the EFSF and EFSM bilateral government loans. The tables below compare the series for the three countries which received bailout money in 2010-2012. The two series are very similar, revealing that the net liabilities of the government of the IMF's balance of payment statistics are indeed dominated by EU and bilateral loans. The data reported in the tables are in billions of US dollars.

1. Greece

Year/Item	Net Liabilities of the Government (Boeckx's dataset)	EU disbursements and bilateral loans
2008	-1.34	0.00
2009	-3.18	0.00
2010	24.68	32.15
2011	41.11	39.88
2012	--	94.68

Note: "EU disbursements and bilateral loans" correspond to

1) Bilateral loans made to Greece as part of the Greek Loan Facility (source: European Commission, "Financial Assistance to Greece") and;
2) EFSF disbursements (source: EFSF, "Lending operations")

2. Ireland

Year/Item	Net Liabilities of the Government (Boeckx's dataset)	EU disbursements and bilateral loans
2008	-0.59	0.00
2009	-0.40	0.00
2010	-0.38	0.00
2011	28.44	30.57
2012	--	18.55

Note: "EU disbursements and bilateral loans" correspond to:

1) EFSM loan disbursements (source: European Commission, "Financial Assistance to Ireland")
2) EFSF disbursements (source: EFSF, "Lending operations");
3) UK bilateral loan to Ireland (source: HM Treasury)
4) Swedish bilateral loan to Ireland (source: Riksgälden Swedish National Debt Office) and;
5) Danish bilateral loan to Ireland (source: Ireland Department of Finance)

3. Portugal

Year/Item	Net Liabilities of the Government (Boeckx's dataset)	EU disbursements and bilateral loans
2008	-3.17	0.00
2009	0.48	0.00
2010	-0.36	0.00
2011	29.16	29.23
2012	--	24.80

Note: "EU disbursements and bilateral loans" correspond to

1) EFSM loan disbursements (source: European Commission, "Financial Assistance to Portugal")
2) EFSF disbursements (source: EFSF, "Lending operations").

Real GDP and GDP Per Capita

Real GDPs (in Mio 1990 USD) and population sizes are from Maddison (2006).

Inflation

European countries' annual inflation rates (in %) are from the following sources:

- Austria, Czechoslovakia: Mitchell (2007), percentage change in the consumer price index, completed by League of Nations, *Statistical Year-Book* for 1923.
- Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland: Michael Bordo's Financial Crises Database (available at: https://sites.google.com/site/michaelbordo/home)
- Bulgaria, Czechoslovakia, Poland, Romania: Mitchell (2007), percentage change in the consumer price index;
- Hungary: Mitchell (2007), percentage change in the consumer price index, completed by League of Nations, *Statistical Year-Book* for 1924.
- Yugoslavia: 1924-1926: League of Nations, *Statistical Year-Book*, percentage change in the wholesale price index; 1927-1928: Mitchell (2007), percentage change in the wholesale price index; 1929-1932: Mitchell (2007), percentage change in the consumer price index.

Public Debts

European countries' annual amounts of government debt were obtained from a post-war UN study on public debts during the 1920s and 1930s (United Nations, 1948).

Fiscal Revenues and Expenditures

Statistics for the different countries' central government revenues and expenditures were published in the League of Nations' *Statistical Year-Book* at an annual frequency as of 1924. We relied on this source for most countries in the sample (the data from the *Statistical Year-Books* were completed with Mitchell, 2007, for Denmark and Finland in 1923, Austria in 1924 and Switzerland in 1923-1924). Data for France and Portugal are from Mitchell (2007). Germany's fiscal revenues and expenditures are taken from Ritschl (2002) and were completed with Mitchell (2007) for 1924. Data for Italy are from Fua (1969), vol. 3.

International Reserves

Under the gold exchange standard system, central banks were allowed to hold short-term foreign assets as a complement to gold in their legal reserves (used to back monetary circulation). International reserves were therefore composed of gold holdings and foreign exchange. Gold reserves were obtained from a 1943 Federal Reserve volume (Board of Governors of the Federal Reserve System, 1943, pp. 521-555). This source reports all European central banks' gold holdings during the interwar period. Data for the different countries' foreign exchange reserves are from the following sources:

- Austria: 1923-1925: League of Nations, *Statistical Year-Book, 1926*; 1926-1932: Oesterreichische Nationalbank (1926-1932), *Mitteilungen des Direktoriums der Oesterreichischen Bank*, various issues;
- Bulgaria, Czechoslovakia, Denmark, Finland, France, Germany, Switzerland: 1923: League of Nations, *Statistical Year-Book, 1926*; 1924-1932: Nurkse (1944);
- Hungary, Greece, Italy, Poland, Portugal, Spain, Yugoslavia: Nurkse (1944);

- Netherlands: Netherlands Bank N.V. (1924-1933), *Reports presented by the President and Commissaries to the General Meeting of Shareholders*, "Statements of the Bank's weekly Returns", various issues;
- Norway: 1923: League of Nations, *Statistical Year-Book, 1926*; 1924-1925: Nurkse (1944); 1926-1932: Klovland (2004);
- Romania: Background data for Eichengreen and Flandreau (2009);
- Sweden: 1923: League of Nations, *Statistical Year-Book, 1926*; 1924-1925: Nurkse (1944); 1926-1932: Sveriges Riksbank (1926-1932), *Tillgangar och skulder. (Assets and Liabilities)*, various issues.

Imports and Exports
Data for the different countries' nominal imports and exports are from Mitchell (2007).

Gold Standard
A gold standard dummy (taking value 1 if a country was on the gold standard in a given year) was constructed using the information provided in Eichengreen (1992, table 7.1, pp. 188-190).

Primary Exporter Dummy
A primary exporter dummy (taking value 1 if a country's exports were composed of more than 75% of primary products over 1925-1932) was constructed using the information published in the League of Nations' *Statistical-Year-Book*. The League of Nations distinguished between five classes of commodities: 1. live animals; 2. articles of food and drink; 3. materials, raw or partly manufactured; 4. manufactured articles; and 5. gold and silver. We define primary products as commodities belonging to categories 1 to 3. The League of Nations' *Statistical Year-Books* do not display the commodity composition of Finland's trade but the share of manufactured products in Finland's exports is reported in a working paper of the United Nations Statistics Division (United Nations Statistics Division, 1962).

League of Nations
The League of Nations dummy takes value 1 for countries, which received a League of Nations' Loan in the 1920s. Information on League of Nations' Loans is from Decorzant and Flores (2012). League of Nations countries include Austria (1923-1932), Bulgaria (1926-1932), Danzig (1925-1932), Estonia (1927-1932), Greece and Hungary (1924-1932).

Ratings
Data on Moody's annual ratings were kindly communicated by Marc Flandreau and Norbert Gaillard and are from Flandreau, Gaillard and Packer (2011). The ratings only cover countries whose governments issued bonds in New York over the period.

Stock Market Volatility
Stock market volatility in New York, London, Paris, Amsterdam, Stockholm and Zurich is measured as the annualized standard deviation (in %) of monthly returns (in local currency) on each domestic stock price index. The stock market indices used are the S&P index of all common stock prices for New York (source: NBER Macro-History Database, series m11025),

the UK FTSE all-share index for London (source: Global Financial Data, series _FTASD), France's CAC all tradables index for Paris (source: Global Financial Data, series _CACTD), Netherlands' all shares price index for Amsterdam (source: Global Financial Data, series _AAXD), Sweden's OMX Affärsvärldens general index for Stockholm (source: Global Financial Data, series _OMXAFGD) and Switzerland's general stock price index for Zurich (source: Global Financial Data, series_SPIXD).

Long-Term Interest Rate

Long-term interest rates correspond to the yields on long-term domestic government bonds in the different financial centers. For New York, we use the annual series of US government bond yield in Carter et al. (2006, series Cj1192). For London, we use the yield on 2.5% consols (source: NBER Macro-History Database, series m13041c). For Paris, we use the yield on the French 3% *Rente perpétuelle* (source: League of Nations, *Statistical Year-Book*, completed with Global Financial Data, series IGFRA10D for 1921-1923). The Dutch long-term interest rate is taken from International Conference of Economic Services (1934) for 1921-1928 and International Institute of Statistics (1938) for 1929-1932 and corresponds to the average yield on eight domestic bonds (initially computed by the Netherlands Bank). We rely on the "long-run yield" series of the Riksbank's Database (*Historical Monetary Statistics of Sweden, 1668-2008*, section: interest and stock returns, available at http://www.historicalstatistics.org) for Sweden's long-term interest rate (note that this series perfectly matches the "yield on 7 government bonds" series reported in the League of Nations' *Statistical Year-Book*). Finally, for Zurich, we use the yield on 3.5% SBB/CFF (Swiss Federal Railways) bonds reported in Swiss National Bank (2007). The source indicates that this yield "was considered the benchmark for the Swiss capital market" (p. 11).

European GDP Growth and Trade Openness

European real GDP growth and trade openness were calculated on the basis of the sources described above for a sample of 15 continental European countries for which data are available over 1921-1932. The countries in this sample are Austria, Belgium, Czechoslovakia, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and Yugoslavia. European real GDP growth is measured as the percentage change in these countries' aggregate real GDPs. European trade openness is measured as the ratio of their aggregate exports to aggregate GDPs (in %). Nominal exports were converted into 1990 constant US dollars using the US Consumer Price Index in Carter and Sutch (2006), series Cc2.