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The mother of all sudden stops: capital flows and reversals in Europe, 1919-32

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

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Abstract

New data documenting European bond issues in major financial centres from 1919 to 1932 show that conditions in international capital markets and not just in borrowing countries are important for explaining the surge and reversal in capital flows. In particular, the sharp increase in stock market volatility in the major financial centres at the end of the 1920s figured importantly in the decline in foreign lending. We draw parallels with Europe after 2008.

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 a severe economic and financial crisis. The crisis of the early 1930s in continental Europe remains, and is regularly pointed to, as one of the most striking examples of the consequences of a capital flow reversal in modern times.

In contrast to the large empirical literatures on sudden stops during the capital market boom of 1870-1913 and the post-1980 era, however, few studies have provided systematic evidence and analysis of the capital flow surge and stop of the interwar period.[1] We attempt to fill this gap with a systematic study of the determinants of capital flows in the 1920s and early 1930s. We rely on new archival data on gross capital exports to European countries. Whilst most historical studies of gross capital flows focus on one or two source countries at most, we consider capital flows from six financial centres to twenty-eight recipient countries. As we show, interwar capital flows were large: in 1927, the aggregate current account deficit of Austria, Germany and Hungary was nearly 5 per cent of their aggregate GDP. Similarly, the subsequent shift in Central European countries' current account deficit between 1927 and 1931 was large: it represented 6 per cent of their collective GDP, culminating with the move of these countries into current account surplus in 1931.

As we further show, conditions in international capital markets and not just conditions in the borrowing countries were important for explaining the interwar surge and reversal. Specifically, the sharp increase in stock market volatility in the major financial centres at the end

[1] Clemens and Williamson 'Wealth bias'; Catao, 'Currency drops'; Esteves, 'European capital exports'; and Bordo et al., 'Sudden stops', explore the determinants of capital flows and sudden stops during the 1870-1914 period. Milesi-Ferretti and Razin, 'Current account reversals'; and Forbes and Warnock, 'Capital flow waves', look at sudden stop episodes of the post-1980 period. Calvo et al., 'Real exchange rates'; and Calvo and Talvi, 'Financial factors' analyse the sudden stops experienced by Latin American countries in the early 2000s. Milesi-Ferretti and Tille, 'Great Retrenchment' explore the causes of the retrenchment in capital flows of 2007-9. Ahearne, Schmitz and von Hagen, 'Current account imbalances'; Lane and Pels, 'Current account imbalances'; and Lane, 'Capital flows', explore the determinants of capital flows following the advent of the euro.

of the 1920s figured importantly in the decline in foreign lending.[2] Mauro, Sussman and Yafeh have shown that capital flows to emerging markets and spreads on their bonds show greater co-movements today than in the late nineteenth century, as if 'investors today seem to pay less attention to developments in the country whose spreads are considered' and respond more to changes in global economic and financial conditions.[3] Mauro et al. point to institutional changes in how international investment is organized (for example, to the growth of institutional investors with widely diversified portfolios) as an explanation for this shift. Our statistical results, together with supportive qualitative evidence, suggest that the shift in question was already underway in the 1920s.

Our analysis also adds nuance to discussions of 1920s capital flows. We show that the slowdown in capital inflows began in earnest in 1928, rather than following the Wall Street crash of 1929. As credit conditions tightened in London and New York, European sovereigns and firms turned to continental financial centres, so much so that a quarter of all European new external bonds in 1929-32 were issued in Paris. In addition, sovereign issuance was substituted for private issuance as global stock market volatility and interest rates rose. Finally, as global financial conditions soured from 1929, credit ratings seem to have played a greater role in influencing market access, consistent with the findings of Flandreau, Gaillard and Packer.[4]

Section I describes the historical context. Section II describes the data and uses them to characterize the lending surge and reversal. Sections III and IV focus on conditions in borrowing

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[2] 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 similar to that detected by Milesi-Ferretti and Tille, 'Great Retrenchment', in the run-up to the recent crisis.

[3] Mauro, Sussman and Yafeh, 'Emerging markets spreads', p.697.

[4] Flandreau, Gaillard and Packer, 'US rating agencies'.

and lending countries respectively. Section VI, in concluding, draws out the broader implications.

I

The stage for interwar capital flows, as for many things that transpired in the 1920s and 1930s, was set by the Great War. The destruction wrought by the First World War created financial needs for reconstruction, most obviously in Belgium and France but also in Central Europe, while the readjustment difficulties bequeathed to peacetime dealt a setback to incomes. The result was a gap between desired investment and realized saving that European countries sought to bridge by borrowing abroad. The United States, in contrast, had not experienced destruction of infrastructure or productive capital stock during the First World War; instead the war stimulated the growth of investment and incomes. The implication for the postwar United States was an increase in realized saving relative to desired investment, making foreign investment an obvious outlet for the excess.

By this logic, there should have been an initial flow of capital from the United States and from European countries where wartime disruptions and postwar adjustment difficulties were least to European countries where incomes and savings were significantly depressed and where the need for investment in reconstruction and rehabilitation was extensive, followed by a gradual reflow of interest and amortization once the borrowed funds had been put to productive use. Some observers claimed to discern these tendencies in the capital flows of the 1920s.[5] Others, their hindsight informed by the financial disaster of the 1930s, were sceptical that foreign lending and borrowing were guided by such logic. Nurkse, in his influential review of interwar

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[5] See for example the discussion in Lary, *The United States*.

currency experience, argued that capital flows were erratic in the 1920s and destabilizing in the 1930s.[6] Bloomfield in a classic study of short-term capital flows, criticized interwar flows as 'massive, sweeping, and highly capricious.'[7] Harris and, more recently, Ritschl argued that borrowing by Germany, in particular, was unproductive and unsustainable.[8] In the German case and generally, governments and corporates borrowed without due attention to the productivity of investments and their capacity to make debt servicing payments. Lenders for their part failed to exercise due diligence in evaluating the creditworthiness of those to whom they lent. This led to surges of lending when volatility was low, rendering investors sanguine, punctuated subsequently by 'sudden stops' when creditors grew concerned about the creditworthiness of their counterparties, resulting in the 'massive, sweeping, and (…) capricious' capital flows condemned by Bloomfield. It followed that a significant share and, in the case of the New York market, a majority of the new issues of the 1920s lapsed into default in the 1930s, at the conclusion of what Flandreau, Gaillard and Packer describe as 'a classic boom-bust debt cycle.'[9]

A variety of distortions and incentive problems could have accentuated these fluctuations and given rise to the resulting instability. Politicians with short time horizons had an incentive to over-borrow and overspend on transfer programmes and public works that might appeal to their constituents and result in re-election. Max Winkler, popular chronicler of the excesses of the period, describes the case of a Bavarian town that sought to borrow for a power plant but, with encouragement from its bankers, incurred additional debts to build a municipal swimming pool, a bath house and a gymnasium.[10] Hjalmar Schacht, president of the Reichsbank, and S. Parker

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[6] See Nurkse, *International currency experience*, p.16 and *passim*.

[7] Bloomfield, *Capital imports*. James, 'Financial flows' is a dissent from the majority view, arguing that the problem in the interwar period was not the intrinsic volatility or instability of capital flows but high public debts, confidence in whose sustainability was fragile and which were subject to destabilization by capital outflows.

[8] Harris, *Germany's foreign indebtedness*; Ritschl, *Deutschlands Krise*; idem, 'German transfer problem'.

[9] Flandreau, Gaillard and Packer, 'US rating agencies'.

[10] Winkler, *Foreign bonds*, p. 87.

Gilbert, Agent General for Reparations, were among those who warned that German governments, facing little in the way of market discipline, were overspending and over-borrowing.[11]

As this reference Gilbert anticipates, the incentives for borrowing and lending were further influenced by reparations. German officials allegedly had an incentive to encourage borrowing insofar as an even heavier burden of external debt strengthened the case for restructuring their country's reparations obligation, while lenders may have had an incentive to accommodate their wishes. 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 was inverted, making private lending less attractive and contributing to the sudden stop.[12]

Lenders are similarly criticized as inadequately discriminating. New York was new to the business of international finance, having recently been elevated to financial-centre status by the Federal Reserve Act, which allowed U.S. banks to branch abroad and originate foreign business, and by the First World War, which interrupted European competition. Retail investors had only recently been acquainted with the merits of government bonds by the Liberty Loan campaign of 1917-9.[13] Although there were a few long-standing houses like J.P. Morgan & Co. with international experience and connections, underwriting in the 1920s was increasingly dominated

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[11] See Mintz, *Foreign bonds*, p. 77 and *passim*.

[12] See Ritschl, *Deutschlands Krise*; idem, 'German transfer problem'; and Section III below. This paragraph's summary is of course a radical simplification of the large and controversial literature over the incentive effects of German reparations. See Schuker, 'American reparations'; and Ritschl, 'Reparations', for two views.

[13] Lewis, *Foreign investments*, describes the role of financial reform and the First World War in the rise of New York as a financial centre. The role played by the Liberty Loan campaign is emphasized by Eichengreen, 'US capital market'.

by new entrants with little reputation to protect.[14] Underwriters establishing bond departments and security affiliates to sell foreign issues on to other investors were heavily motivated by the commission earned at the time of issue rather than the subsequent performance of the bond and eventual return to the investor, resulting in excessive and indiscriminate lending. Reliable delegated monitors they were not.[15]

The final investor had her own incentive and information problems, as final investors do. Americans had limited prior experience in investing in foreign bonds, on whose basis they might formulate realistic expectations of risks and returns. U.S. credit rating agencies, though experienced in rating corporate debt securities, were new to the game of evaluating foreign bond issues, sovereign issues in particular. Ratings, like capital flows, were strongly procyclical and had little predictive power for future returns above and beyond contemporaneous market yields.[16]

Many foreign bonds were held as part of widely diversified portfolios by institutional investors, notably by investment trusts, a structure imported into the United States from Britain. Calvo and Mendoza have argued that institutional investors with widely diversified portfolios have inadequate incentive to incur the costs of gathering and processing information on the risks of individual bonds.[17] Mauro, Sussman and Yafeh suggest that the dependence of modern investors, in contrast to their nineteenth-century predecessors, on such institutional investors may help to explain the volatility of international bond markets.[18] Contemporary critiques of the

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[14] Mintz, *Foreign bonds*, is the classic analysis of the dynamics of this process. Feis, *Diplomacy*, p. 3 echoes her view: 'Save for a few they [the investment bankers of the period] were untrained and – it must be said – unfit for the task of guiding the flow of American capital abroad. The more cautious and fastidious – the more responsible among them – were lost in the push.'

[15] Stallings, *Banker*, is perhaps the best-developed statement of this view. See also Darity and Horn, *Loan pushers*.

[16] See Flandreau, Gaillard and Packer, 'US rating agencies'.

[17] Calvo and Mendoza, 'Regional contagion'.

[18] See Mauro, Sussman and Yafeh, 'Emerging markets spreads'. We return to their arguments below.

investment-trust industry suggest that this transition may have already been underway in the 1920s.[19]

In addition to individual borrowers and investors and their institutional intermediaries, the hand of government can also be discerned in some of these financial ebbs and flows. Feis recounts how in the mid-1920s the U.S. State Department let it be known in no uncertain terms how it would look unfavourably on bond flotations for France until the French government settled its war debts to the United States.[20] Moggridge describes how the Bank of England, with some support from the UK Treasury, used moral suasion ('polite blackmail') to discourage lending to foreign governments in 1925-6, around the time when Britain was first struggling to return and then to remain on the gold standard.[21] And there was of course the role of 'transfer protection' (effective seniority for interest payments on new commercial lending relative to reparations payment) in the case of Germany prior to 1929. We consider some of these policies in more detail in the analysis that follows.

II

We attempt to shed quantitative light on these issues using estimates of private bond issues to twenty-eight European countries from the six major financial centres: New York, London, Paris, Amsterdam, Stockholm and Zurich.[22] These estimates, spanning 1919 to 1932,

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[19] The best-known such critique is Galbraith, *Great Crash*. Insofar as investment trusts invested in other investment trusts, the resulting incentive problems were greater still. Speaker, *Investment trust*, is a more sanguine contemporary view.

[20] Feis, *Diplomacy*.

[21] Moggridge 'Controls on long term capital'.

[22] Anon, 'Europe's Capital movements', p. 25 notes that long-term bond and share issues outside the six centres were minimal. For example, it is estimated that 97.7 per cent of Germany's long-term loans were floated on these six markets. The data source refers to 'lending countries' (the US, the UK, France, Netherlands, Sweden, Switzerland) rather than 'financial centres'. However, since the data refer to the country of issuance of the bonds and not to the purchasers' nationality, the term 'lending country' might be confusing. To avoid confusion, we refer to 'financial centres' rather than 'lending countries' throughout the paper.

were compiled from a typewritten, pencil-annotated memo in the Ragnar Nurkse papers at Princeton University's Mudd Library.[23] This document, dated June 1943 and entitled 'Europe's Capital Movements, 1919-32: A Statistical Note', was prepared for the League of Nations. Nurkse, who worked for the League from 1933 through 1945, almost certainly authored it or at least contributed substantially to its making.[24]

Analysing gross rather than net capital flows, as is necessary when working with new issues, has several advantages. First, reliable balance-of-payments statistics for the pre-World War II period, as required to construct estimates of net capital flows, exist only for a limited subset of countries. Even then, the capital account is constructed as the residual item of the balance of payments and is therefore subject to reliability problems.[25] Moreover, net capital flows say little about countries' ability to access international capital markets, as a zero net flow might very well reflect a large (gross) inflow counterbalanced by a large (gross) outflow, as Fostel and Kaminsky note. They therefore recommend using international primary issuance as an

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[23] Princeton University, Mudd Library, MC173, Series 1, Box 8, Folder 3. Feinstein and Watson 'International capital flows', p. 106, refer to a copy of this memo 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.'

[24] 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 comprises the population of European bond issues in the six centres. Commentary indicates that much work was done to place new issues in different financial centres on a comparable basis and thus address the inconsistency problems of other sources (see, for example, Royal Institute of International Affairs, *Problem of international investment*). 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.

[25] 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, 'International Capital Flows'.

indicator of access to foreign finance.[26] While there is a handful of studies of gross long-term capital issues in the nineteenth century,[27] we are unaware of similar work for the interwar years.

We exclude official capital flows, currency swaps and short-term credits extended by central banks and governments.[28] More generally, we exclude short-term capital movements.[29] Short-term loans constituted a non-negligible part of capital flows and were used extensively in financing trade.[30] Then there was the amortization (retirement) by previous borrowers of their outstanding obligations and also some repatriation of foreign securities to investors in the issuing countries. Lary and Bloomfield 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 domestic investors.[31] Finally, there was the opportunistic repatriation starting in 1931 of foreign bonds in default that were bought back at deep discounts. Because these transactions were economically and diplomatically sensitive, little is known about

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[26] Fostel and Kaminsky, 'International capital markets'; Broner et al., 'Gross capital flows'; Milesi-Ferretti and Tille, 'Great Retrenchment'; Fratzscher, 'Capital flows'; and Forbes and Warnock, 'Capital flow waves', also stress the importance of considering gross capital flows in sudden-stop episodes as a way of distinguishing the behaviour of foreign and domestic investors.

[27] Clemens and Williamson, 'Wealth bias'; Catao, 'Currency drops'; Esteves, 'Imperialism and capitalism'. Moreover, this earlier work focused on capital issues in one or two financial centres, whereas our data track European issues in all major financial centres. Thus, Clemens and Williamson, 'Wealth bias', focus on primary issues on the London market in the 1865-1913 period, using data from Jenks, *British capital*; and Simon, 'Foreign investment', as updated by Stone, *Global export*. Esteves compares the determinants of capital issues in Britain and Germany. Catao, 'Currency drops'; and Bordo, Cavallo and Meissner, 'Sudden stops', have also explored the determinants of sudden stops during the 1880-1913 period using alternatively London gross primary capital issues and net capital inflows.

[28] Appropriately so, it can be argued, insofar as these flows reflected political determinants as opposed to the economic and financial conditions that are the focus of our analysis. 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.

[29] Limited direct evidence is available on the magnitude and direction of short-term capital flows, the best discussion being Conolly, 'Short-term indebtedness'.

[30] 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, *The United States;* and Eichengreen and Flandreau, 'International currency'). This instrument was also used widely in Britain (see Accominotti, 'London merchant banks').

[31] Lary, *The United States*; Bloomfield, *Capital imports*. 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, *The United States*.

their extent.[32] Only for a small handful of countries do we have reasonably 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 running at 20 to 30 per cent of new issues in the boom period 1924-28.[33] 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.[34] 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.[35]

Figures 1 and 2 show the value of long-term bonds floated by European countries in the six financial centres from 1919 to 1932 in millions of 1990 US dollars. Issues are broken down by financial centre in figure 1 and by public- versus private-sector borrower in figure 2. They show how gross capital exports to European countries rose sharply starting in 1924 and peaked in 1927. While New York accounts for the largest share of bonds issued in the 1924-8 period (66

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[32] Although some estimates are available in the German case. See Klug, 'German buybacks'.

[33] See Lary, *The United States*, for details.

[34] While our data do not include share issues, shares accounted for at most ten per cent of the total of gross capital issues for foreign residents in the six financial centres under study. Anon, 'Capital movements', table 3C, estimates that total share issues on account of European countries reached 642 millions of current US dollars over 1919-1932, whereas bond issues amounted to 5,889 millions of US dollars.

[35] We also construct variables designed to capture potential determinants of capital flows. Recipient country characteristics include: GDP, GDP per capita, GDP growth, public debt, central government's budget surplus, broad money, the volume of international reserves and terms of trade changes. We add dummy variables for whether countries were exporters of primary products and were on the gold standard. Primary exporters are defined as countries whose exports were at least 75 per cent primary products. Conditions in the financial centres include source country 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. See online appendix for the list of data sources.

per cent), other markets like London (16 per cent), Amsterdam (8 per cent), and to a lesser extent Stockholm (6 per cent) played significant roles. Starting in 1926, private borrowers were responsible for the largest share of capital issues.

[Figure 1 about here]

[Figure 2 about here]

That new issues on behalf of European borrowers fell already in 1928 may surprise readers who associate the decline in lending with the collapse of the New York Stock Exchange and the deterioration in U.S. economic and financial conditions. In fact, that the falloff in lending to Europe began earlier was noted by earlier specialists (for example, Mintz).[36] We see in figures 1 and 2 that the phenomenon was not limited to New York and that it disproportionately affected public-sector borrowers.

New bond issues declined by 64 per cent in real terms in 1929. However, this was followed 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 centres 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. Where Paris had been only a marginal player in the capital-flow surge of the 1920s, it became an equally important market as New York in the early years of the Great Depression. Twenty-five per cent of all European bonds issued in 1929-32 were floated in Paris. As the New York and London capital markets dried up in 1929-32, European governments and firms evidently turned

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[36] Mintz, *Foreign bonds.*

to Paris and Stockholm. This partial substitution between financial centres 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 centres rather than simply to questions about the solvency of the recipients.

Figures 3 to 5 compare the capital surge and sudden stop in the European periphery during two crisis episodes: 1925-32 and 2006-13. 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 Hungary in 1925-32 and Greece, Ireland Italy, Portugal and Spain (the GIIPS) in 2006-13. We set year zero, the peak year for current account deficits, as 1927 and 2008 respectively. Evidently, 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 faster in the Great Depression than in the GIIPS after 2008. By 1930, Central European countries had already substantially reduced their current account deficits and they even ran current account surpluses as of 1931. By contrast, the GIIPS' current account deficits remained substantial until 2011. Although a further contraction occurred in 2012, these countries were still running modest deficits in that year.

[Figure 3 about here]

Part of the explanation for the differences in current account adjustments between the two periods is the extent to which official 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).[37] 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 is direct.

[Figure 4 about here]

[Figure 5 about here]

Figures 4 and 5 show the aggregate ratios of net private and official capital inflows to GDP for the main European debtors in 1925-32 and 2002-11.[38] They confirm that the reversal in 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.[39] By 1931 and 2010, net capital inflows to the European debtors were strongly negative, reflecting capital flight.[40] Evidently, the decline in private capital inflows

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[37] On the BIS loans, see Toniolo, *Bank for International Settlements*.

[38] 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, 'Eurosystem'). Since errors and omissions are excluded, the sum of private and official capital inflows does not exactly match the figure for the current account deficit.

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

[40] In their study of capital flow waves since the 1980s, Forbes and Warnock, 'Capital flow waves', distinguish 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, European capital importers in the 1920s faced a combination of a stop and a flight in 1931-2.

to Greece, Ireland, Italy, Portugal and Spain in 2008-11 was larger than that experienced by Central European countries in 1927-31.[41] However, the rise in official inflows was also larger, resulting in an initially less severe current account adjustment for the capital importers. In 2011 indeed, net official inflows to the GIIPS amounted to 12.4 per cent of their collective GDP and more than compensated for net private outflows (8.3 per cent 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, Germany and Hungary amounted to 3.4 per cent of their collective GDP and did not compensate for the net private outflows (4.2 per cent of GDP). These countries therefore had to shrink their current account deficits more severely and, by 1931, transform those deficits into surpluses.[42]

The decline in private capital inflows to the debtor countries was associated in both periods with a decline in capital outflows from the major European creditors. France, the Netherlands and Switzerland (the largest capital exporters of the 1925-30 period) became net importers of capital in 1931, registering a net private capital inflow of 5.7 per cent of collective GDP. But this private inflow was offset by an outflow of official capital (change in international reserves and BIS loans) of 4.4 per cent of their collective GDP. In contrast, Germany (the largest European capital exporter in the early 2000s) remained a net exporter of private capital in 2008-11, although 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.

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[41] The decline in aggregate net private capital inflows to Austria, Germany and Hungary between 1927 and 1931 was 8.4 per cent of their collective 1927 GDP. The decline in aggregate net private capital inflows to the GIIPS between 2008 and 2011 represented 10.1 per cent of their collective 2008 GDP. The sudden stop experienced by Central Europe in the early 1930s also is comparable to that endured by Latin America in the early 2000s. Calvo and Talvi, 'Financial factors', table 8.1, find that net capital inflows declined by 8 per cent on average for seven Latin American countries between 1998 and 2002. See also Calvo, Izquierdo and Talvi, 'Real exchange rate'.

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

Thus, in contrast to the post-2008 situation, when the Eurosystem provided collective insurance against sudden stops, Central European countries in 1928-31 had to self-insure by accumulating and using international reserves. Official assistance was more limited in this earlier period. Although not negligible, these limited official inflows did not suffice to compensate for private capital outflows.

III

Following earlier literature, we distinguish determinants of capital flows specific to the lending countries and the global financial system from factors specific to the recipient countries, starting here with recipient-specific conditions.[43] Our dependent variable is the amount of bond borrowing by a given country in all markets in a given year (in millions of current US dollars). We control for the recipients' economic size (GDP), macroeconomic performance (real GDP growth lagged), economic development (lagged GDP per capita), fiscal and monetary policies (lagged inflation, lagged ratios of public debt, fiscal surplus and international reserves to GDP along with a gold standard dummy), position in world trade (lagged change in terms of trade as well as an indicator for whether the country is a primary product exporter), financial depth (ratio of broad money to GDP) and finally for the presence or absence of capital controls (as coded by Quinn).[44]

As noted above, Ritschl argued that transfer protection encouraged private capital inflows into Germany before 1929 whereas the Young Plan discouraged them thereafter. We therefore add a set of dummy variables for Germany for the Dawes Plan years (1924-8), the Young Loan

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[43] An earlier literature, motivated by the Latin American and Asian crises, developed this distinction. See, for example, Calvo, Leiderman and Reinhart, 'Capital inflows', and Fernandez-Arias, 'Private capital inflows'.
[44] Quinn, 'Capital account liberalization'. Dropping the capital controls measure enables us to expand the country sample by two but does not otherwise change the results below.

disbursement year (1930) and the post-Young Loan period (1931-2).[45] Reflecting Decorzant and

Flores' emphasis on the role of the League of Nations in European countries' access to external

capital in the 1920s, we also include a dummy variable for whether a country previously

borrowed under the auspices of the League.[46] Table 1 reports summary statistics for all variables.

[Table 1 about here]

Our econometric results focus on the period 1924-32. The 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.[47] Following Santos Silva and Tenreyro, we therefore

use the Poisson pseudo-maximum likelihood (PPML) estimator.[48] This provides a simple way to

deal with the zero values and is well behaved even when the proportion of zero observations is

very large.[49] We include year dummies in all regressions in order to control for time-varying,

supply-side factors common to all receiving countries. We also report results with and without

(borrowing) country fixed effects. Although adding country fixed effects dramatically reduces

degrees of freedom and eliminates variation at the cross-section level, comparing results with

and without country fixed effects can still be informative. Table 2 reports estimates for an

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[45] Ritschl, *Deutschlands Krise*; idem, 'German transfer problem'. We do not have a dummy variable for Germany in 1929 as this was a year of transition and uncertainty surrounding the outcome of the Young Plan.

[46] Decorzant and Flores, 'Public borrowing'.

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

[48] Santos Silva and Teneyro, 'Log of gravity'.

[49] Santos Silva and Teneyro, 'Further simulation'.

unbalanced panel of eighteen countries and nine years, for the full 1924-32 period as well as sub-periods corresponding to the surge (1924-8) and stop (1929-32).[50]

[Table 2 about here]

Few of the standard country-specific factors register as significant drivers of capital flows. We find no evidence that stronger economic growth, lower inflation, lower budget deficits, improving terms of trade or higher financial openness were positively associated with capital inflows; in the only instance where one of these variables (inflation) enters significantly, it has a counterintuitive sign. We similarly find no evidence of an association between capital flows and maintenance of the gold standard, consistent with Obstfeld and Taylor.[51]

This is not to say that all recipient-country characteristics were irrelevant. The negative coefficient on public debt in column II (significant at the 10 per cent level) suggests that investors might have discriminated against heavily indebted countries.[52] Our results also indicate that financially developed countries borrowed more on international capital markets, other things being equal (column I), although this effect is only significant at the 10 per cent level and disappears when controlling for time-invariant, country-specific characteristics (column II).

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[50] Note that we cannot include country fixed effects in the regressions for the sub-periods as the loss in degrees of freedom would be too large. Out of the twenty-eight recipient countries in the dataset, we exclude Danzig, Estonia, Iceland, Ireland, Latvia, Lithuania and Luxemburg from the regressions, covariates being unavailable for these countries. We also exclude the United Kingdom 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 during this period. Over the 1919-1932 period, only very small amounts of bonds (of $2 million or less) were floated by British corporations on the Amsterdam market. No government debt issues were recorded and the data tables for other financial centres do not include a "United Kingdom line". Finally, the capital account openness index is unavailable for Greece and Yugoslavia. These two countries are therefore excluded from the regressions, although they are included in the descriptive statistics in table 1.

[51] Obstfeld and Taylor, 'Sovereign risk'. Note, however, that it is inconsistent with earlier accounts such as Lary, *The United States,* which emphasize the facilitating role of gold convertibility in 1924-28. Regressions for the 1924-28 sub-period still find no impact of gold-standard membership.

[52] The coefficient in column II implies that a one standard deviation decline in a country's ratio of public debt to GDP is associated with a 65% increase in bond issues on its behalf.

International reserves enter negatively in column I (without fixed effects) but not in column II (with fixed effects). This indicates that countries with low levels of reserves borrowed more than others on average but that a decline in borrowing countries' reserves to GDP ratio was not associated with an increase in capital inflows. Exporters of primary products also appear to have received more capital than others during this period. Finally, our results provide some support to the hypotheses that the League of Nations countries and Germany under the Dawes Plan years (1924-8) enjoyed privileged access to international capital markets. However, there is no evidence that Germany was a negative outlier in the years following the adoption of the Young Plan (1931-2).

Comparing the results for the two sub-periods, it would appear that capital flowed to countries with comparatively low levels of economic development (or GDP per capita) during the reconstruction period 1924-8 and to the most economically advanced countries thereafter. Financially open countries borrowed more in 1924-8 but not in 1929-32. International reserves were only negatively associated with capital flows 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. Finally, the privilege of League of Nations countries in accessing international capital markets did not last long; it had already vanished in 1929-32.

Apparently the markets only grew seriously concerned with countries' creditworthiness when liquidity dried up and growth rates declined. Evidence to this effect can be found in the breakdown of European bond issues by Moody's rating. The share of borrowing countries, whose governments were rated in the top two categories (Aaa and Aa) increased in all financial

centres in 1929-32 relative to 1924-28.[53] This is suggestive evidence that riskier, lower-rated borrowers were being rationed out of the market during the sudden stop.[54]

Although several interesting findings emerge from this analysis, recipient-country-specific factors do not perform very well overall. Many coefficients in table 2 are insignificant at conventional confidence levels. Only a handful of country-specific variables successfully predict capital inflows. It could be that investors paid only limited attention to country-specific factors, as suggested by Mauro, Sussman and Yafeh for the 1990s.[55] Alternatively, the short time series we analyse, and the existence of zero entries for some countries for some years, may limit the information content of those factors. An interesting question, then, is whether this is a problem just for the econometrician or also for the investor seeking to make inferences about future returns on the basis of these variables.

IV

After controlling for country-specific factors in the regressions for the 1924-32 period, we find that the coefficients on year dummies still exhibit a pattern similar to that in figure 1. These year dummies control for time-varying factors common to all countries and, in particular, supply-side factors.[56] We therefore turn next to these supply-side factors and investigate what drove the volume of capital exports from the principal financial centres in this period. Our dependent variable here is the value of bonds floated in a given financial centre in a given year, again in millions of current US dollars.

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[53] More detail is provided in our working paper (Accominotti and Eichengreen, 'Mother of all sudden stops').
[54] Ratings are from Flandreau, Gaillard and Packer, 'US rating agencies'. 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.
[55] Mauro, Sussman and Yafeh , 'Emerging markets spreads'.
[56] The year dummies might of course also capture unobserved, time-varying demand shocks common to all borrowing countries. We thank an anonymous referee for pointing this out.

Studies of post-1980 sudden stops have emphasized changes in risk perception and interest rates as determinants of capital flows.[57] To assess whether a similar dynamic was evident in the 1920s and 1930s, we include long-term interest rates (which proxy for the cost of capital in each centre) and a proxy for risk in the six financial centres.[58] Interest rates are measured as the yield on long-term domestic government bonds in each centre.[59] A concern with including this variable is potential endogeneity, insofar as an increase in the volume of European bond issues in a given centre might push up the long-term interest rate prevailing in that centre. However, most studies of the period point to the primacy of domestic conditions (the economic expansion, central bank policy) and not foreign bond flotations as determinants of interest rates in the main lending countries.[60] In addition, to the extent that it is present, this endogeneity would imply a positive association between capital flows and interest rates and therefore bias the results against our hypothesis that high interest rates discouraged borrowers from issuing bonds in a given centre.[61]

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 source country size (GDP) and financial openness, for Europe's overall economic growth, and for its openness to trade.[62]

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[57] See, for example, Milesi-Ferretti and Tille, 'Great Retrenchment'; Fratzscher, 'Capital flows'; and Forbes and Warnock, 'Capital flow waves'.

[58] We estimated the same equations using short-term interest rates, obtaining similar results.

[59] Ideally we would prefer a measure of ex ante real interest rates. However, constructing one requires a measure of inflation expectations over the ten or more years until the bond matures. The plausible proxies, such as forward foreign exchange rates and commodity futures prices, are for shorter horizons. It is also plausible under the gold standard that price levels were expected to follow a random walk (Barsky and Summers, 'Gibson's paradox'), in which case nominal rates are an acceptable proxy for real interest rates.

[60] The value of European bond issues remained small in all lending countries relative to GDP so a major impact on interest rates is unlikely.

[61] We also re-estimated the regressions without the interest rate variable and showed that our results are robust to omitting it. These results are available upon request.

[62] European growth and openness are constructed based on a sample of fifteen continental European countries. GDP growth is measured as the annual growth rate of real GDP. Trade openness is the ratio of aggregate exports to

Table 3 presents regressions for a balanced panel of six financial centres and twelve years (1921-32). Column I reports simple pooled estimates, while the remaining columns add financial-centre fixed effects and year dummies (to control for time-varying factors common to all financial centres).

[Table 3 about here]

After controlling for time and financial centre fixed effects, most of the coefficients in table 3 are significant at high levels of confidence. Evidently conditions in the principal financial centres and not just conditions in the recipient countries are important for explaining capital flows. In particular, we find a negative and statistically significant relationship between capital issues on the one hand and stock market volatility and interest rates on the other. Earlier studies attached considerable weight to the influence of interest rates;[63] by comparison, there has been less commentary on the role of volatility.[64] Although we do not find evidence of a positive association between the lending countries' financial openness and capital exports, this result might reflect the fact that the measure of capital account openness used here places heavier weight on inflow than outflow controls and therefore only imperfectly captures the kind of informal government interventions described in section I.

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aggregate GDP (in per cent). Milesi-Ferretti and Tille, 'Great Retrenchment', p. 314 also control for global growth and trade openness in their time-series analysis of global capital flows. Forbes and Warnock, 'Capital flow waves', include global growth in their list of the global factors explaining capital-flow events.

[63] Royal Institute of International Affairs, *Problem of international investment*; Lary, *The United States*; Bloomfield, *Capital imports*.

[64] 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 post-war conditions prevailed, similarly does not alter the results. The relationships we document are not, therefore, an artefact of the early 1920s, when international capital markets and European economies were still recovering from the war.

These results point to three explanations for the sudden stop of the late 1920s: higher interest rates in the principal financial centres, increased stock market volatility, and a combination of the two. Figures 6 and 7 show the evolution of long-term interest rates and stock market volatility from 1921 to 1932 in the New York, London and Paris markets. Although interest rates rose slightly in London and New York in 1929 as a consequence of increases in central bank discount rates, Figure 6 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 1931-2, 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 1924-8 lending boom. Because France was still struggling to stabilize its currency, Paris experienced high interest rates, handicapping its efforts to become a major financial centre. Only after the franc was stabilized in 1926-8 did rates decline and Paris begin competing seriously with other international financial centres.

[Figure 6 about here]

[Figure 7 about here]

While 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. Volatility rose sharply in New York and London in 1929, coincident with the collapse in lending to European countries (figure 7). At the same time, volatility in Paris declined, causing bond issues to be redirected there. After a temporary decline in 1930, stock market volatility increased everywhere in 1931, coincident with the final collapse of lending.

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The relationship between stock market volatility and capital flows was especially pronounced for the United States. The correlation between the volatility of the S&P index and new foreign issues in New York, in annual data for 1921-1932, is -0.68. 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, where increased risk aversion brought capital exports to a sudden stop after 1928.[65]

In order to give a better sense of the role of financial centre factors in the overall decline in capital flows, we estimate the counterfactual volume of European bond issues in each financial centre over 1929-32, assuming stock market volatilities and interest rates had remained constant at their 1928 levels. For each centre, we fix the value of the stock market volatility and interest rate variables at their 1928 levels and predict (counterfactual) European bond issues using the estimated coefficients of table 3/column IV (holding the other variables at their actual values). The predicted counterfactual amount of European bond issues is twice as high as the actual amount over the 1929-32 period. Had stock market volatilities and interest rates remained constant at their 1928 levels, bond issues would only have declined by 12 per cent in real terms between 1928 and 1929 (as opposed to 64 per cent actual) and would have recovered strongly in 1930 and 1931. In 1931, total bond issues (6,207 million constant 1990 US dollars) would have been almost as high as in 1927 (6,208 million), the peak year of the capital surge.

Finally, the shares of the different financial centres in the total volume of European bond issues would also have been markedly different. New York would have remained the main centre for bond issues (55.9 per cent) in 1929-32, followed by London (15.1 per cent). Paris and Stockholm, by contrast, would have been much behind with respectively 4.2 per cent and 7.5 per cent of all bond issues. These results confirm that changes in global financial-centre conditions

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[65] This result resembles findings of Milesi-Ferretti and Tille, 'Great Retrenchment' and Forbes and Warnock, 'Capital flow waves', for the recent period, both of whom conclude that global risk perceptions have been important determinants of capital flow surges and reversals.

played an important role in the overall decline in capital flows of 1929-1932 and in the redistribution of bond issues between the different centres during the sudden stop.[66]

V

In this paper we have analysed international lending to European countries between the wars, systematically analysing gross capital flows to continental Europe during the critical period 1919-32. We establish that the slowdown in capital inflows began in earnest in 1928 and document substitution across financial centres: as financing conditions tightened in London and New York for reasons not primarily of the borrowers' doing, European sovereigns and firms turned to continental financial centres, so much so that a quarter of all European new external bonds in 1929-32 were issued in Paris. Our results reveal the importance of global factors, especially stock market volatility, in explaining the capital surge and sudden stop of the interwar period.

Every sudden-stop episode is different and it follows that the characteristics and determinants of this one, as documented in this paper, do not automatically carry over to other such instances. In particular, other studies for other periods have found a larger role for country-specific factors.[67] That said, interwar experience underscores how global factors help to shape the capital inflows and outflows to which countries are subject. In the 1920s the direction and magnitude of such flows reflected more than just the success of the recipients at stabilization and then recovery. The sudden stop that followed reflected changes in financial conditions and then

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[66] As a robustness check, appendix 1 presents the results of dyadic regressions where we estimate the effect of supply-side (financial-center specific) and demand-side (recipient-country specific) factors jointly. The results confirm those of the analysis above.

[67] This point emerges from the comparison with analyses of more recent episodes, such as Catao and Milesi-Ferretti, 'Liabilities and crises'. It may be that the short time span that is of concern in our study (and resulting short time dimension of our panel) contributes to the difficulty of identifying country-specific influences.

financial distress in the major financial centres, starting with the United States, as much as any deterioration in economic performance in the capital-importing economies. These were precedents of which European countries in the period leading up to Global Credit Crisis of 2007-8 could have usefully taken heed.

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Table 1. Descriptive Statistics

	Countries	Unit	N	Years	Mean	St.Dev	Min	25th pc	50th pc	75th pc	Max
Bond Issues											
Gross Bond Issues/GDP (by recipient country)	20	%	180	1924-1932	1.12	1.91	0.00	0.00	0.32	1.58	12.36
Gross Bond Issues/GDP (by financial center)	6	%	72	1921-1932	0.90	1.21	0.00	0.08	0.49	0.99	5.05
Recipient countries variables											
Nominal GDP	20	Millions of USD	180	1924-1932	3134	4053	274	918	1710	2630	20067
GDP per capita (lagged)	20	USD	180	1924-1932	214	120	47	121	180	305	499
Lagged Real GDP growth	20	%	165	1924-1932	2.83	5.49	-18.53	-0.65	3.24	5.91	25.76
Lagged Inflation	20	%	177	1924-1932	3.34	20.48	-35.86	-4.08	0.00	4.44	196.48
Lagged Public debt/GDP	20	%	163	1924-1932	48.62	40.72	5.05	20.87	36.02	62.42	216.82
Lagged Fiscal Surplus/GDP	20	%	164	1924-1932	-1.12	2.95	-25.97	-1.87	-0.61	0.28	3.86
Lagged Broad Money/GDP	20	%	173	1924-1932	50.12	23.80	4.26	32.93	46.12	64.06	117.85
Lagged International Reserves/GDP	20	%	171	1924-1932	6.76	4.34	0.64	4.01	5.30	8.04	30.23
Lagged Change in Terms of Trade	20	%	165	1924-1932	-0.90	21.41	-195.77	-5.24	0.00	7.50	47.10
Capital Account Openness	18	Index 0-100	161	1924-1932	76.01	31.99	12.50	50.00	100.00	100.00	100.00
Financial centers variables											
Nominal GDP	6	Millions of USD	72	1921-1932	20467	30610	1464	2072	6301	18839	103700
Stock market volatility	6	%, annualized	72	1921-1932	14.95	10.13	2.44	8.10	12.56	17.95	56.49
Long-term interest rate	6	%	72	1921-1932	4.60	0.75	3.29	4.20	4.56	4.88	6.48

Sources: see text and online data appendix. Summary statistics for gross bond issues by recipient country are only shown for countries included in the regressions.

Table 2. Recipient Countries' Conditions, 1924-32

	I: 1924-1932	II: 1924-1932	III: 1924-1928	IV: 1929-1932
Ln GDP	0.983***	-0.546	1.517***	0.481**
	(5.28)	(-0.39)	(5.24)	(2.34)
Lagged Ln GDP per capita	-0.163	2.878	-1.145***	0.731**
	(-0.88)	(1.41)	(-5.63)	(2.01)
Lagged Real GDP growth	-0.034*	-0.043	-0.044**	-0.021
	(-1.91)	(-1.47)	(-2.05)	(-0.59)
Lagged Inflation	0.029**	0.030*	0.013	0.058
	(2.21)	(1.87)	(1.16)	(1.42)
Lagged Public Debt/GDP	-0.002	-0.016*	0.001	-0.007
	(-0.66)	(-1.72)	(0.24)	(-0.77)
Lagged Fiscal Surplus/GDP	0.034	-0.059	-0.015	-0.000
	(0.52)	(-0.77)	(-0.27)	(-0.00)
Lagged Broad Money/GDP	0.008*	-0.030	0.023***	-0.016
	(1.89)	(-1.09)	(2.80)	(-1.62)
Lagged Reserves/GDP	-0.106**	-0.034	-0.226***	-0.040
	(-2.13)	(-0.70)	(-4.19)	(-0.61)
Gold Standard	-0.053	0.206	-0.825	1.395
	(-0.13)	(0.42)	(-1.62)	(1.30)
Capital Account Openness	0.012	-0.003	0.038***	-0.001
	(1.43)	(-0.34)	(4.30)	(-0.14)
Primary Exporter	0.685***		1.820***	-0.155
	(2.71)		(4.95)	(-0.34)
Lagged Change in Terms of Trade	0.005	-0.005	0.003	-0.003
	(0.47)	(-0.65)	(0.35)	(-0.47)
Germany 1924-1928	0.739	1.050**	0.422	
	(1.50)	(1.99)	(0.58)	
Germany 1930	1.568***	2.008***		1.743***
	(3.18)	(4.38)		(5.35)
Germany 1931-1932	0.705	0.472		0.318
	(0.89)	(0.58)		(0.42)
League of Nations	0.533**		0.704*	0.055
	(2.26)		(1.73)	(0.13)
Constant	-6.107***	-9.713	-5.860**	-4.739*
	(-3.43)	(-0.56)	(-2.36)	(-1.87)
Year dummies	YES	YES	YES	YES
Recipient Country Fixed Effects	NO	YES	NO	NO
N	131	131	64	67
R²	0.93	0.94	0.95	0.96

Note: Dependent variable: Total amount of bonds issued by a given country in a given year (in millions of current US dollars). All regressions are estimated with the PPML estimator, include year dummies and exclude the UK. Robust standard errors are clustered by recipient country. z-statistics in parentheses; *: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Table 3. Financial Centres' Conditions, 1921-32

|	I	II	III	IV
Financial center level				
Ln GDP	0.318***	0.302***	1.369	2.826***
	(4.61)	(4.58)	(1.57)	(3.26)
Stock Market Volatility	-0.060***	-0.063***	-0.061***	-0.074***
	(-6.01)	(-9.57)	(-8.10)	(-6.94)
Long-Term Interest Rate	-1.057***	-1.096***	-1.005***	-0.893***
	(-6.80)	(-7.42)	(-5.31)	(-3.27)
Capital Account Openness	0.001	0.003	-0.003	-0.003
	(0.19)	(0.52)	(-0.49)	(-0.40)
European level				
European Real GDP Growth	0.042		0.037	
	(1.25)		(1.00)	
European Trade Openness	0.054		-0.043	
	(0.46)		(-0.54)	
Constant	5.994***	6.668***	-1.286	-12.843*
	(4.16)	(5.44)	(-0.19)	(-1.78)
Year dummies	NO	YES	NO	YES
Financial Center Fixed Effects	NO	NO	YES	YES
N	72	72	72	72
R²	0.81	0.89	0.82	0.91

Dependent variable: Total amount of European bonds issued in a given financial centre and a given year (in millions of current US dollars). All regressions are estimated with the PPML estimator. European trade openness and GDP growth are calculated on a sample of fifteen European countries (see online data appendix). Robust standard errors are clustered by financial center. z-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, 1919-32
By Financial Centre (In millions of 1990 constant US Dollars)**
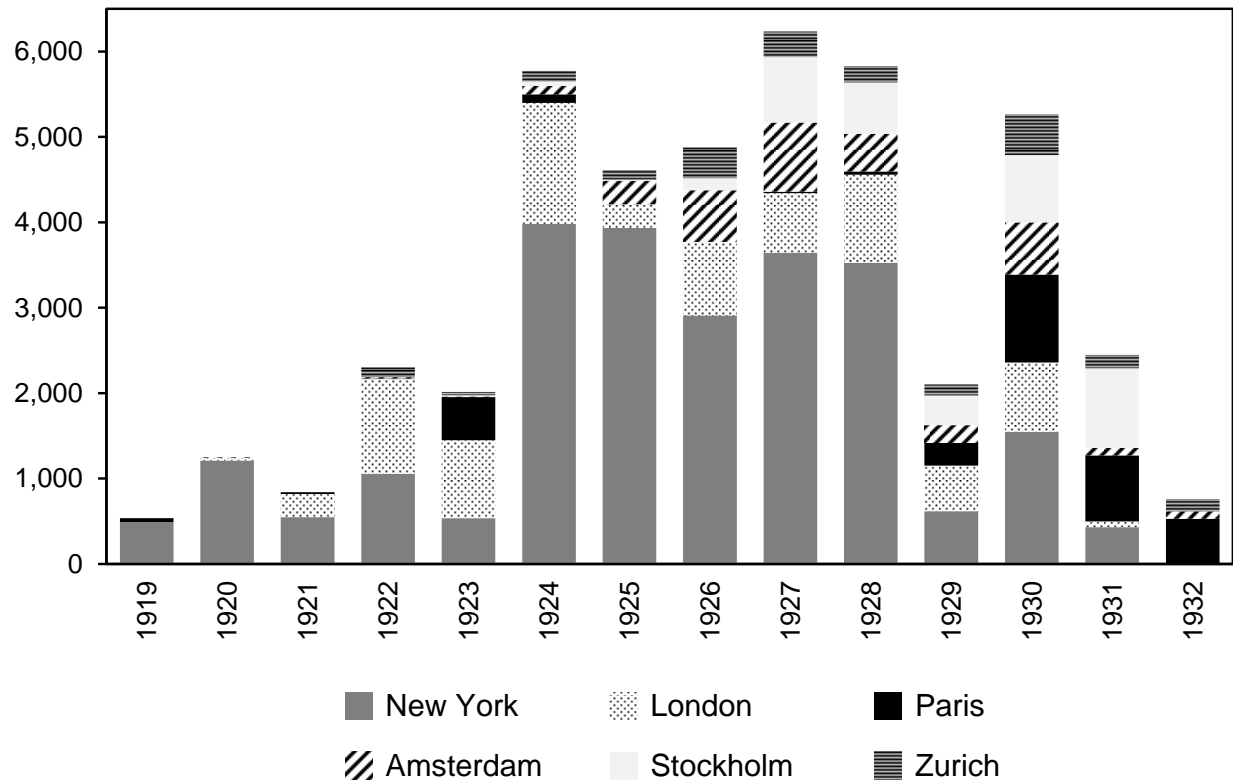
Source: Anon , 'Anon, 'Europe's Capital Movements, 1919-1932 – A Statistical Note', unpublished manuscript, Mudd Library, Princeton University.

Figure 2. Bond Issues on Account of European Countries, 1919-32
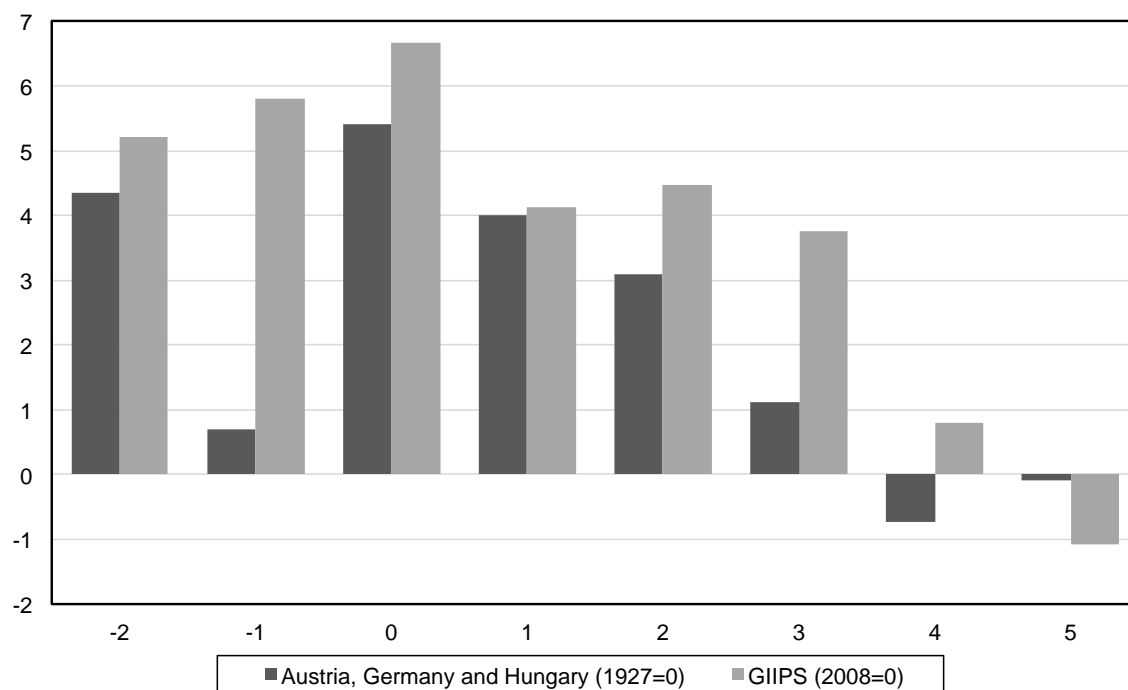**By Class of Borrower (In millions of 1990 constant US Dollars)**
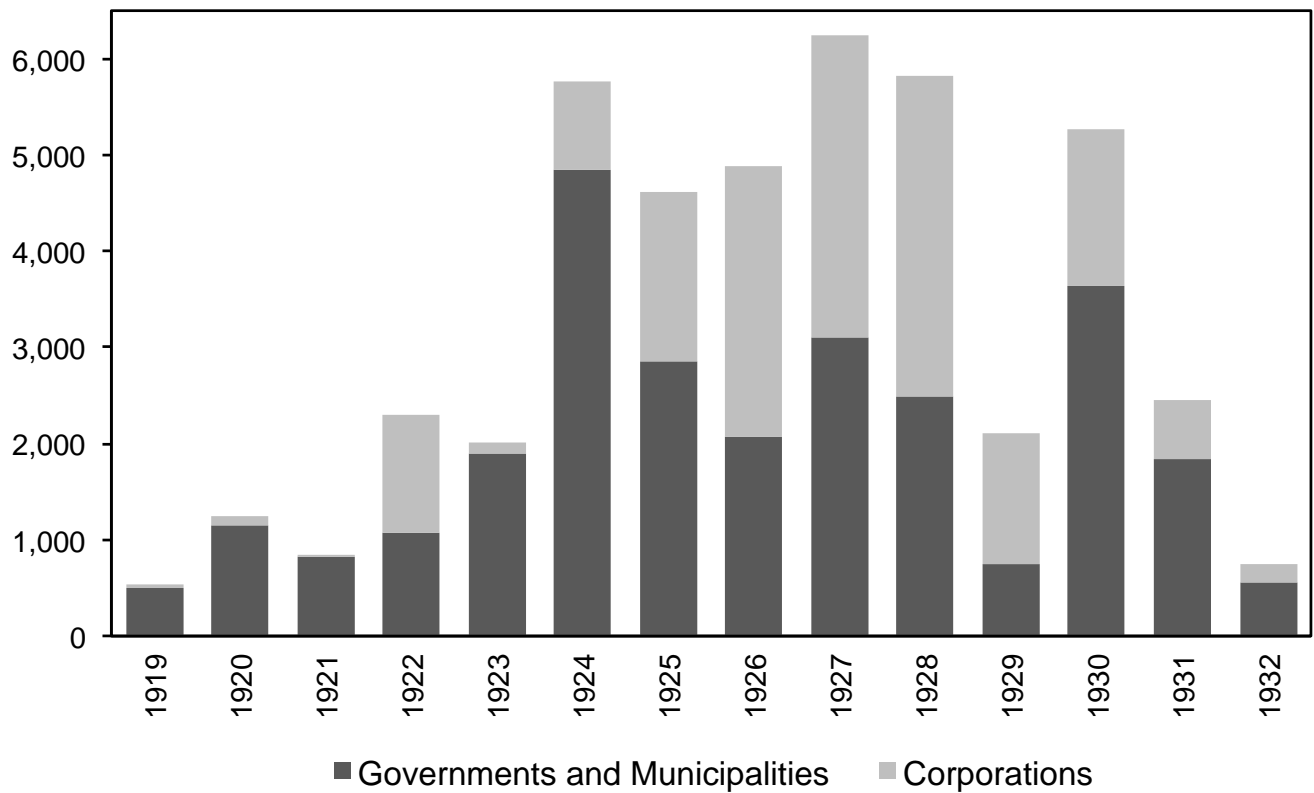
Source: Anon, 'Europe's Capital Movements, 1919-1932 – A Statistical Note', unpublished manuscript, Mudd Library, Princeton University.

Figure 3. Ratio of Current Account Deficit to GDP (in per cent)
1925-32 vs. 2006-13

Sources: see online data appendix. 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 (2006-2013). Year 0 corresponds to 1927 and 2008 respectively for the two groups.

Figure 4. Private and Official Capital Inflows, 1925-32
Austria, Germany and Hungary (in per cent of aggregate GDP)
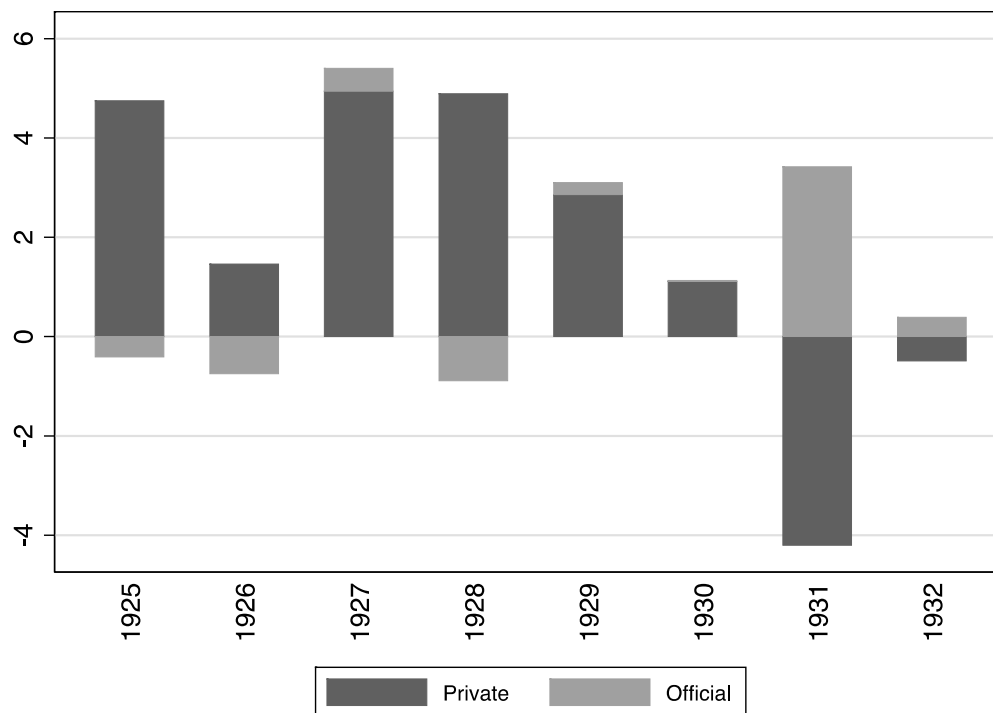
Source: see online data appendix. The graph displays the aggregate ratios of net private and official capital inflows to GDP (in %) for Austria, Germany and Hungary. Private capital inflows correspond to the sum of the current account deficit and accumulation of gold and foreign exchange reserves. Official inflows correspond to international reserves outflows and loans arranged by the Bank for International Settlements.

**Figure 5. Private and Official Capital Inflows, 2002-11
GIIPS (in per cent of aggregate GDP)**
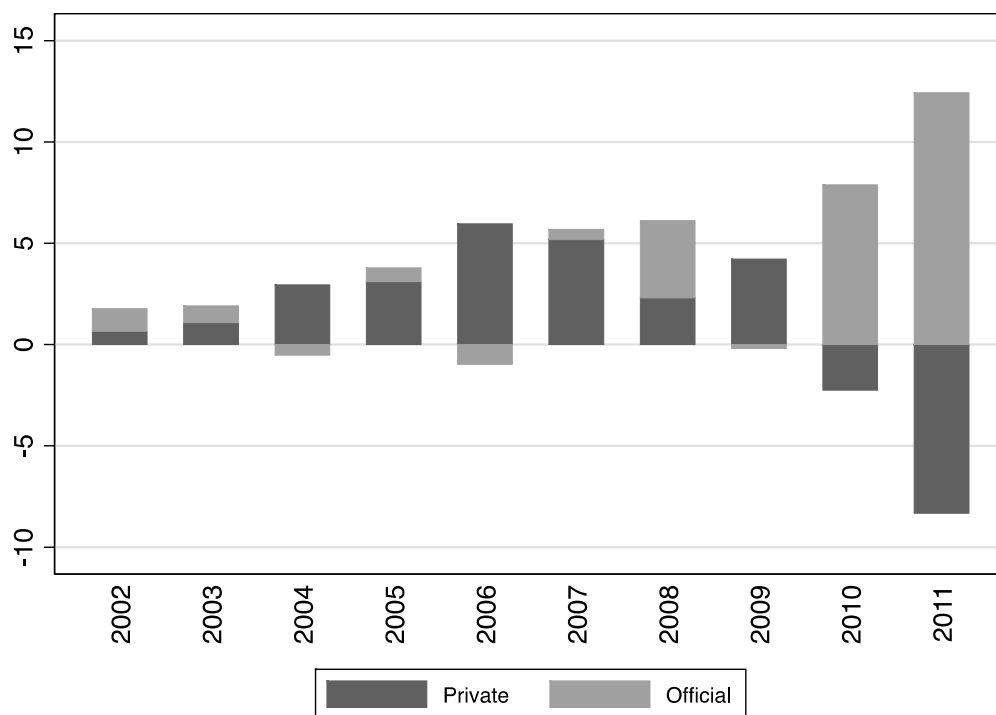
Source: Data communicated by Jef Boeckx (originally from Thomson Datastream). The graph displays the aggregate ratios of net private and official capital inflows to GDP (in %) for Greece, Ireland, Italy, Portugal and Spain. Private capital inflows are calculated as the difference between the financial 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, 'Eurosystem' 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. Long-Term Interest Rates in New York, London and Paris (in per cent) 1921-32
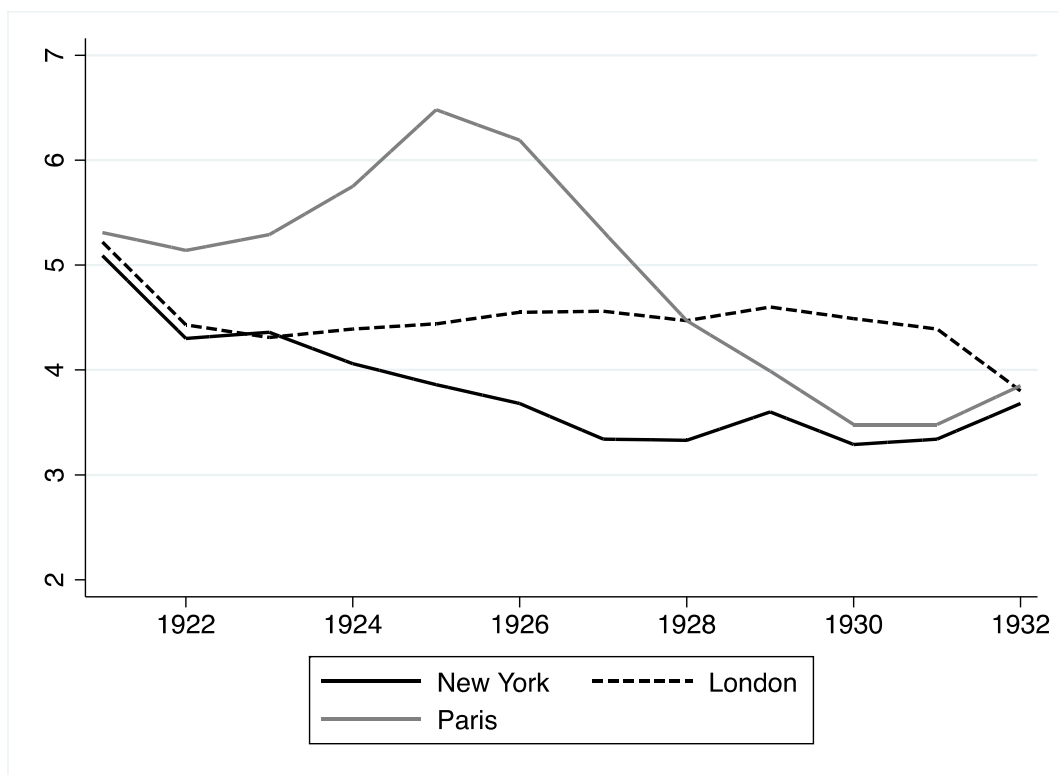
Source: see online data appendix. Note: New York: Yield on long-term US government bond; London: Yield on 2.5% consol; Paris: Yield on French 3% Rente perpétuelle.

Figure 7. Stock Market Volatility in New York, London and Paris (in per cent, annualized) 1921-32

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

Appendix I
Dyadic Regressions

An alternative approach to the analysis of capital flows in tables 2 and 3 is so-called "dyadic regression," where we distinguish the entire network of flows between individual borrowing and lending countries.

Table A.1 shows that our estimates are robust to adopting this framework. The dependent variable in these regressions is the volume of bonds issued in financial centre i on account of country j in a given year (in millions of current US dollars). The model is estimated using the Poisson pseudo-maximum likelihood estimator over the 1924-32 period.[68] Conditions in the financial centres (GDP, stock market volatility, long-term interest rates) remain statistically significant drivers of capital flows, now measured at the bilateral level. In contrast, only a few of the recipient country specific conditions matter. Overall, the results of the dyadic regressions confirm those of the analysis in tables 2 and 3.

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[68] Although a high proportion of the observations for the dependent variable are zeros in this set-up, Santos-Silva and Tenreyro, 'Further Simulation', show that this should not affect the performance of the estimator.

Table A1. Determinants of Bilateral Capital Flows, 1924-32

	I	II	III	IV
Financial Center Level				
Ln GDP	0.328***	0.217***	5.198**	5.237**
	(3.63)	(2.82)	(2.21)	(2.24)
Stock Market Volatility	-0.048***	-0.038***	-0.056***	-0.056***
	(-2.71)	(-2.77)	(-3.57)	(-3.59)
Long-Term Interest Rate	-0.924***	-1.217***	-0.589**	-0.592**
	(-4.16)	(-5.96)	(-2.04)	(-2.08)
Capital Account Openness	-0.002	0.006	-0.004	-0.004
	(-0.15)	(0.27)	(-0.19)	(-0.20)
Recipient Country Level				
Ln GDP	0.894***	0.974***	0.970***	-0.528
	(5.55)	(5.31)	(5.27)	(-0.38)
Lagged Ln GDP per capita	-0.201	-0.134	-0.128	2.893
	(-1.00)	(-0.71)	(-0.68)	(1.44)
Lagged Real GDP growth	-0.003	-0.033*	-0.034*	-0.042
	(-0.13)	(-1.89)	(-1.90)	(-1.45)
Lagged Inflation	0.037**	0.028**	0.028**	0.031*
	(2.31)	(2.16)	(2.18)	(1.89)
Lagged Public Debt/GDP	-0.000	-0.002	-0.002	-0.015*
	(-0.06)	(-0.63)	(-0.64)	(-1.71)
Lagged Fiscal Surplus/GDP	-0.024	0.033	0.033	-0.060
	(-0.36)	(0.50)	(0.50)	(-0.78)
Lagged Broad Money/GDP	0.012*	0.008*	0.008*	-0.030
	(1.73)	(1.85)	(1.84)	(-1.10)
Lagged Reserves/GDP	-0.095**	-0.099*	-0.102*	-0.023
	(-2.01)	(-1.87)	(-1.95)	(-0.46)
Gold Standard	-0.018	-0.070	-0.056	0.191
	(-0.03)	(-0.16)	(-0.13)	(0.38)
Capital Account Openness	0.005	0.013	0.013	-0.003
	(0.62)	(1.46)	(1.42)	(-0.34)
Primary Exporter	0.570**	0.659***	0.650**	
	(2.34)	(2.62)	(2.57)	
Lagged Change in Terms of Trade	0.000	0.005	0.005	-0.005
	(0.01)	(0.46)	(0.46)	(-0.65)
Germany 1924-1928	1.033**	0.745	0.737	1.067**
	(2.15)	(1.52)	(1.52)	(2.03)
Germany 1930	1.509***	1.561***	1.549***	2.011***
	(5.60)	(3.23)	(3.23)	(4.38)
Germany 1931-1932	0.436	0.736	0.706	0.486
	(0.66)	(0.93)	(0.89)	(0.59)
League of Nations	0.508*	0.529**	0.523**	
	(1.87)	(2.29)	(2.27)	
Constant	-4.078	-4.479*	-42.558***	-46.568*
	(-1.29)	(-1.91)	(-2.63)	(-1.79)
Year Dummies	NO	YES	YES	YES
Financial Center Fixed Effects	NO	NO	YES	YES
Recipient Country Fixed Effects	NO	NO	NO	YES
N	752	752	752	752
R²	0.67	0.74	0.79	0.82

Note: Dependent variable: Total amount of bonds issued by a country j in financial centre i in year t (in millions of current US dollars). Robust standard errors are clustered by recipient country. z-statistics in parentheses; *: significant at the 10% level; **: significant at the 5% level; ***: significant at the 1% level.

Appendix S1
Data Appendix

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 in figure 1 using the US Consumer Price Index in Carter et al. (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 A1 exclude Danzig, Estonia, Iceland, Ireland, Latvia, Lithuania and Luxemburg, covariates being unavailable for these countries. The United Kingdom is also excluded from the sample of capital recipients for these regressions. Finally, one of the explanatory variables (capital account openness) in tables 2 and A1 is unavailable for Greece and Yugoslavia. These two countries are therefore excluded from these regressions, although they are included in the descriptive statistics of table 1. More details on the source for long-term capital flows are given in section II.

Net Capital Flows
- **1925-1931 (Austria, Germany and Hungary)**

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);
  - Germany: Ritschl (2002).
  - Hungary: Mitchell (2007), completed by United Nations (1949) for 1925 (this source reports the balance of current account and gold);

- **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 which include 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").

Nominal GDPs
Nominal GDPs in millions of national currency units are from the following sources:
- Austria, Bulgaria, Germany, Hungary: Mitchell (2007) completed by Klasing and Milionis (2014);
- Belgium, Portugal, Switzerland: Michael Bordo's Financial Crises Dataset (available at: https://sites.google.com/site/michaelbordo/home);
- Czechoslovakia, Denmark, Finland, France, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom, Yugoslavia: Mitchell (2007);
- Greece: Kostelenos et al. (2007);
- Poland: Klasing and Milionis (2014);
- Rumania: Kaser and Radice (1985) completed by Klasing and Milionis (2014);
- United States: Carter et al. (2006), series Ca10.

All GDPs were converted into million current USD using the annual exchange rates in League of Nations' *Statistical Year-Book*.

Population
Population sizes are from Maddison (2006).

Real GDP Growth
Growth rates of real GDP are calculated from the real GDP figures in 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
- 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.

Broad Money
Broad money is defined as M2 or M3 and comes from the following sources:
- Austria: M2: Zipser (1997), p. 66.
- Belgium: M2: Michael Bordo's Financial Crises Dataset (M1) and Mitchell (2007) (Deposits in savings banks);
- Bulgaria, Czechoslovakia, Finland, Greece, Hungary, Netherlands; Poland; Portugal; Rumania, Sweden; United Kingdom; Yugoslavia: M2: Mitchell (2007);
- Denmark: M2: Johansen (1985), tables 6.2, 6.6 and 6.8;
- France: M2: Pierre Villa's dataset on the French economy, available at: http://www.cepii.fr/francgraph/bdd/villa/mode.htm
- Germany: M2: Ritschl (2002) completed by Mitchell (2007);
- Italy: M3: Michael Bordo's Financial Crises Dataset
- Norway: M2: Klovland (2004);
- Spain: M2: Barciela Lopez, Carreras and Tafunell (2005);
- Switzerland: M3: Swiss National Bank (2007), *Historical Time Series*, available at: http://www.snb.ch/en/iabout/stat/statpub/histz/id/statpub_histz_actual
- United Kingdom: M2: Michael Bordo's Financial Crises Dataset

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);
- Rumania: 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.

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).

Capital Account Openness
Financial openness is measured through Quinn's (2003) index of capital account openness. The data were kindly communicated by Dennis Quinn. The index is unavailable for Greece and Yugoslavia.

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).

Change in Terms of Trade

Annual terms of trade estimates are available for most European countries during the interwar period. We relied on these secondary sources for constructing this variable. However, we couldn't find secondary sources for Bulgaria, Greece and Poland and therefore estimated these countries' terms of trade using the information on the values and quanta of exports and imports reported in the League of Nations' *Statistical Year-Book.* Secondary sources used for other countries are the following:

- <u>Austria and Finland</u>: United Nations Statistics Division (1962);
- <u>Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland</u>: Kindleberger (1956);
- <u>Czechoslovakia, Hungary, Rumania, Yugoslavia:</u> Kaser and Radice (1985);
- <u>Denmark</u>: Abildgren (2004), p. 50;
- <u>Norway</u>: Central Statistics Bureau of Norway (1994), *Historical Statistics 1994*, table 18.5: "Index of external trade";
- <u>Portugal</u>: Lains (2006), table A2;
- <u>Spain</u>: Barciela Lopez, Carreras and Tafunell (2005); table 8.5, pp. 608-609, "Relaciones reales de intercambio neta".

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 et al. (2006), series Cc2.

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