When did the dollar overtake sterling as the leading international currency? Evidence from the bond markets

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Abstract

This paper offers new evidence on the emergence of the dollar as the leading international currency, focusing on its role as currency of denomination in global bond markets. We show that the dollar overtook sterling much earlier than commonly supposed, as early as in 1929. Financial market development appears to have been the main factor helping the dollar to overcome sterling's head start. The finding that a shift from a unipolar to a multipolar international monetary and financial system has happened before suggests that it can happen again. That the shift occurred earlier than commonly believed suggests that the advantages of incumbency are not insurmountable. And that financial deepening was a key determinant of the dollar's emergence points to the challenges facing currencies aspiring to international status.

Key words: foreign public debt, international monetary system, international currencies, role of the US dollar, network externalities, path dependency

JEL classification: F30, N20

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1. Introduction

The global economic and financial crisis has lent new impetus to discussions of the future of the international monetary and financial system. Policy makers in countries like China and Russia have openly questioned the viability of the current dollar-based global system.

Some advocate moving to a multipolar system in which the dollar shares its international currency role with the euro, the Chinese yuan and/or the IMF's Special Drawing Rights. At the Cannes Summit of November 2011, G20 Leaders committed to taking "concrete steps" to ensure that the international monetary system reflects "the changing equilibrium and the emergence of new international currencies".[1]

Others expect this change to develop more spontaneously; they see it as a natural result of the declining economic and financial dominance of the United States and the increasingly multipolar nature of the global economy, together with the advent of the euro and rapid internationalization of the yuan (e.g. Angeloni et al., 2011; Bini Smaghi, 2011a and 2011b; Constâncio, 2011; Dorrucci and McKay, 2011; Eichengreen, 2011; Fratzscher and Mehl, 2011; Subramanian, 2011).

Sceptics object that prospect of a shift to a multipolar monetary and financial system is in fact remote; if it occurs, such a transition will take many decades to complete (Kenen, 2011; Frankel, 2011). The view that a shift to a multipolar system is unlikely to occur rapidly is rooted in theoretical models where international currency status is characterized by network externalities giving rise to lock-in and inertia, which benefit the incumbent (see e.g. Krugman, 1980; Krugman, 1984; Matsuyama, Kiyotaki and Matsui, 1993; Zhou, 1997; Hartmann, 1998; and Rey, 2001).[2]

These models rest, in turn, on a conventional historical narrative, epitomized by Triffin (1960), according to which it took between 30 to 70 years, depending on the aspects of economic and international currency status considered, from when the United States overtook Britain as the leading economic and commercial power and when the dollar overtook sterling as the dominant international currency. The US, it is observed, surpassed Britain in terms of absolute economic size already in the 1870s. It became the leading commercial power, gauged by the value of foreign trade, already in 1913. It was the leading creditor nation by the conclusion of World War I. And yet sterling remained the dominant international currency, not simply during this period, but also throughout the interwar years, according to the conventional narrative, and even for a brief period after World War II.

Recent studies, referred to by Frankel (2011) as the "new view," have challenged this conventional account. Eichengreen and Flandreau (2009), relying on new data on the currency composition of global foreign exchange reserves, show that the dollar in fact overtook sterling as leading reserve currency already in the mid-1920s – that is to say, more than two decades prior to the date assumed by previous scholars.

[1] See the G20 Leaders' *Final declaration* at the Cannes Summit, 3-4 November 2011.

[2] In their calibrated model of international currency status, Portes and Rey (1998) show that a mixed equilibrium (i.e. multiple international currencies) is possible despite network externalities, however.

Eichengreen and Flandreau's "new view" also challenges broader implications of the conventional narrative. First, it suggests that inertia and the advantages of incumbency are not all they are cracked up to be. Second, it challenges the notion that there is room for only one international currency in the global system. Eichengreen and Flandreau show, to the contrary, that sterling and the dollar accounted for roughly equal shares of global foreign exchange reserves throughout the 1920s. Third, the new view challenges the presumption that dominance, once lost, is gone forever. Eichengreen and Flandreau's data indicate that sterling re-took the lead from the dollar for a brief period after 1931. This reinforces the point that the advantages of incumbency in the competition for reserve currency status may be less than commonly supposed.

In a companion piece, Eichengreen and Flandreau (2012) show that what was true of reserve currencies was true also of the use of currencies for financing international trade. The dollar overtook sterling as the leading form of trade credit (as the currency of denomination for what were known as "trade acceptances" or "bankers' acceptances") already in the mid-1920s, not only after World War II. The US achieved this from a standing start – that is to say, despite the fact that dollar-denominated trade credits had been virtually unknown as recently as 1914. Both market forces (financial market development) and policy support (with the Federal Reserve System as a market maker in the New York market for bankers' acceptances) were instrumental in helping the dollar rival and overtake sterling. That said, both New York and London, and both the dollar and sterling, remained consequential sources of trade credit in the 1920s. This again challenges the notion of international currency competition as a winner-take-all game.

Some critics have questioned the new view. Ghosh, Ostry and Tsangarides (2011) suggest that the interwar gold standard was special in that gold, not foreign exchange, was the dominant reserve asset, accounting for some two-thirds of international reserves. The fact that gold played a large monetary role then but plays only a small one today may limit the inferences about prospective changes in international currency status that can be drawn from this earlier experience, in other words. Forbes (2012) suggests that, compared to the past, international financial transactions may play a larger role in driving the decision of which unit or units to use internationally. Merchandise transactions, and the importance of a currency and market as a source of trade credit, play a correspondingly smaller one. Thus, inferences about the future are less convincing insofar as they are drawn from the past behaviour of trade credits and not from the use of currencies in international financial transactions.

In this paper we address these objections and complete the story. We provide new evidence from the interwar years on the use of the leading international currencies, sterling and the dollar, in international financial transactions. This sheds light on a third dimension of international currency status, namely the use of currencies as vehicles for international financing. We focus on the international bond market, bonds being the principal instrument for foreign lending and borrowing in this earlier era prior to the advent of syndicated bank lending.[3]

[3] As explained in inter alia Eichengreen and Portes (1989).

Looking at yet an additional aspect of international currency competition is useful for establishing the generality (or otherwise) of the so-called "new view" of international currency competition. In addition, because international bonds were typically denominated in national currencies and not gold, the earlier objection that evidence from reserves data is not insightful for today no longer applies.[4] Last, we try to go deeper than in previous studies in understanding the factors that helped the dollar surpass sterling. We provide a systematic empirical analysis of the determinants of currency choice in international bond markets during the interwar years.

We employ data on the currency denomination of foreign public debt for 33 countries in the period 1914-1946. We focus on bonds issued in foreign markets ("international bonds") because they were only rarely denominated in the issuer's own currency. Instead, these were denominated in international currencies so as to appeal to international investors. It is thus the denomination of these foreign bonds that shed light on international currency use.[5]

Our analysis supports the new view in that the dollar had a share almost equal to that of sterling as a currency of denomination for international bonds already in the interwar years. When excluding the Commonwealth countries, which were heavily inclined towards sterling issuance due to their dominion status, the dollar overtook sterling as early as 1929.

Our results further call into question two other tenets of the conventional narrative. While sterling lost its pre-eminence in 1929 (again, abstracting from the Commonwealth countries), it subsequently ran neck and neck with the dollar as the dominant currency of denomination for international bonds at least for a brief period. This is at odds with the conventional view that dominance, once lost, is gone forever.

Second, much of the 1920s and the 1930s saw the use of both sterling and the dollar as currencies of denomination in international debt markets. This was a bipolar rather than a unipolar currency system. This finding is at odds with the presumption that there is room for only one dominant international currency in the market.

Finally, our empirical results suggest that inertia effects in international currency use, while strong, are not insurmountable. In addition to incumbency, financial development was an important macroeconomic determinant of the ability of the dollar to ultimately overcome sterling's initial advantage. Its impact dwarfed that of country size or that of monetary policy and the exchange rate regime. We also find evidence of the importance of more microeconomic factors, such as market liquidity, which strengthens our emphasis on financial development further, but not of hedging or funding cost considerations, whose importance then seem to be confined to the more recent period.

[4] There were some so-called gold bonds (gold-indexed bonds or bonds containing clauses specifying that they were to be redeemed in national currencies of constant gold content). We discuss these further below.

[5] The reluctance of foreign investors to purchase bonds denominated in the currency of the issuer in more recent periods has similarly been emphasized in the literature on "original sin" (Eichengreen and Hausmann, 2005).

The interwar years being the only period since the onset of the industrial revolution when one incumbent unit was dethroned by a competitor as the world's currency, these findings are relevant to discussions of the future of the international monetary system. They suggest that a shift from a dollar-based system to a multipolar system is not impossible. While it will still take time, the shift could occur sooner than commonly believed. Our results point to financial deepening and market liquidity as key determinants of how and when additional units strengthen their international currency status.

Contemporary data on the currency of denomination of international bonds are consistent with the existence of this kind of shift. The share of the euro in the stock of international debt securities increased to some 30% in the 2000s from approximately 20% in the 1990s.[6] Again, this is inconsistent with the presumption that there is room for only one international currency in the financial domain.

The rest of the paper is structured as follows. Section 2 presents our dataset and section 3 some stylised facts. Section 4 describes our empirical methodology, while section 5 presents the baseline empirical results. Following a discussion of robustness in section 6, section 7 concludes and draws implications for policy and future research.

2. Data

For data on the currency composition of foreign debt we draw on United Nations (1948).[7] The data it contains were gathered by statisticians employed by the League of Nations, the UN's predecessor, and by the UN itself, drawing on official national sources including national accounts and/or budgetary accounts prepared by ministries of finance, annual or special reports of central banks or national statistical institutes, national statistical yearbooks, and so forth. An overview of these primary sources is in Appendix I.

As is also the case with modern debt data, there is always the possibility that the UN data are not strictly comparable across countries.[8] Some debt floated in foreign financial centres may in fact be purchased by domestic residents. Some national statistical agencies may include with foreign debt domestically issued securities purchased by foreign investors. The authors of the UN compendium attempted to adjust for these problems insofar as possible.[9]

[6] The share of the euro prior to 1999 is proxied by the share of legacy currencies, net of intra-euro area issuance. See Appendix III as well as ECB (various issues) and Detken and Hartmann (2000) and (2002).

[7] It also contains data on outstanding amounts of *domestic* public debt in some 50 countries during the interwar period, compiled from national sources, data that have been used by Reinhart and Rogoff (2008a, 2008b, 2009a, 2009b, 2010) and Reinhart (2010) and in subsequent work on public debt developments in the very long run (e.g. Ali Abbas et al. 2011; Fratzscher, Mehl and Vansteenkiste, 2011). Data on domestic public debt were not broken down by currency, which is why we focus in the paper on foreign public debt.

[8] For an example of a modern debt-data compendium, see World Bank (various dates).

[9] As the authors of the volume observed (p. 8) "The division of the debt into domestic and foreign is not always based on the same criteria. In a number of countries, the distinction between domestic and

But what is key for our purpose, which is to gauge the importance of sterling, the dollar and other currencies as vehicles for international financial transactions, is that the public debt categorized as foreign by the UN is distinguished by currency of denomination.[10] Evidently, the UN applied consistent criteria when categorizing countries' foreign debts by their currency of denomination. Each foreign debt issue was categorized by "the original currencies in which it was raised." The authors distinguish the currency of issuance from the currency of the country in which the bonds were issued. They account for the fact that not every foreign bond issued in London was denominated in sterling, that the currency in which the bond was issued was not always the same as the currency in which it was redeemed, and that both the currency of issuance and currency of redemption could differ from the currency of the country where it was issued (for instance, a bond issued in French francs in London might be payable in dollars).[11]

We digitized the UN data on foreign public debt for 33 countries (including five Commonwealth countries) in three continents (Asia, Europe and America): Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Denmark, Dominican Republic, Finland, France, Guatemala, Haiti, Honduras, India, Japan, New Zealand, Nicaragua, Norway, Panama, Peru, Poland, Portugal, Romania, Siam, South Africa, Switzerland, Turkey and Uruguay. A few countries (e.g. Italy) that provide data on their overall stock of foreign debt but not on its currency composition were necessarily excluded from the sample. A detailed description of the data is in Appendix II.[12]

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foreign debt is made according to the currency in which the debt is expressed; in others, according to the place where the debt was contracted – *i.e.*, abroad or at home; in others still, according to the residence of the creditor: in the latter case, foreign bonds repurchased by residents of the home country are considered domestic debt, as in Sweden." Similarly, in the case of Norway, it is specified that (United Nations, 1948, p. 107): "According to an estimate by the Bank of Norway, the following amounts of loans raised abroad were owned by Norwegians at the end of 1940..." Similarly, in the case of Uruguay, it is reported that (ibid., p. 154) "Domestic debt includes also the so-called 'International Debt' consisting of two Brazilian issues, but which are payable in Uruguayan pesos and are held in Uruguay".

[10] In addition, since we exclusively consider non-US and non-UK debt, it is always the international financing role of sterling or the dollar that is captured by our data.

[11] An example of this awareness is their discussion of Norway. As the UN authors explain (p. 107), "The loans raised [*by Norway*] in France were originally issued in francs [*i.e. the currency of the country in which the bond was issued as well as its currency of issuance*], but are also payable in several currencies at fixed rates of exchange, including sterling at 25.25 francs = 1 sterling [i.*e. currency in which the bond was redeemed*]. After the devaluation of the French Franc in 1928, these bonds were paid, beginning with 1933, in sterling in Paris, rather than in French francs." The UN authors take these differences into account and adjust the data correspondingly: "The outstanding amounts have therefore, up to 1932 inclusive, been converted at par rates of exchange, but beginning with 1933 the francs have been converted in sterling at 25.25." In cases where currency of denomination was not specified as e.g. Canada, Australia, New Zealand and South Africa, for which we could gather from the UN volume security-by-security information as to whether debt was "payable", "redeemable" or "due" in London or in New York, we determined this from other sources. Where it was not possible to determine this on the basis of other sources, we excluded the country.

[12] Data on commercial (i.e. private) debt (denominated in gold francs) are also available for France. Such private debt accounts for approximately 15% of France's total foreign debt. Since we do not have comparable private debt data for the other countries in our sample, we exclude France's commercial debt from our analysis.

Data are annual and available from 1914 to 1946.[13] Some 14-24 countries report data between 1914 and 1927 (see Figure 1); approximately 30 countries report data between 1928 and 1939; and 19-27 countries report data between 1940 and 1945.

Alongside sterling, the dollar, the French franc, the Swiss franc and the German mark, foreign public debt was issued in 16 other currencies. These include the Austrian schilling, Belgian franc, Canadian dollar, Czechoslovak crown, Danish crown, Dutch florin, Dutch gulden, Italian lira, Norwegian crown, Scandinavian crown, Spanish peseta, Swedish crown, Argentinean peso, Romanian lei.[14] While around one-third of the countries in our sample (e.g. Cuba, Dominican Republic, Haiti, India, New Zealand, Panama, Portugal, South Africa, Switzerland and Siam) had foreign debt in only one currency (either sterling or dollars), others had foreign debt in ten or more currencies. Romania had foreign debt in 14.

Debt denominated in some of these minor currencies was occasionally denominated in currency units of constant gold content. Thus, the data set includes foreign debt denominated in Argentine gold pesos, Austrian gold crowns, Austrian gold florins, French gold francs, Italian gold lire and Romanian gold lei. Argentina, Austria, France and Romania had been off the gold standard for extended periods and/or suffered high inflations, helping us to understand the practice.[15] However, the value of foreign bonds denominated in currencies of constant gold content was relatively small, namely in the order of 3% of the global total stock. There appear to have been almost no dollar or sterling loans of constant gold content.[16] Turkey issued such bonds between 1933-1934 and 1938-1939 but in negligible amounts (some $6-9 million).

We take the book value of outstanding amounts in different currencies and convert them to US dollars using end-of-year market exchange rates.[17] Debt in gold currency is converted to US dollars using the exchange rate under the gold standard that is nearest to the year when such debt was issued. For instance, Brazil's debt in gold francs (issued in 1914) is converted to its equivalent US dollar amount using the Franc Germinal 1914 parity (5.095 gold francs per US dollar).[18]

Following standard practice in the literature, we use currency shares at current exchange rates in our empirical model. This allows us to compare our results with those of earlier studies. However, to take into account the impact of

[13] Subject to missing observations (typically during World War I and its immediate aftermath and during World War II).
[14] Names could change over time. For instance, the Austro-Hungarian "gulden" was replaced by the crown ("krone") in 1892 as part of the introduction of the gold standard. However, the name "florin" was used on Austrian coins, while "forint" was used on post-1867 Hungarian banknotes and coins.
[15] Borchard (1951) describes this in more detail.
[16] There were, however, gold clauses specifying payment in dollars of constant gold content in U.S. treasury liabilities issued domestically in this period. Those gold clauses were famously thrown out by the US Supreme Court following the 1933 devaluation of the dollar (Kroszner, 1999).
[17] Taken from the UN volume, *Global Financial Data* (GFD) and the *Measuring Worth* database.
[18] There is no need to exclude from the aggregate share of debt issued in gold the amount of debt issued in dollars or sterling of constant gold content to correct for potential downward biases in the aggregate dollar and sterling shares between 1919 to 1933, since no country issued debt denominated in dollars or sterling of constant gold content in those years.

devaluations (like that of sterling in 1931 and the dollar in 1933) and valuation effects, we also calculate currency shares at constant exchange rates, which we consider in robustness checks.[19]

Another issue is the treatment of war-related debts. France is the most notable case: between 80 and 90% of its foreign public debt was owed to allied governments and incurred during World War I. Moreover, France's foreign public debt, at some $6-7 billion, is by far the largest in our sample, and equivalent to over a third of our 33 countries' total stock of foreign public debt. It will therefore be important to check for the sensitivity of our results to the (ex)inclusion of France (from) in the sample.

A further distinction is between the fiscal and calendar years, which do not always coincide.[20] A few countries have fiscal years that start on 1 April of year *t* and end on 31 March of year *t* + 1. There are even some countries (e.g. Brazil, France, Romania and Poland) that changed from calendar to fiscal year at some point in our sample. We follow the UN statisticians' convention by assigning data for fiscal year 1 April *t* to 31 March *t* + 1 to calendar year *t* + 1.[21]

3. Stylized facts

We start with an overview of the evidence that can be immediately gained from these data. The 33 countries in the sample accounted on average for about 37% of world GDP over 1914-1946.[22] By 1929, roughly the mid-point of our sample, these countries owed more than $17 billion of foreign public debt, about double the amount owed in both 1920 and 1939 (Figure 2). This is a bit higher than the amount of global reserves (in gold and foreign exchange, with 24 countries) estimated by Eichengreen and Flandreau (2009) for that year, namely $10 billion. It corresponded to about 4% of world GDP at that time. By comparison, the stock of international debt securities accounted for 17% of world GDP as of end-2010.[23]

Of these $17 billion, some $10 billion was sterling debt (also equivalent to almost 50% of UK GDP) and another $7 billion was dollar debt (also equivalent to roughly 7% of US GDP). The shares of both currencies were substantial. This confirms the insight of the "new view" that there is room for more than one international financing currency at any point in time.

Sterling and the dollar together accounted for about 97% of global foreign public debt. Other currencies, such as the French franc, the Swiss franc, the German mark and the Dutch guilder, were largely irrelevant, this despite the fact that the

[19] Considering the evolution of currency shares in both constant and current market exchange rates is similarly the practice in studies of the currency composition of foreign exchange reserves (e.g. Truman and Wong, 2006; ECB, various issues).
[20] As is the case today in most countries.
[21] Two exceptions were France, Poland and Romania, where we assigned the data to calendar year *t* so as to avoid gaps in the time series.
[22] As against 39% of world GDP for both the US and the UK.
[23] And 114% of world reserves, according to data from the ECB's *Review of the international role of the euro* (July 2011 edition) and the International Monetary Fund's World Economic Outlook Database (September 2011 edition).

French and German economies were substantial in size.[24] The absence of the French franc is notable, given the efforts of French officials to elevate Paris to the status of an international financial centre and secure for the franc an international role (Meyers, 1936). This reinforces Eichengreen and Flandreau's finding using data on the currency composition of foreign exchange reserves, which were heavily dominated by sterling and dollars and where the French franc similarly did not provide a meaningful alternative. As noted above, securities indexed to gold accounted for a very small share of international bonds (about 1% in 1929).

There are also marked differences in the regional origin of foreign public debt denominated in sterling and dollars (see Figures 3 and 4). Almost 80% of dollar-denominated debt was owed by Europe. Of that amount, the main debtor was, by a large margin, France, which alone accounted for almost 60% of global foreign public debt owed in US dollars. This reflected France's heavy involvement in World War I since, as mentioned above, the largest share of its debt was held by allied governments. US loans to the French government, first through the agency of US banks and then by the US government itself, amounted to just over $4 billion when converted into long-term bonds in the early 1920s.[25] Most of the remainder was owed by Latin America (where four countries, Cuba, Dominican Republic, Haiti and Panama, issued foreign public debt exclusively in dollars). This reflected the strong economic and financial ties that the US developed with the region since the turn of the century and, especially, during and after World War I (Mitchener and Weidenmeier, 2005). The rest was owed by two Commonwealth countries (Australia and especially Canada) and Japan, which borrowed in the US as early as 1904-5 to finance its war with Russia and returned to the market in the 1920s.[26]

The bulk of sterling-denominated debt (about 40%) was owed by the Commonwealth countries, in line with their strong political as well as economic ties to the UK. A further 40% was owed by Europe. France was again the main European originator, accounting for a third of global foreign public debt denominated in sterling. Asia (i.e. Japan and Siam, with the latter one issuing debt exclusively in sterling) accounted for around 5% of global foreign public debt in sterling, while Latin America (Argentina, Brazil, Chile, Bolivia, Costa Rica, Honduras, Guatemala, Nicaragua, Peru and Uruguay) accounted for a further 9%.[27]

When did the dollar surpass sterling as leading currency of denomination of international bonds? Figure 5a shows the breakdown of global foreign public debt at

[24] In the early 1930s, the combined share of currencies other than sterling and the dollar reached a peak of almost 10%, however.

[25] Amounts borrowed from the UK by the French government were slightly smaller (Moulton and Pasvolsky 1926, p. 45). The relatively even breakdown of French debt between sterling and dollars in the 1920s is evident in Figure 7 below.

[26] Of $245 million of war loans floated abroad by the Japanese government in 1904-5, $192 billion were sold in the United States (Lewis 1938, p. 340). It appears that, unlike Japanese borrowing in New York in the 1920s, these earlier bonds were not dollar-denominated.

[27] That India, as a British colony, should have issued debt exclusively in London is unsurprising. While the Thais successfully maintained their independence by playing the British and French colonialists off against one another, their dependence on the London market (with their foreign debt consisting "entirely of sterling obligations", as stressed in UN (1948, p. 129) is evidence of the continuing importance of sterling and secondary status of the French franc in international bond markets (see above).

market exchange rates when the sample includes all 33 countries. By 1931, the share of the dollar (45%) was almost equal to that of sterling (51%).

Including our five Commonwealth countries in the aggregates may bias the results, however, due to their strong political links with the UK, which constrained their tendency to issue debt in currencies other than sterling.[28] Indeed, the picture changes dramatically when one excludes the Commonwealth countries, as in Figure 5b. The cross-over date is now 1929. Sterling's lead is largest in 1924, although the dollar's share of the market is already substantial. The second half of the 1920s then shows the dollar closing the gap; this was the period marked by "the scramble for 'investment opportunities'" (Lewis, 1938, p. 376 – the quotation marks around "investment opportunities" are hers) and when British authorities, concerned with the weakness of the balance of payments, used moral suasion and controls in an effort to restrain long-term foreign lending (Moggridge, 1971).

Figure 5b is strikingly similar to that obtained by Eichengreen and Flandreau (2009) using their data on reserve composition.[29] It is inconsistent with the conventional wisdom that sterling remained the dominant currency throughout the interwar period despite the fact that the US had long since overtaken the UK as the main economic, commercial and financial global power.

Sterling then regained market share after 1933 and again ran neck and neck with the dollar at the end of the decade. US experience with foreign public debt in this period was unhappy; some two-thirds of outstanding issues lapsed into default, roughly double the share of sterling-denominated debt (Winkler, 1933). This reflected a combination of factors: bonds issued in dollars appear to have been more marginal credits; US underwriters were less experienced; sterling-denominated bonds issued by members of the British Commonwealth and Empire were faithfully serviced all through the 1930s (Mintz, 1951, Eichengreen and Portes, 1990). But whatever the explanation, the relatively widespread defaults on dollar-denominated debts demoralized the New York market and limited foreign issuance there. The Johnson Act of 1934 then prohibited governments in default on their sovereign debts from marketing new loans in the United States.[30]

History can be messy; this is certainly true of the 1930s. But the fact that a variety of special factors caused the lead of the dollar over sterling as a currency of denomination for international bonds to narrow temporarily does not change the fact that the greenback had emerged as a major vehicle for long-term foreign lending already in the 1920s. Indeed, it reinforces the point that fortunes can change quickly and that the advantages of incumbency tend to be overstated.

[28] The sovereignty of these countries remained indeed subject to limitations at least until the statute of Westminster in 1931, which declared self-governing dominions within the British Empire to be equal.

[29] The parallel could reflect the fact that official and private foreign investors respond to similar pecuniary and nonpecuniary incentives. Another interpretation is that central banks hold reserves in part to facilitate intervention in the foreign exchange market, where the relevant foreign exchange market is the one on which domestic issuers depend.

[30] But, notwithstanding this setback, the dollar then permanently overtook sterling in the early 1940s. And not only after World War II, as suggested in earlier accounts.

That the share of the dollar rose sharply after 1914 is not simply a reflection of World War I. It reflects also the fact that the ban on foreign branching by US banks was lifted by the Federal Reserve Act of 1913. This set the stage for the first wave of expansion of US banks abroad (Phelps, 1927). In subsequent years, US banks set up foreign branches, underwrote foreign bonds and strived to sell these to domestic customers for the first time. This points to the role of financial development –including financial development policies– as an instrumental determinant of the rise of the dollar as an international borrowing currency – something that we analyse directly, below.

The dramatic rise in the share of the dollar in the early 1920s could conceivably reflect the fact that the currency shares reported in Figure 5b are calculated as weighted averages (with weights being proportional to the size of debt). The largest debtors, including America's wartime allies, such as France, might therefore have a disproportionate influence on aggregate changes. But, in fact, calculating shares as un-weighted averages (as in Figure 5c) does not alter the finding. Not only does the share of the dollar still rise swiftly, but the greenback overtakes sterling already in the mid-1920s, and not only in 1929.

The finding of a sterling-dollar duopoly again carries over if we calculate currency shares at constant rather than current exchange rates in order to control for valuation effects due to the devaluation of sterling in 1931 and of the dollar in 1933.[31] The dollar surpasses sterling in the late 1920s and maintains its lead even after the US went off the gold standard (see Figure 6a).

The results are also similar when one excludes France, the largest dollar debtor (as in Figure 6b) and when one additionally excludes countries issuing exclusively in dollar or sterling (see Figure 6d).[32]

Finally, considering the full sample (i.e. including Commonwealth countries, which were tilted so much to sterling issuance for political reasons) with un-weighted averages does not modify the conclusion (Figure 6c). By this metric, the dollar overtook sterling already in the mid-1920s and ran neck and neck with sterling in the 1930s.

Figure 7 shows that already at the time of World War I the dollar was the dominant currency of foreign debt denomination in Belgium, the Dominican Republic, Haiti, Panama, Poland and Switzerland.[33] Swiss bonds, for example, were sold in New York as early as 1899.[34] The efforts of New York underwriters to attract foreign borrowers to the US market were actively supported by the State Department, which saw foreign dependence on US lending as a lever for opening foreign markets to American exports. Bolivia, Brazil, Chile, Guatemala, Norway,

[31] We focus on the sample of 28 countries (i.e. excluding the Commonwealth countries), unless explicitly stated otherwise.

[32] Here we again use market exchange rates. Moreover, many of these countries borrowing exclusively in one of the two major currencies were members of the British Empire who essentially had no choice. One might argue that in analyzing the choice of vehicle currency for foreign borrowing we should focus exclusively on countries that actually had such a choice, which points to excluding these cases.

[33] And by 1919 in the case of Poland, after it gained independence in 1918.

[34] Lewis (1938), p.337.

Peru, Romania and Uruguay steadily increased the share of their foreign currency debt in dollars in the course of the 1920s, this being when American promoters aggressively "search[ed] the world over for foreign borrowers."[35]

In just three countries – Austria, Colombia and Finland – did the share of the dollar decline markedly in the interwar years. In Austria this reflected the growing dependence of the government on Paris, the one market that remained open during the early-1930s financial crisis. Finland borrowed in Swedish kronor (for, inter alia, extension of its telephone system) in the 1930s and during World War II. Colombia engaged in a borrowing binge in New York in 1927-28, when it issued two mega-loans in dollars; thereafter its relatively modest borrowings were both in sterling and dollars as well as in French francs in the case of a substantial 1931 loan floated in Paris, bringing down the dollar share of the total. There was similarly some movement by central banks into subsidiary currencies like the French franc and Swedish kronor in the 1930s, when problems affected the markets in dollars and sterling, but it was similarly limited in incidence and magnitude (Eichengreen, 2011).

4. Econometric specification

We now estimate the determinants of currency shares of foreign public debt. Since our panel has a 3-dimensional structure with country, currency and time dimensions, we account for the possibility of unobservable country, currency and time effects:

$$y_{i,j,t} = \alpha_{i,j} + \beta s_{j,t} + \boldsymbol{\gamma}' \mathbf{X}_{\mathbf{j,t}} + \boldsymbol{\theta}' \mathbf{D}_{\mathbf{t}} + \varepsilon_{i,j,t} \qquad 1)$$

where *i*, *j*, and *t* are the country, currency and time dimensions; *y* is the share of currency *j* in country *i*'s foreign public debt in year *t*; *s* is a measure of financial depth; **X** is a vector of key other determinants of international currency status (including inertia, size and credibility effects in the baseline specification); **D** is a vector of time effects. We reduce the dimensions of our panel from three to two by distinguishing country-currency (subsequently referred to as 'group') and time dimensions. With 28 countries and two currencies, we therefore have 56 groups, and control for unobserved effects at the group level, denoted α. The estimable parameters are therefore α, β together with the vectors $\boldsymbol{\gamma}$ and $\boldsymbol{\theta}$**.** The specification is akin to that in Chinn and Frankel (2007, 2008a, 2008b) and Frankel (2011).

We implement Eq. (1) using a linear fixed-effect estimator and report standard errors that are robust to heteroskedasticity and clustered heterogeneity (to control for possible residual correlation between country-dollar and country-sterling observations in each year). Given that shares are, at any point in time and in any country, bounded between zero and one, a tobit estimator might have been warranted. However, insofar as our data are censored neither from above nor from below, this is not necessary. That said, we also report results using alternative

[35] Lewis (1938), p.377.

estimators including tobit and the Arellano-Bond (1991) two-step GMM procedure for dynamic panels.

The disturbances are split into unobserved group effects, with variance σ_α^2, and panel-level effects, with variance σ_ε^2, which are assumed to be independent. To gauge whether group-fixed effects are required, we calculate the ϱ-statistic, which measures the contribution of the variance of the disturbances due to group effects to the total variance of the disturbances:

$$\rho = \frac{\sigma_\alpha^2}{\sigma_\varepsilon^2 + \sigma_\alpha^2}$$

When ϱ is close to zero, the estimates with group-level effects are not significantly different from standard OLS. Formal comparison between the two models can be achieved by conducting a likelihood-ratio test, where the null hypothesis is that a standard OLS model is better suited than a model with group-level effects.

Building on the literature on the macroeconomic determinants of currency shares (e.g. Chinn and Frankel 2007, 2008a, 2008b and Frankel 2011), we focus on four categories of explanatory variables. The first of these is network externalities, which is widely emphasized in the earlier literature. An international currency, like a domestic currency, is more useful when others use it. That is to say, a currency used in international debt markets is more likely to be used in international trade transactions, in foreign exchange trading, as an anchor currency or as a reserve currency, etc. which gives rise to economies of scope.[36] This network effect gives rise to inertia or incumbency effects. To capture them we include the lagged value of *y* in **X**.

Our second potential determinant is country size. The currency of an economy with a large share in global output, trade and finance has a "big natural advantage", to paraphrase Chinn and Frankel (2007). To proxy for such size effects, we use the time-varying shares of US and UK output in global output.[37]

A third potential determinant is confidence in a currency's value. An international currency being a store of value, investors will want to know that its value is stable and will not be inflated away. As a proxy for confidence we use contemporaneous inflation, calculated using annual CPI data.[38]

[36] Krugman (1980) first showed how the use of international currencies as vehicles in foreign exchange markets could be subject to tipping points and path dependency, while Krugman (1984) introduced the notion of multiple equilibria in this context. Matsuyama, Kiyotaki and Matsui (1993) considered the issue in the context of random matching games, along with Zhou (1997). Rey (2001) looked at the emergence of multiple equilibria determined by network externalities and international trade patterns. Flandreau and Jobst (2009) also find empirical evidence in favour of persistence in foreign exchange trading data for the late 19th century, but not in favour of pure path dependency and lock-in effects.

[37] Calculated using data from the Groningen Growth and Development Centre (founded by Angus Maddison). See http://www.ggdc.net/databases/hna.htm.

[38] Again taken from GFD.

Our fourth determinant of currency shares is *s*, financial depth. Liquidity is widely recognized as an important attribute of the attractiveness of investing in a particular security – or for that matter in a security denominated in a particular currency – and financial development is an important determinant of market liquidity. While financial depth has not been used in previous empirical studies of the determinants of choice of currency of denomination for, inter alia, central bank reserves, Eichengreen and Flandreau (2012) show that financial depth and development was a key determinant of the rise of dollar-denominated trade credits in the 1920s.[39] Moreover, the literature on the international role of the euro has stressed the importance of financial development and integration as key determinants of the single currency's growing international profile (Portes and Rey, 1998; Papaioannou and Portes, 2008). As our measure of financial development we use bank assets relative to GDP as measured by Schularick and Taylor (2012). This is in the spirit of Eichengreen and Flandreau, who similarly proxy financial development by the asset side of banks' balance sheets.

In robustness checks, we additionally consider determinants of currency choice which have been highlighted in recent literature using firm-level data. An example of these is hedging. Firms issue debt in the currencies of countries in which they operate as a way of hedging their exposure to foreign exchange risk (Kedia and Mozumdar, 2003). Specifically, there is evidence that the probability of issuing foreign currency debt is positively correlated with foreign-exchange exposure metrics such as foreign sales in total sales (Allayanis and Ofek, 2001) or earnings and cash in foreign currency as a share of firm value (Allayannis et al., 2003). To proxy for the aggregate country exposure to foreign exchange risk in dollar and sterling, we use the share of the US and the UK in a country's trade.[40]

Another potential determinant is funding cost. McBrady and Schill (2007) suggest that deviations from uncovered or covered interest parity may present opportunities for borrowers to lower borrowing costs by issuing in a foreign currency. Cohen (2005) and Habib and Joy (2010) find that interest rate differentials matter, suggesting that bond issuers choose their issuance currency to exploit arbitrage opportunities between funding currencies. As a proxy for this effect, we use the differential between the short-term interest rate in country *i* and that in the US (respectively the UK).

Finally, previous studies have shown that market liquidity matters particularly for currency choice at the firm level. Firms facing domestic credit constraints have an incentive to broaden their investor base by issuing in foreign currency (Allayanis and Ofek, 2001; Kedia and Mozumdar, 2003). The larger the pool of potential investors in a market, the greater the incentive to issue in their currency. As a complement to our financial development proxy, we consider a specific metric of relative market liquidity. We follow Flandreau and Jobst (2009), who argue that the short-term interest differential is a good measure of relative market liquidity in a credible gold

[39] King and Levine (1993) and a large surrounding literature also analyze the impacts of financial deepening, where financial depth is typically proxied by variables such as credit to GDP or money to GDP and has been found to have strong causal effects on domestic growth.

[40] The trade data are taken from Mitchell (1998a, 1998b 1998c). This results in a number of missing observations and a smaller sample size, which is why we limit use of this variable to the section on robustness checks.

standard, and use the short-term dollar-sterling interest differential to capture this effect.[41] We define US market liquidity as the differential between the US short term interest rate and the corresponding sterling rate (the lower the spread, the higher the liquidity), and UK market liquidity as the same spread but with an opposite sign.

5. Baseline empirical results

To facilitate comparison with the estimates of the determinants of the currency composition of foreign exchange reserves in recent periods, we initially exclude financial deepening from the model and focus on persistence, credibility and country size. Table 1 presents these benchmark results, where the three variables are entered first one-by-one and then together. Moreover, to facilitate comparison between the alternative (nested) specifications, the sample size is kept constant. The estimation is carried out on our baseline sample of 28 countries excluding the Commonwealth countries (whose strong political links with the UK constrained their ability to issue debt in currencies other than sterling) and over the full 1914-1946 period. The full sample of 33 countries is considered in robustness checks.

A first pattern evident in Table 1 is of significant inertia effects. The point estimate on lagged currency share of 0.90 suggests that these are strong, albeit not insurmountable. Specifically, 10% of the adjustment to the long run in international currency shares in global debt markets is estimated to occur in a single year, ceteris paribus. This corresponds to a half-life of about 7 years. This estimate is similar in magnitude to the estimates of Chinn and Frankel (2007, Table 8.4, p. 303) of 0.90-0.96 using reserve data for 1973-1998.[42] It suggests that, in order to adequately understand the evolution of currency shares, it is important to consider medium-term evolutions, as we do here. But the estimate also indicates that the share of a currency in global bond markets can be halved in a less than a decade, ceteris paribus, which is essentially what happened to sterling between 1914 and the mid-1920s.

Credibility also matters, although its effect is smaller. Lower inflation significantly raises the share of the dollar or sterling in countries' foreign public debt, although the impact is small in magnitude. The full model estimate (column 4 of Table 1) suggests that the short run (one year) effect of reducing the inflation rate by 10 percentage points (a large amount by US and UK standards in the 1920s) is associated with an increase in the share of the US dollar (sterling) of about one and a half percentage point. Again, our estimated coefficient of -0.15 is fairly close to those of Chinn and Frankel (2007), who found estimates ranging between -0.07 and -0.14.

Country size is also important. The full model estimate suggests that the short run effect (one year) of an increase in the share of the US (UK) economy in global output of 10 percentage points corresponds to an increase in the share of the US dollar (sterling) by roughly four percentage points. The estimated coefficient of over

[41] We take short-term nominal interest rates from Michael Bordo's multi-country dataset on financial crises (http://sites.google.com/site/michaelbordo/home4) for the data on funding cost and market liquidity.

[42] Note that they also provide panel logit estimates; we tried to run regressions with this estimator as well, but convergence of the likelihood function to a global maximum was not obtained.

0.4 is higher than that of Chinn and Frankel (2007), whose estimates range from 0.09 to 0.12.

Columns 5 and 6 report the results for financial deepening. The point estimates for the persistence and credibility effects change somewhat, with the size effect being larger than before (with an estimated elasticity close to unity) and credibility losing statistical significance. Importantly, financial deepening also exerts a significant effect on the share of the US dollar (sterling) in global foreign public debt markets. The full model estimate suggests that, in the short run (over one year), an increase in the ratio of banking assets to GDP by 10 percentage points is associated with an increase in the share of the US dollar (sterling) of about three percentage points.[43]

Figure 8 shows the contributions of size, credibility and financial deepening to the change in the average share of the US dollar in foreign public debt between 1918 and 1932. The contributions are calculated using the estimated parameters of the benchmark model (Table 1, column 6). They explicitly take into account the effects of inertia arising from the persistence introduced by the lagged values of currency shares in the specification. Those dynamics imply that changes in credibility, size and financial depth have an impact on currency shares not just contemporaneously but in the future as well. For each year t between 1919 and 1932 we calculate the contribution of variable z (i.e. either size, credibility or financial deepening) to the change in the average share of the US dollar (sterling) in global foreign public debt y as $(\Sigma_{i = 0,\ldots\infty} \rho^i \theta dz_{t\text{-}i})/dy_t$, where θ is the estimated parameter for z, ρ is the estimated parameter for the lag of y, and $dy_t = y_t - y_{t\text{-}1}$. The overall contribution of z to the change in y is then obtained by summing the 14 annual contributions between 1919 and 1932.

Figure 8 shows that financial deepening is by far the most important contributor to the increase in the share of the dollar as a currency of denomination for international bonds between 1918 and 1932, consistent with the findings of Eichengreen and Flandreau (2012) for the market in trade acceptances. With the ratio of US banking assets to GDP rising from 70% to 100% of GDP over the period, the share of the dollar in global foreign public debt would have risen by over 40 percentage points ceteris paribus.[44] Next in importance is greater credibility due to lower US inflation, although this impact is not statistically significant.[45]

Interestingly, country size contributed *negatively* to the rise of the dollar, since the share of the US in global output fell from 30% in 1918 to 22% in 1932, contributing to a decline in the share of the US dollar of 20 percentage points ceteris paribus.

[43] Note that when one does not control for size and credibility, financial depth is significant at the 13% confidence level.

[44] Arithmetically, the bank-asset ratio continues increasing in the United States through 1931-32 despite the fact that bank assets decline (GDP declines faster). After that, however, the trend reverses.

[45] There was indeed marked regime shifts between 1918-1919, when the US had double-digit inflation, 1921-22, when it experienced double-digit deflation, and the remainder of the 1920s, when prices were broadly stable.

Figure 9 shows similarly estimated contributions for sterling. Here too financial deepening had a positive impact. But country size is the most important factor explaining the fall in the average share of sterling between 1918 and 1932, with the share of the UK in global output falling from 13% in 1918 to 8% in 1932.[46] This is consistent with the large literature emphasizing how slow growth and high unemployment handicapped Britain's efforts to maintain its financial pre-eminence and undermined the role of sterling in the 1920s (Chandler, 1958; Sayers, 1976).

If one conducts a similar exercise for the period 1932-1939, during which the average share of the US dollar in foreign public debt declined by about ten percentage points, it is again financial depth (in this period financial retrenchment) that contributes most (see Figure 10). Over that period, the ratio of bank assets to US GDP fell by nearly 20 percent of GDP as a result of the bank failures of the Great Depression.[47]

In sum, we can explain a significant fraction of the change in currency shares in global bond markets in the 1920s and 1930s. Along with inertia, financial development in the United States is the most important determinant of the dollar's rise in the 1920s, while economic stagnation leading to a decline in relative country size is the most important factor in sterling's decline.

6. Robustness

Table 2 examines the robustness of the results to the use of alternative estimators, including a linear group-fixed effect estimator without time effects (column 1), a linear group-random effect estimator (column 2), and a panel tobit estimator (column 3). The results are close to our baseline estimates both in terms of statistical significance and economic magnitude (note that the effect of credibility is again statistically insignificant and that of financial depth is smaller in magnitude when time effects are excluded).

One could also argue that the interpretation of the lagged dependent variable in terms of inertia is problematic, insofar as the latter is simply picking up persistent error terms. The combination of serially correlated errors and the lagged dependent variable also introduces the possibility of biased coefficient estimates due to correlation between the lagged variable and the error term.

One way to deal with this problem is to instrument the lagged dependent variable with its second lag and the first lags of the independent variables (see e.g. Griliches, 1961; Liviatan, 1963). This will yield consistent, albeit inefficient, estimates.[48] Intuitively, including only the predicted component of lagged currency

[46] To be more precise, financial deepening is – along with inertia – the single most important *identified* contributor to the decline in the share of sterling, given that the contribution of the residual is even larger in absolute magnitude.

[47] As an alternative hypothesis, one could suggest that it is the dollar's departure from the gold standard that led to the decline in its share of global foreign public debt. This is unlikely to be the case, however. Sterling left the gold standard two years earlier than the dollar, but its share did not fall and actually increased throughout the 1930s.

[48] Inefficient since the adjustment does not correct for error autocorrelation.

shares enhances the plausibility that the lag is picking up genuine inertia effects, rather than merely persistent random errors. Another approach is that of Hatanaka (1974), which includes both the fitted value and the residual from the first-stage regression in the second stage and yields estimates that are both consistent and efficient.

Columns 4 and 5 of Table 2 report the results for the two approaches. The estimates are strikingly close to those obtained with the baseline specification, in terms of sign, statistical significance and economic magnitude (in addition, the effect of credibility regains its previous statistical significance). Overall, these results are consistent with the idea that we are picking up genuine inertia effects and not merely persistence in the error term.

In Table 3, column 1, we exclude France, the single largest debtor in both US dollar and sterling. In column 2 we control for the fact that the number of countries reporting data varies over time, which could distort our baseline results if large outliers start (or discontinue) reporting data, thereby creating significant breaks in the series. We do this by including as additional control variable the number of countries reporting data on foreign currency debt composition per year. The results again remain largely unaffected.

We can also use currency shares calculated at constant exchange rates rather than current rates (the use of current rates being the established practice in the literature), in order to take into account possible valuation effects arising from e.g. devaluations. The effect of persistence remains broadly unchanged, while that of size declines markedly in magnitude and that of credibility is again insignificant (column 3). Importantly, the estimate for financial deepening remains significantly positive, although it is now smaller in magnitude.

Columns (4), (5) and (6) of Table 3 provide evidence on the role of firm-level determinants of currency choice in bond issuance, namely hedging of foreign exchange exposures, market liquidity and funding cost. We find empirical support only for market liquidity, although it is important to note that the size of our sample has shrunk markedly due to limited data availability. In line with expected theoretical priors, the results in column 5 suggest that a higher US-UK spread is associated with a significant decline in the respective international currency's share. Conversely, they show that greater liquidity is associated with greater use of a particular unit in global debt markets. This further supports our emphasis on financial development.

We also consider the possible endogeneity of financial development. In Section 5 we provided evidence that financial development, as proxied by the ratio of bank assets to GDP, is an important determinant of the attractions of a currency as a unit of denomination for international bonds. Readers may be worried about reverse causality, that the issuance of bonds in a market may be followed by the deposit, at least temporarily, of the receipts accruing to the issuer in the banks of that same market. Causality, in other words, may run from the value of bond flotations to the level of bank deposits as well as the other way around.

A counter-argument is that our dependent variable is the share of bonds denominated in a particular currency and not the share floated in a particular national

market; these are not always the same, as noted above. Another counter-argument is that even if issuers did temporarily deposit the receipts from bond issuance in the banks of the country where the issue was floated, the money to buy the bonds would have come, in part, from the same place – that is, investors would have withdrawn money from those same banks in order to finance their purchases.

To get at this question, we instrumented bank deposits as a share of GDP using other dimensions of financial development less plausibly affected by bond issuance in the same country: broad money to GDP; private credit to GDP; and narrow money to GDP. The results are in Table 4. In column 1 only broad money to GDP is used as instrument, while in column 2 all three variables are used as instruments. The results confirm that the impact of financial development is not due to endogeneity. Its estimated coefficient remains comparable with that obtained in the baseline estimates in terms of both statistical significance and economic magnitude. This is further supported by estimates obtained using the Arellano-Bond (1991) two-step GMM estimator.[49] We again obtain similar results, including for financial depth, and the models successfully pass standard specification tests.[50]

As a further robustness check, we add the five Commonwealth countries to the sample. The results again are similar (see Table 5). This confirms that our findings are not biased by the exclusion of countries heavily oriented to sterling for institutional and political reasons, underscoring the generality of our conclusions.

Some readers may worry that the regression results on the importance of financial development are a figment of a persistent –albeit stationary– process, given that financial depth could be trending. This is not the case, however. Although financial depth increased significantly in the US in the 1920s, it collapsed in the Great Depression of the 1930s. Formal Fisher-Phillips-Perron tests for unbalanced panels also reject the presence of a unit root in financial depth, both with and without a time trend.[51] Estimates in first-differences rather than in levels –i.e. unlike the conventional specification used in the literature, which models inertia explicitly– confirm that financial development matters.[52] Not surprisingly, the effect of inertia vanishes virtually, while that of size turns negative in two specifications, albeit becoming insignificant in the full model. But the results for credibility and –importantly– financial depth remain unchanged, which supports again our emphasis on financial development.

[49] This estimator also takes care of residual autocorrelation, like the Griliches (1961)-Liviathan (1963) or the Hatanaka (1974) estimators of Table 2. The instruments are based here on moment equations constructed from lagged levels of currency shares and of the first-differenced errors along with the ratios of broad money, private credit and narrow money to GDP as additional instruments. Given our large *T* context (i.e. 33 years of data available), the resulting number of instruments is very large relative to the number of groups *N* (i.e. 350 vs. 54). This is unlike the standard Arellano-Bond (1991) context (where *N* is large and *T* small) and at odds with a standard rule of thumb according to which the number of instruments should not exceed *N*.

[50] The Sargan statistic does not reject the null that our overidentifying conditions are valid. Moreover there is evidence of first-order serial correlation in the first-differenced disturbances, as expected, but not of second-order, which is comforting.

[51] According to the *Z* and *L** statistics of the tests.

[52] The results are not reported here to save space, but they are available from the authors upon request.

Finally, Table 6 presents estimates where the dependent variable is simply the share of debt denominated in dollars relative to that denominated in sterling (and where the independent variables are US relative to UK variables). This specification addresses possible ambiguities in the interpretation of developments on both sides of the Atlantic. For instance, UK financial depth might have well increased on the whole but decreased relative to that in the US. The results in Table 6 are again qualitatively close to those in the baseline specification, however. In the full model (column 6), the estimated inertia coefficient remains unaltered; the credibility measure is insignificant; and the effect of size and financial depth are positive, significant, and even larger than in the baseline specification.

7. Conclusions and implications

This paper has provided new evidence on the emergence of the US dollar as the leading international currency, focusing on its role as a financing currency in global debt markets.

This evidence challenges the three central tenets of the conventional wisdom on international currencies. First, network externalities, first-mover advantages and inertia matter, but they cannot indefinitely delay the transfer of leadership in the international monetary sphere relative to that in the economic, commercial and financial spheres; they do not dominate to the extent previously thought. Our evidence shows that, abstracting from the Commonwealth countries, the dollar overtook sterling already in 1929, at least 15 years prior to the date cited in other accounts. Even including the Commonwealth countries, which were wedded to sterling for political and institutional reasons, the dollar was already within hailing distance of sterling as a currency of denomination for international bonds by the latter 1920s.

Second, our evidence challenges the presumption that once international monetary leadership is lost, it is gone forever. Although sterling lost its leadership in the 1920s it recovered after 1933 and again ran neck and neck with the dollar at the end of the decade.

Third, our findings challenge the presumption that there is room for only one dominant international currency due to strong network externalities and economies of scope. International debt markets in the 1920s and the 1930s were characterised by a bipolar currency system, not a unipolar one. This is true even if one takes into account the Commonwealth countries, which were heavily oriented towards sterling for very institutional and political reasons.

Our results point to the development of US financial markets as the main factor that helped the US dollar overcome sterling's incumbency advantage. We find that financial deepening was the most important contributor to the increase in the share of the US dollar in global foreign public debt between 1918 and 1932. In the case of the UK, economic stagnation (declining relative economic size) was the most important factor accounting for sterling's declining share over the period.

These findings have implications for the future of the international monetary system. They suggest that a shift from a unipolar dollar-based system to a multipolar system is not impossible; that it could occur sooner than often believed; and that financial deepening and market liquidity will be key determinants of the ability of currencies other than the dollar to strengthen their international currency status. They point to addressing financial market fragmentation and deepening financial integration in the euro area as important to the evolution of the euro's international profile in the years ahead; and to the opening up of the capital account, along with further exchange rate reform and the building up of liquid domestic financial markets, as of key importance to that of the Chinese yuan.

The international status of a currency will rest on solid foundations, however, only if financial deepening in the issuing country is sustainable, and not if financial innovation and liberalization simply causes a boom that eventually goes bust. The impact of finance on international currency shares in global debt markets worked both ways during the interwar period. In particular, the collapse of the US banking system and subsequent financial retrenchment was the most important factor contributing to the decline in the share of the US dollar in global foreign public debt between 1932 and 1939.

The yen's experience is another cautionary tale. Attempts by the Japanese authorities to develop the international role of their currency suffered from the bursting of Japan's equity and real estate bubbles in the late 1980s and the banking and economic crisis of the 1990s. This underscores that the compass guiding the pace and scope of financial sector reform should always point to the direction of medium-term sustainability. In turn, this highlights the important role that macro-prudential policies and tools will play in shaping the international status of currencies in the new millennium.

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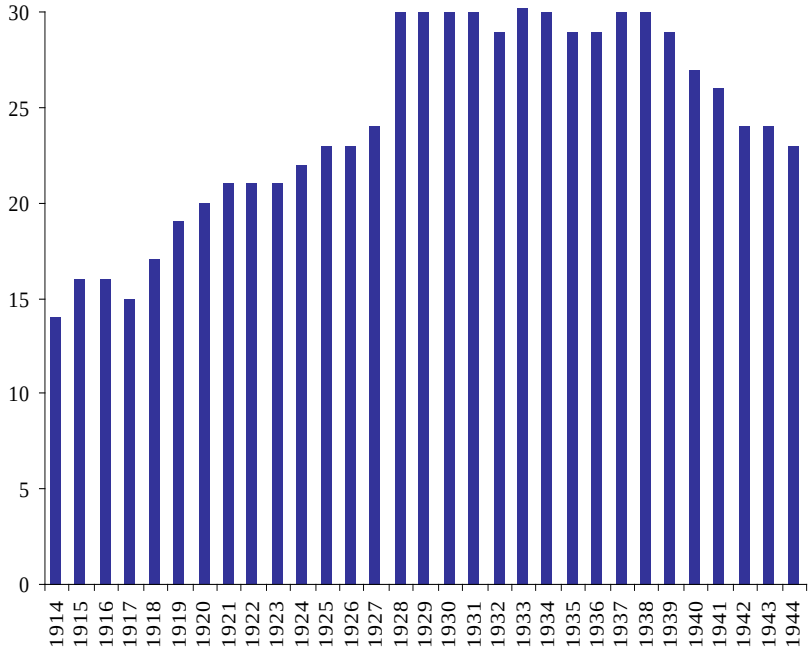
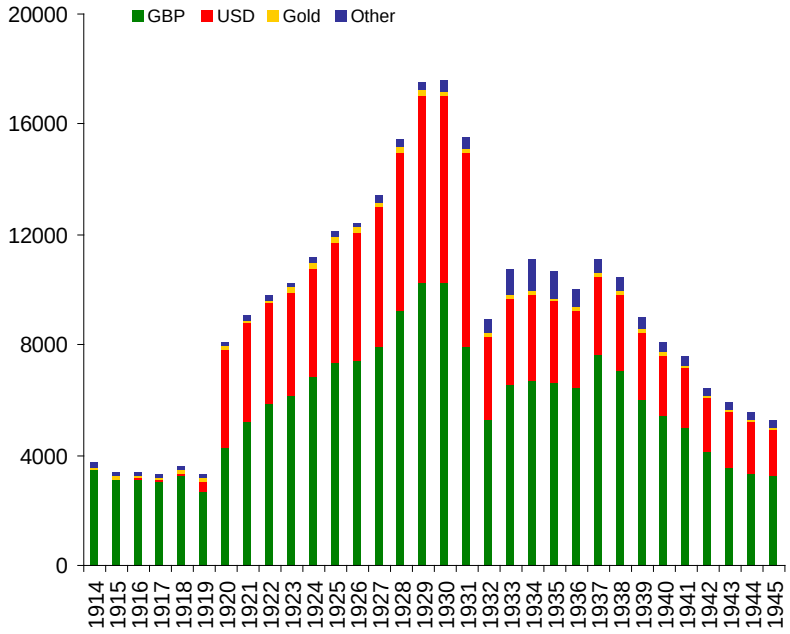
Figure 1: Number of countries reporting data



Note: The figure shows for each year between 1914 and 1946 the number of countries reporting data on the currency composition of their foreign public debt, as available from United Nations (1948).

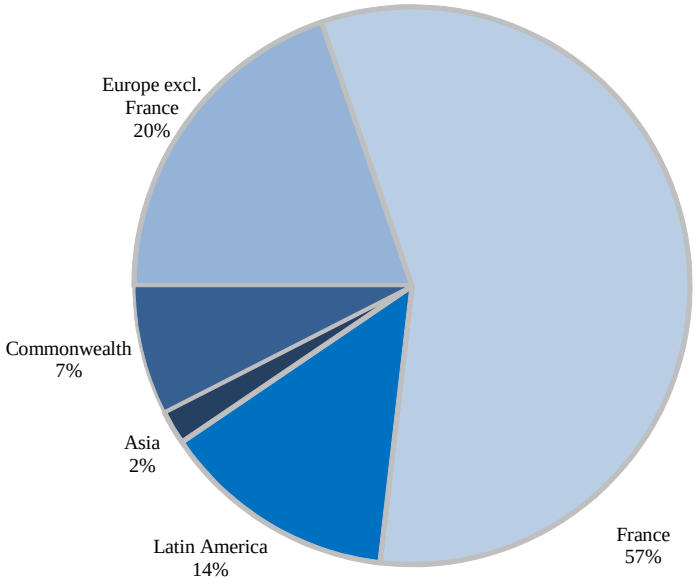
Figure 2: Global foreign public debt

(Currency breakdown in USD million; at current exchange rates)



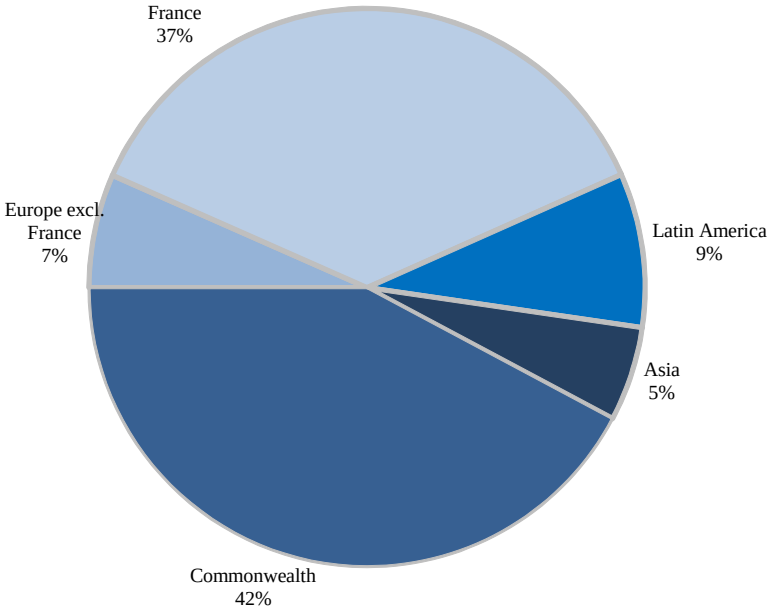
Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure plots over time the global stock of foreign public debt, in USD million and at current exchange rates, calculated with our full sample of 33 countries, and broken down into selected currencies.

Figure 3: Global foreign public debt in US dollar – Main debtors
(As a % of total; at current exchange rates; in 1929)



Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows for 1929 (roughly the mid-point of our sample) the global stock of US dollar-denominated foreign public debt (amounting to USD 6,828 million) broken down by main debtor regions.

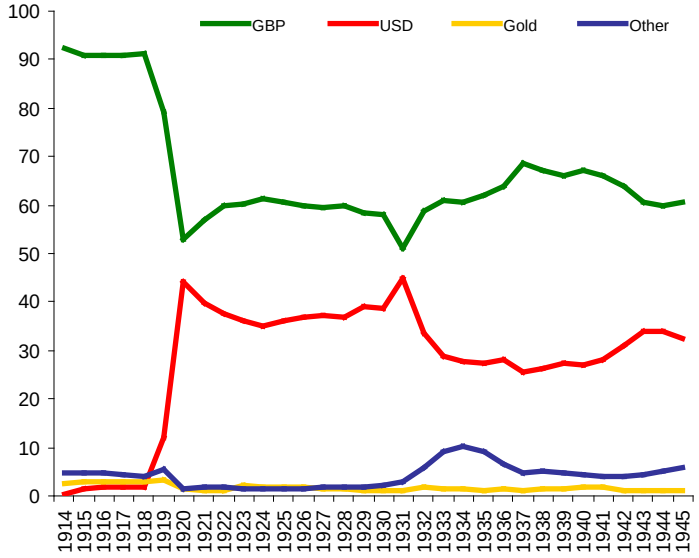
Figure 4: Global foreign public debt in sterling – Main debtors
(As a % of total, at current exchange rates; in 1929)



Notes: Authors' estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows for 1929 (roughly the mid-point of our sample) the global stock of sterling-denominated foreign public debt (amounting to USD 10,232 million) broken down by main debtor regions.

Figure 5a: Global foreign public debt – Full sample

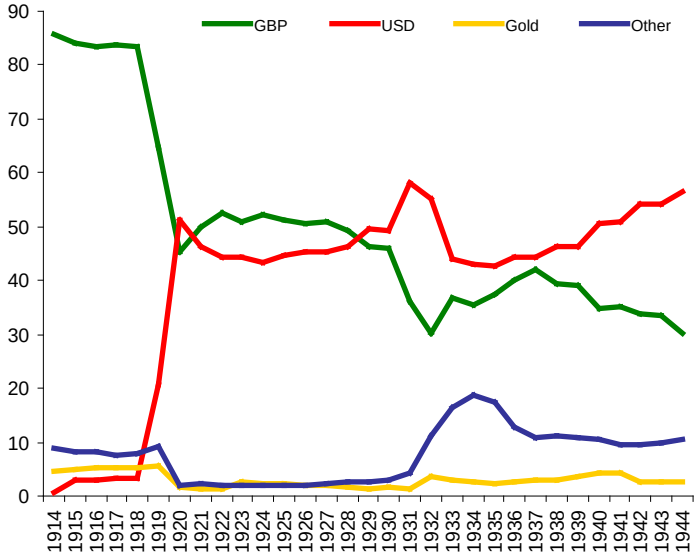
(Selected currency shares as a % of total; at current exchange rates)



Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows the evolution over time of the shares of sterling, US dollar, gold and other currencies in the global stock of foreign public debt (in % and at current exchange rates) based on our full sample of 33 countries. Data for Australia, Canada, New Zealand and South Africa refer to the location (London or New York) where debt was "payable", "redeemable" or "due" and are not strictly comparable with those of the remaining 29 countries whose data refer to actual foreign currency debt denomination.

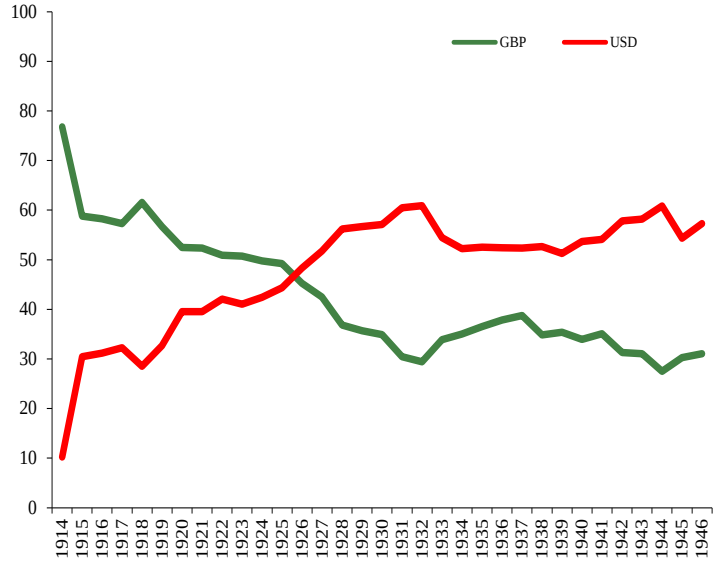
Figure 5b: Global foreign public debt – Excl. Commonwealth countries

(Selected currency shares as a % of total; at current exchange rates)



Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows the evolution over time of the shares of sterling, US dollar, gold and other currencies in the global stock of foreign public debt (in % and at current exchange rates) based on a restricted sample of 28 countries, i.e. the full sample minus our five Commonwealth countries (India, Australia, Canada, New Zealand and South Africa).

Figure 5c: Global foreign public debt – Arithmetic averages
(Selected currency shares as a % of total; at current exchange rates)

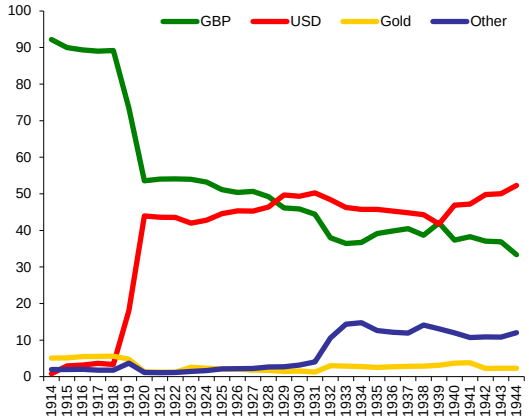


Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows the evolution over time of the shares of sterling and the US dollar (in % and at current exchange rates) calculated as cross-country arithmetic averages and based on a restricted sample of 28 countries, i.e. the full sample minus our five Commonwealth countries (India, Australia, Canada, New Zealand and South Africa).

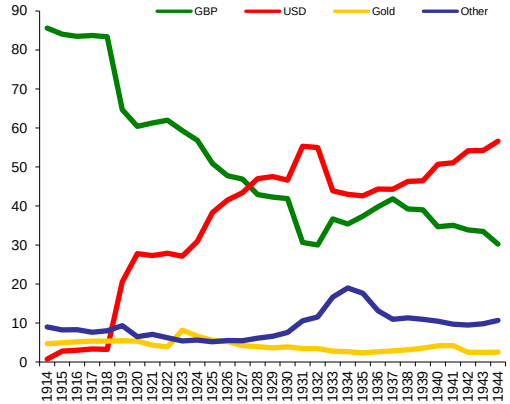
Figure 6: Global foreign public debt – Alternative methods to calculate currency shares

(As a % of total)

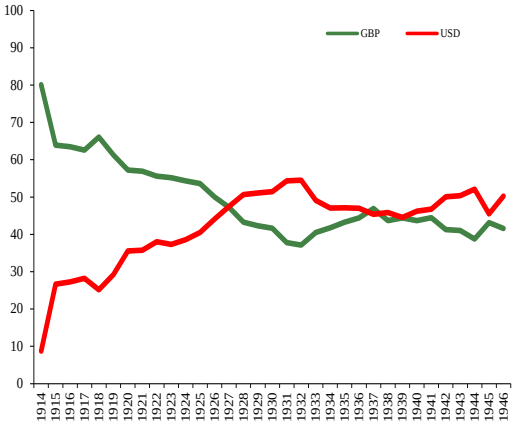
a. At constant (end-1930) exchange rates (incl. France)



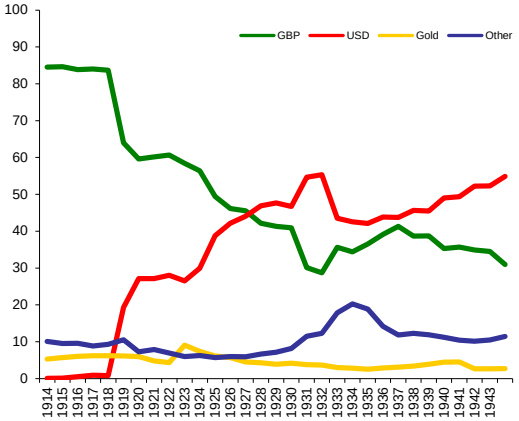
b. At current exchange rates (excl. France)



c. At current exchange rates, arithmetic average across 33 countries



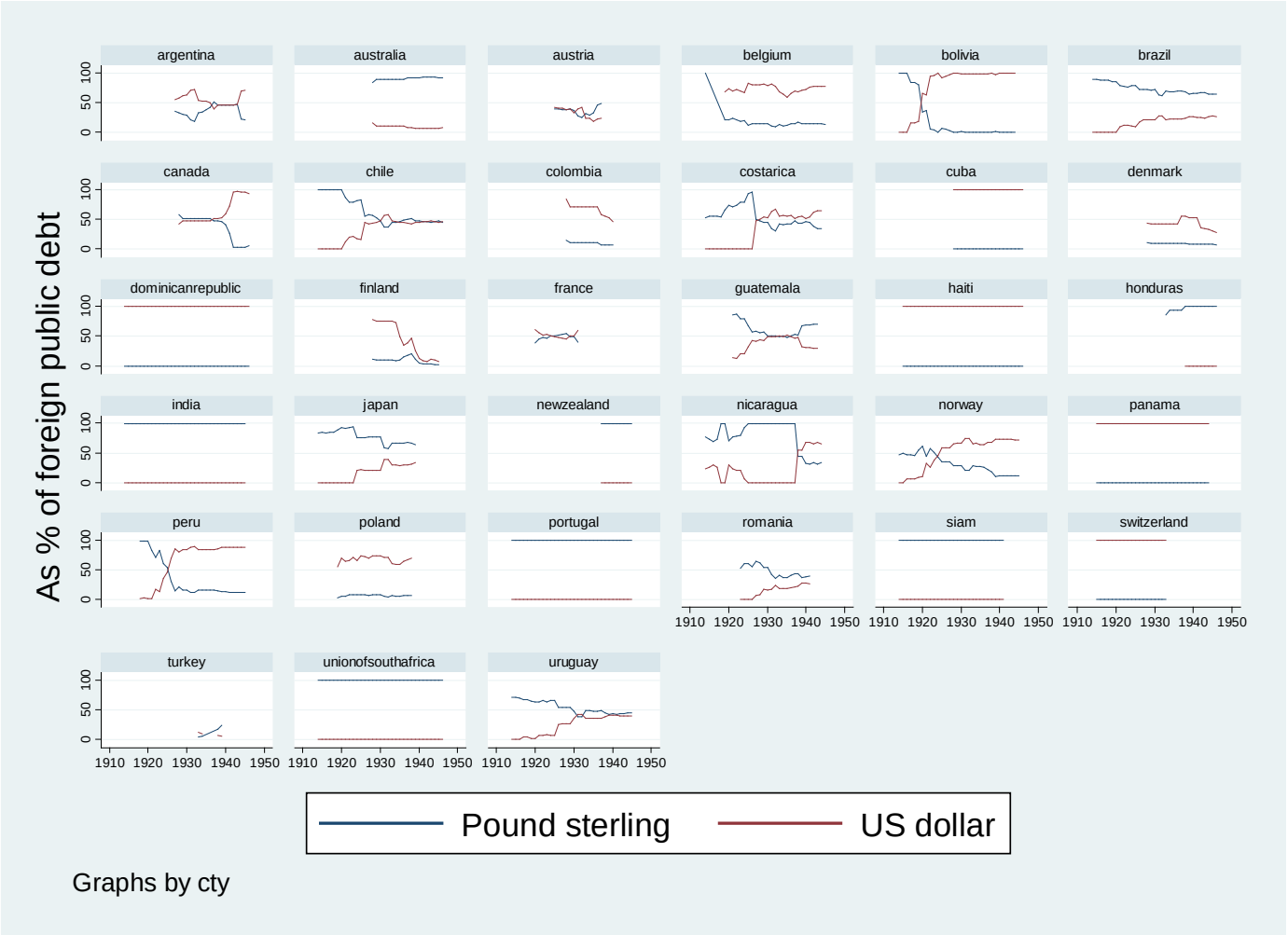
d. At current exchange rates, excluding France & countries issuing only in US dollar or sterling



Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows the evolution over time of the shares of sterling, US dollar, gold and other currencies in the global stock of foreign public debt using alternative methods to calculate currency shares and based on the sample of 28 countries (except Figure 6c), i.e. the full sample minus our five Commonwealth countries (India, Australia, Canada, New Zealand and South Africa).

Figure 7: Share of US dollar/sterling debt in foreign public debt – Breakdown by country

(% at current exchange rates)



Notes: Authors' own estimates based on United Nations (1948) as well as the *GFD* and *Measuring Worth* databases on exchange rates. The figure shows the evolution over time of the shares of the US dollar and sterling in the foreign public debt of each of our sample's 33 countries (in % and at current exchange rates). Data for Australia, Canada, New Zealand and South Africa refer to the location (London or New York) where debt was "payable", "redeemable" or "due" and are not strictly comparable with those of the remaining 29 countries whose data refer to actual foreign currency debt denomination.

Figure 8: Estimated contributions (*incl. inertia effects*) to the change in the share of the US dollar in global foreign public debt between 1918 and 1932
(In percentage points)

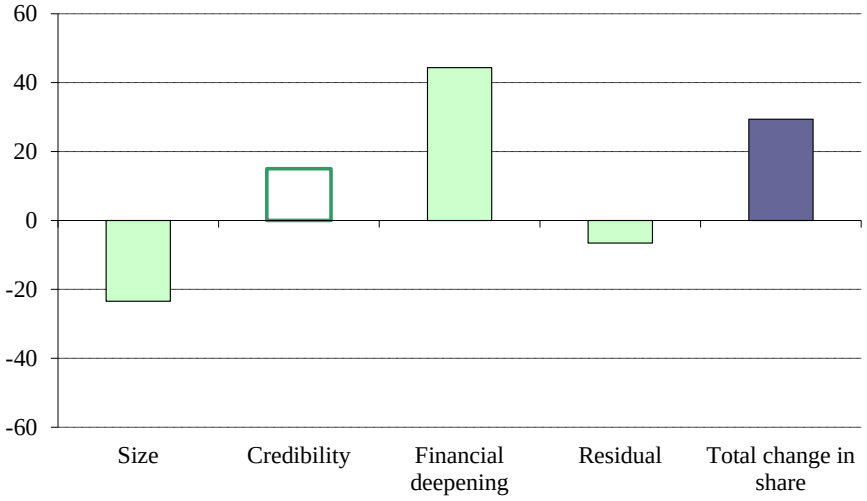
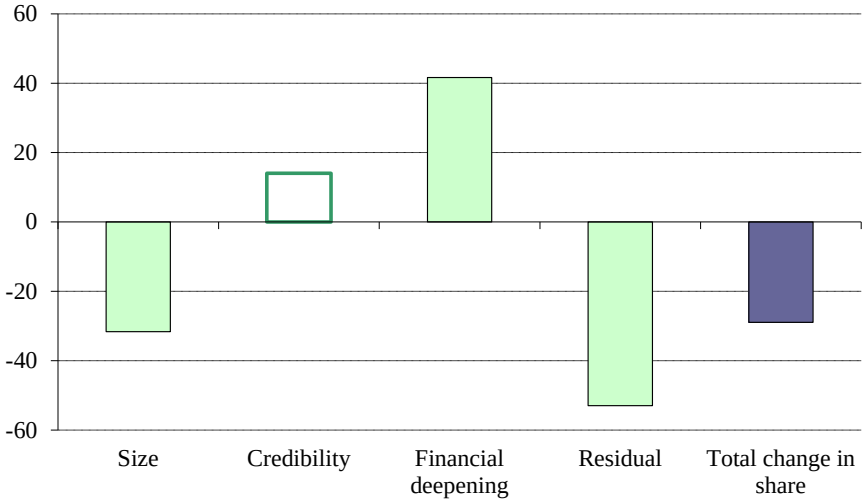
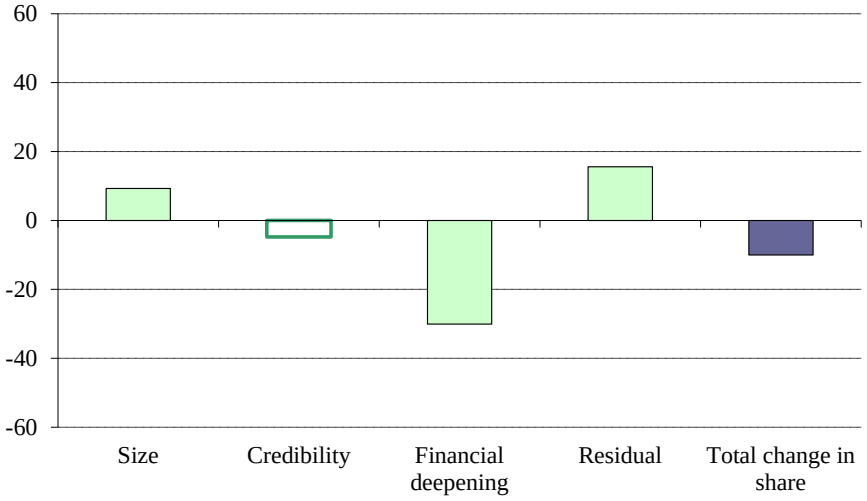


Figure 9: Estimated contributions (*incl. inertia effects*) to the change in the share of sterling in global foreign public debt between 1918 and 1932
(In percentage points)



Notes: The contributions reported in Figures 8 and 9 are calculated using the estimated parameters of benchmark model (6) of Table 1. They include inertia effects arising from the dynamic specification of the model, which we calculate as follows. For each year t between 1919 and 1932 we calculate the contribution of variable z (i.e. either size, credibility or financial deepening) to the change in the average share of the US dollar (sterling) in global foreign public debt y as $(\Sigma_{i = 0,\ldots\infty} \rho^{i}\theta dz_{t-i})/dy_{t,}$ where θ is the estimated parameter for z, ρ is the estimated parameter for the lag of y, and where $dy_t = y_t - y_{t-1}$. The overall contribution of z to the overall change in y throughout the period is obtained by summing the 14 annual contributions between 1919 and 1932. Recall also that the estimated effect of credibility was found to be statistically insignificant.

Figure 10: Estimated contributions (*incl. inertia effects*) to the change in the share of the US dollar in global foreign public debt between 1932 and 1939
(In percentage points)



Notes: Please refer to the notes to Figures 8 and 9.

Table 1: Baseline model estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Inertia	0.897***	0.896***	0.905***	0.904***	0.894***	0.903***
	(0.009)	(0.009)	(0.011)	(0.011)	(0.009)	(0.011)
Credibility		-0.109*		-0.151***		-0.082
		(0.058)		(0.054)		(0.060)
Size			0.349**	0.445***		0.992***
			(0.149)	(0.138)		(0.193)
Financial depth					0.088*	0.338***
					(0.057)	(0.077)
Constant	4.390***	6.402***	-2.786	-2.772	-0.408	-34.285***
	(1.138)	(2.194)	(3.439)	(4.100)	(3.371)	(8.898)
Observations	1,061	1,061	1,061	1,061	1,061	1,061
No. of groups	56	56	56	56	56	56
R^2 (overall)	0.972	0.972	0.969	0.965	0.972	0.904
R^2 (within)	0.849	0.850	0.850	0.851	0.850	0.854
R^2 (between)	0.997	0.997	0.991	0.986	0.997	0.909
ρ	0.270	0.278	0.306	0.367	0.275	0.742
σ^{α}	3.698	3.761	4.022	4.598	3.735	10.18
σ^{ε}	6.075	6.066	6.060	6.041	6.071	5.995
log likelihood	-3377	-3375	-3374	-3370	-3376	-3361

Note: The table reports estimates of Eq. (1) based on our baseline sample of 28 countries over 1914-1916 and including the main determinants of international currency status, group effects and time effects. The standard errors reported in parentheses are robust to heteroskedasticity and clustered heterogeneity; *** p<0.01, ** p<0.05, * p<0.13.

Table 2: Estimates with alternative estimation methods

	(1) No time effects	(2) Random effects	(3) Panel tobit	(4) Griliches (1961) Liviatan (1963)	(5) Hatanaka (1974)
Inertia	0.901***	0.979***	0.975***		
	(0.010)	(0.004)	(0.007)		
Credibility	-0.026	-0.078	-0.078	-0.232**	-0.146*
	(0.028)	(0.060)	(0.059)	(0.101)	(0.080)
Size	0.425***	1.215***	1.198***	0.821**	0.887***
	(0.136)	(0.199)	(0.195)	(0.314)	(0.200)
Financial depth	0.090**	0.322***	0.325***	0.305**	0.338***
	(0.034)	(0.073)	(0.084)	(0.127)	(0.079)
Fitted inertia				0.879***	0.882***
				(0.028)	(0.016)
1st stage residual					0.866***
					(0.030)
Constant	-9.340*	-29.980***	-33.420***	-24.847*	-29.835***
	(4.830)	(6.543)	(6.545)	(14.322)	(9.452)
Observations	1,061	1,061	1,061	1,003	1,003
No. of groups	56	56	56	54	54
R^2 (overall)	0.963	0.973	.	0.743	0.911
R^2 (within)	0.850	0.853	.	0.717	0.838
R^2 (between)	0.983	0.998	.	0.745	0.921
ρ	0.400	0	0.0170	0.828	0.710
σ^{α}	4.888	0	0.788	17.60	9.467
σ^{ε}	5.991	5.995	6.002	8.009	6.054
log likelihood	-3374	.	-3415	-3467	-3186

Note: The table reports estimates for our benchmark model (Table 1; Eq (6)) based on our baseline sample of 28 countries over 1914-1916 and using: (1) a linear group-fixed effect estimator, but without time effects; (2) a linear group-random effects estimator and (3) a panel tobit estimator (also including currency effects); (4) the Griliches (1961)-Liviatan (1963) estimator; and (5) the Hatanaka (1974) estimator. The standard errors reported in parentheses are robust to heteroskedasticity and clustered heterogeneity; *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Other sensitivity tests

	(1) Excl. France	(2) Compo. effects	(3) Constant shares	(4) Hedging & exposure	(5) US/UK market liquidity	(6) Cost of funding
Inertia	0.905***	0.903***	0.912***	0.920***	0.915***	0.894***
	(0.011)	(0.011)	(0.010)	(0.012)	(0.011)	(0.043)
Credibility	-0.105*	-0.082	0.011	0.064	0.151***	-0.107
	(0.058)	(0.060)	(0.051)	(0.047)	(0.049)	(0.085)
Size	0.999***	0.992***	0.517***	1.127***	0.951***	1.981***
	(0.201)	(0.193)	(0.148)	(0.285)	(0.250)	(0.528)
Financial depth	0.338***	0.338***	0.133**	0.424***	0.298***	0.810**
	(0.080)	(0.077)	(0.056)	(0.090)	(0.087)	(0.253)
# reporting countries		0.019				
		(0.087)				
Bilateral trade with US/UK				-0.004		
				(0.053)		
US-UK spread					-1.102***	
					(0.311)	
Interest rate differential						-0.028
						(0.493)
Constant	-34.062***	-35.384***	-14.734**	-45.473***	-36.443***	-87.689***
	(9.235)	(9.596)	(6.677)	(10.107)	(9.725)	(24.120)
Observations	1,024	1,061	1,061	729	729	125
No. of groups	54	56	56	39	39	8
R^2 (overall)	0.907	0.904	0.962	0.856	0.902	0.714
R^2 (within)	0.855	0.854	0.876	0.848	0.850	0.793
R^2 (between)	0.911	0.909	0.976	0.868	0.917	0.711
ρ	0.744	0.742	0.491	0.787	0.695	0.952
σ^{α}	10.22	10.18	5.465	11.61	9.040	22.31
σ^{ε}	6.005	5.995	5.560	6.036	5.983	5.003
log likelihood	-3245	-3361	-3281	-2309	-2302	-356.0

Note: The table reports estimates for our benchmark model (Table 1; Eq (6)) based on our baseline sample of 28 countries over 1914-1916 and (1) excluding France (largest debtor) from the estimation; (2) controlling for the number of countries reporting data; (3) using currency shares calculated at constant exchange rates; (4) controlling for hedging and exposure considerations; (5) relative market liquidity; (6) cost of funding considerations. The standard errors reported in parentheses are robust to heteroskedasticity and clustered heterogeneity; *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Endogeneity

	(1)	(2)	(3)	(4)
	Panel 2SLS estimates		Arellano-Bond (1991) estimates	
Inertia	0.903***	0.871***	0.761***	0.755***
	(0.012)	(0.014)	(0.087)	(0.092)
Credibility	-0.085	-0.192***	-0.042	-0.122
	(0.060)	(0.067)	(0.048)	(0.088)
Size	0.967***	0.813***	0.976*	1.025*
	(0.217)	(0.208)	(0.592)	(0.632)
Financial depth	0.322***	0.362***	0.292**	0.431**
	(0.099)	(0.090)	(0.132)	(0.195)
Constant	-37.160***	-37.076***	-27.640*	-39.440*
	(9.768)	(8.852)	(16.345)	(20.571)
Observations	1,061	1,022	1,003	978
No. of groups	56	56	54	54
R^2 (overall)	0.908	0.918		
R^2 (within)	0.854	0.834		
R^2 (between)	0.914	0.927		
ρ	0.731	0.696		
σ^{α}	9.893	9.105		
σ^{ε}	5.995	6.017		
AR(1)			-3.420***	-3.396***
AR(2)			-0.008	0.098
Sargan χ^2-stat.			24.322	27.088

Note: The table reports estimates for our benchmark model (Table 1; Eq (6)) based on our baseline sample of 28 countries over 1914-1916 using (i) a panel 2SLS estimator and (ii) the 2-step GMM Arellano-Bond (1991) estimator. The instruments –alongside lagged levels of currency shares and first-differenced errors for (ii) – include the ratio of broad money to GDP (in columns 1 and 3) as well as the latter, private credit to GDP and narrow money to GDP (in columns 2 and 4). Standard errors are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.11.

Table 5: Estimates including Commonwealth countries

	(1)	(2)	(3)	(4)	(5)	(6)
Inertia	0.897***	0.896***	0.903***	0.903***	0.894***	0.902***
	(0.009)	(0.009)	(0.011)	(0.011)	(0.009)	(0.011)
Credibility		-0.096*		-0.133***		-0.073
		(0.051)		(0.048)		(0.052)
Size			0.312**	0.396***		0.867***
			(0.133)	(0.124)		(0.174)
Financial depth					0.076*	0.293***
					(0.050)	(0.069)
Constant	4.694***	6.278***	-1.833	-1.907	0.339	-29.147***
	(1.098)	(1.958)	(3.423)	(3.681)	(2.970)	(7.985)
Observations	1,214	1,214	1,214	1,214	1,214	1,214
No. of groups	66	66	66	66	66	66
R^2 (overall)	0.976	0.976	0.974	0.971	0.977	0.921
R^2 (within)	0.849	0.849	0.849	0.850	0.849	0.852
R^2 (between)	0.998	0.998	0.993	0.989	0.998	0.926
ρ	0.316	0.325	0.378	0.433	0.330	0.747
σ^{α}	3.871	3.945	4.425	4.951	3.994	9.657
σ^{ε}	5.689	5.682	5.676	5.661	5.686	5.624
log likelihood	-3785	-3783	-3782	-3778	-3784	-3770

Note: The table reports estimates of Eq (1) based on our full sample of 33 countries over 1914-1916, i.e. including the five Commonwealth countries in our sample (Australia, Canada, India, New Zealand and South Africa) and the main determinants of international currency status, group effects and time effects. The standard errors reported in parentheses are robust to heteroskedasticity and clustered heterogeneity; *** p<0.01, ** p<0.05, * p<0.13.

Table 6: Estimates in relative terms (dollar minus sterling shares)

	(1)	(2)	(3)	(4)	(5)	(6)
Inertia	0.867***	0.867***	0.867***	0.867***	0.867***	0.867***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Credibility		0.952		-0.258		1.228
		(0.617)		(0.783)		(0.767)
Size			0.489*	0.569		2.032***
			(0.250)	(0.349)		(0.572)
Financial depth					0.365***	0.813***
					(0.114)	(0.200)
Constant	-6.603	-9.909*	-10.607**	-9.549*	1.393	53.468***
	(3.995)	(5.804)	(4.172)	(4.843)	(1.721)	(12.724)
Observations	517	517	517	517	517	517
Number of cty	28	28	28	28	28	28
R^2 (overall)	0.974	0.974	0.974	0.974	0.974	0.974
R^2 (within)	0.866	0.866	0.866	0.866	0.866	0.866
R^2 (between)	0.997	0.997	0.997	0.997	0.997	0.997
ρ	0.376	0.376	0.376	0.376	0.376	0.376
σ^{α}	8.745	8.745	8.745	8.745	8.745	8.745
σ^{ε}	11.27	11.27	11.27	11.27	11.27	11.27
log likelihood	-1958	-1958	-1958	-1958	-1958	-1958

Note: The table reports estimates of Eq (1) in relative terms (i.e. dollar share minus sterling share) based on our baseline sample of 28 countries over 1914-1916 and including the main determinants of international currency status, group effects and time effects. The standard errors reported in parentheses are robust to heteroskedasticity and clustered heterogeneity; *** p<0.01, ** p<0.05, * p<0.1.

Appendix I: Primary sources used by the United Nations to compile data on the currency composition of foreign public debt

Argentina. *Memoria del Departamento de Hacienda*; *Memoria de la Contaduria de la Nación*; *El Ajuste de los Resultados Financieros de los Ejercicios de 1928 a 1936*, Buenos aires, 1938; Dirección General de Estadística, *Informe No. 6*, Series F., No. 2, Buenos Aires, 1923, *Revista de Economia Argentina.*

Australia. *The Budget*, *Finance Bulletins* - Summary of Australian Financial Statistics, the *Treasurer's Statement of Receipts and Expenditure, Official Year-Book of the Commonwealth of Australia.*

Austria. *Bundes-Rechnungsabschluss der Republik Österreich, Statistisches Handbuch für dir Republik Österreich*.

Belgium. Office Central de Statistique, *Annuaire Statistique, Evolution des Finances de l'Etat, 1931-1940* ; Banque Nationale, *Bulletin d'Information et de Documentation*.

Bolivia. Oficina Nacional: *Estadística Financiera, Estadística Boliviana*; Dirección General de Estadística: *Extracto Estadístico*. Ministerio de Hacienda, Dirección General de Estadística: *Finanzas*. Banco Central de Bolivia: *Boletín*.

Brazil: Contadoria Geral da Republica: *Balancos Gerais da União* (title varies slightly during the period 1914-1943), *Anuario Estadistico do Brasil*. Sir Otto E. Niemayer: Report submitted to the Brazilian Government, 1931.

Canada: *Public Accounts*; *Canada Yearbook*.

Chile. *Sinópsis Estadística*, 1926/27, Price, Waterhouse, Faller & Co.; *Informe sobre el Estado de la Hacienda Pública*; *Memoria de la Controleria General; Sinópsis Geográfico-Estadística*, 1933.

Colombia: *Informe Financiero de Contralor General, Anuario Estadistica, Boletin del Departamento de Controloria*.

Costa Rica. Secretaria de Hacienda y Comercio, *Memoria*; Congreso Constitucional, Centro de Control, *Informe*.

Cuba. Communications received by the Economic, Financial and Transit Department of the League of Nations from the Cuban Government.

Denmark: Closed Accounts, Statistik Aarbog, Danske Staatslaan.

Dominican Republic: *Informe de la Camara de Cuentas;* Moody's *Government and Municipal Manual; Secretaria de Estado del Tesoro y Credito Público; Anuario de Estadístico de la República Dominicana; Annual Report of the Council of the Corporation of Foreign Bond Holders.*

Finland: Closed Accounts, Bureau Central de Statistique, *Annuaire Statistique de Finlande, Recueil de Statistique*, Communication from Bank of Finland, Institute for Economic Research.

France. Closed accounts (*Comptes Généraux*), Ministère des Finances, *Dette Publique (*Situations Mensuelles*), Inventaire de la Situation financière (1913-1946).*

Guatemala. Secretaria de Hacienda y Crédito Público, *Memoria*; Council of the Cooperation of Foreign Bondholders, *Annual Reports*.

Haiti. *Annual Reports of the Fiscal Representative*, Banque Nationale d'Haïti, *Annual Reports of the Fiscal Department*.

Honduras: Secretaria de Hacienda y Crédito Público; *Memorias*; Council of Foreign Bondholders, *Annual Reports*.

India. *Combined Finance and Revenue Accounts, Budgets of the Government of India, Statistical Abstracts for British India.*

Japan. Department of Finance, *Financial and Economic Annual of Japan, Résumé statistique de l'Empire de Japon,* Bank of Japan, *Economic Statistics of Japan, Oriental Economist,* Supreme Commander for the Allied Powers, *Japanese Economic Statistics.*

New Zealand: *Public Accounts*; *New Zealand Official Yearbook.*

Nicaragua. *Memoria del Secretaria de Hacienda y Tesoro, Memoria del Recaudador General de Aduanas y alta Comisión, Informe del alta Comisión, Boletín Mensual Estadística,* Año 2, Nos. 11 y 12.

Norway. Closed accounts; *Statistique officielle de la Norvège,* serie VIII; *Statistical Year-Books of Norway*.

Panama. Secretaria de Hacienda y Tesoro, Memoria; Contralor General de la República, *Informe*; Dirección de Estadística y Censo, *Estadística Panamena.*

Peru. *Balance y cuenta de la Republica, Extracto Estadístico del Perú.*

Poland. *Budgets, Closed Accounts, Annuaire Statistique de la République Polonaise,* the *Statistical Bulletin* of the Ministry of Finance; the *Bulletin* of the Bank of Poland; Central Statistical Office, *Statistical News*.

Portugal. *Conta Geral do Estado, Orçamento Geral, Movimiento Financeiro de Portugal, Anuário Estadistico.*

Romania. *Exposé des motifs, Budgets,* Central Statistical Institute, *Statistical Year-Books,* National Bank, *Bulletin d'Information et de Documentation*.

Siam. *Reports of the Financial Adviser on the Budget of the Kingdom of Siam. Annual Reports of the Bank of Siam.*

Switzerland. *Comptes d'Etat, Statistical Year-Books of Switzerland*.

Turkey. *Closed Accounts*; Central Bank of Turkey: *Bulletins.* 1940-1944: Reply by the Turkish Government to questionnaire of the Economic, Financial and Transit Department of the League of Nations.

Union of South Africa: *Annual Report of the Controller and Auditor-General and Treasury Statements, Annual Report of the Public Debt Commissioners. Official Yearbook of the Union of South Africa*.

Uruguay. *Deuda Pública Nacional, Anuario Estadístico*.

Appendix II: Country-level information on the data availability on currency composition of foreign public debt

Argentina. Annual data from 1927 to 1946 (with missing observations for the year 1928 which were filled with interpolation) in six currencies (sterling, US dollar, Spanish peseta, Swiss franc, Italian lira and gold Argentinean peso) are available from United Nations (1948, p. 11). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates. Debt in gold peso converted to US dollar using the exchange rate at which Argentina re-entered the gold standard in 1927 (1.0385 ARS/USD).

Australia. Annual data for 1928 and 1937 to 1947 on bonds "redeemable" in London and in New York are available from United Nations (1948, p. 18). Data are interpolated for the period 1929-1936 by assuming that currency shares remain constant at the average of 1928 and 1937 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Austria. Annual data from 1925 to 1937 in 15 currencies (sterling, US dollar, French franc, Swiss franc, Belgian franc, gold franc, Dutch Gulden, Italian lira, Spanish peseta, Swedish crown, Norwegian crown, Danish crown, Czech crown, Egyptian pound and German Reichmark) are available from United Nations (1948, p. 19). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates. Debt in gold franc (issued in 1932) converted to US dollar amounts using the Franc Poincaré 1928 parity (25.575 gold francs per US dollar). Data on debt issued in Czech crown was converted into US dollar amounts using the exchange rate of the koruna vs. the US dollar available from the United Nations volume (Table I, p. 49). Data on debt issued in Egyptian pound not converted to US dollar amounts due to missing exchange rate data (and thereby discarded).

Belgium. Annual data from 1919 to 1945 in seven currencies (sterling, US dollar, French franc, Dutch gulden, Swiss franc, Swedish crown and Canadian dollar) are available from United Nations (1948, p. 22). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates.

Bolivia. Annual data from 1914 to 1944 in two currencies (sterling, US dollar) are available from United Nations (1948, p. 25). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates.

Brazil. Annual data from 1914 to 1946 in four currencies (sterling, US dollar, French franc, gold franc) are available from United Nations (1948, p. 28). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates. Debt in gold franc (issued in 1914) converted to US dollar amounts using the Franc Germinal 1914 parity (5.095 gold francs per US dollar).

Canada. Annual data for 1928 and 1937 to 1947 on bonds "payable" in London and in New York are available from United Nations (1948, p. 37). Data are interpolated for the period 1929-1936 by assuming that currency shares remain constant at the average of 1928 and 1937 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Chile. Annual data from 1914 to 1946 in three currencies (sterling, US dollar, Swiss franc) are available from United Nations (1948, p. 38). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates.

Colombia. Annual security-by-security data for 1928 and 1937 to 1944 on bonds in two currencies (sterling, US dollar) are available from United Nations (1948, p. 44). Due to large bond amounts in unspecified currencies (National City Bank and others'; 'Export and Import Bank, Washington"; 'Conversion bonds') data post-1940 had to be discarded. Data are interpolated for the period 1929-1936 by assuming that currency shares remain constant at the average of 1928 and 1937 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Costa Rica. Annual data from 1914 to 1944 in three currencies (sterling, US dollar, French franc) are available from United Nations (1948, p. 45). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates.

Cuba. Annual data from 1928 to 1946 in one currency (US dollar) are available from United Nations (1948, p. 48), reported in millions of national currency. Foreign debt consists of US dollar obligations. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Denmark. Annual security-by-security data for 1928 and 1935 to 1944 on bonds in five currencies (sterling, US dollar, Dutch gulden, Swedish kronor and Swiss franc and some issues in multiple currencies) are available from United Nations (1948, pp. 53-54). Data are interpolated for the period 1929-1934 by assuming that currency shares remain constant at the average of 1928 and 1935 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Dominican Republic: Annual data for 1914-1946 on bonds in one currency (US dollar) are available from United Nations (1948, p. 55).

Finland. Annual security-by-security data for 1928 and 1934 to 1945 on bonds in three currencies (sterling, US dollar, Swedish kronor and some issues in unspecified currencies) are available from United Nations (1948, pp. 63). Data are interpolated for the period 1929-1933 by assuming that currency shares remain constant at the average of 1928 and 1934 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

France. Annual data from 1920 to 1931 in two currencies (sterling, US dollar) are available from United Nations (1948, p. 65) corresponding to the debt owed to the "allied governments". Data on commercial (private) debt (denominated in gold franc) are also available accounting for approximately 15% of total foreign debt. Since we focus on public debt in the paper, we exclude such commercial debt from our empirical analysis. Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of -period) market exchange rates.

Guatemala. Annual data for 1915 and from 1921 to 1946 in two currencies (sterling, US dollar) are available from United Nations (1948, p. 74). With the exception of a 4% sterling loan, the whole of foreign debt consists of US dollar obligations.

Haiti. Annual data from 1915 to 1946 in one currency (US dollar) are available from United Nations (1948, p. 76-77). Foreign debt consists of two issues of dollar bonds. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Honduras. Annual data for 1933 and from 1938 to 1946 in one currency (sterling) are available from United Nations (1948, p. 78-79). Foreign debt consists of four loans in sterling. Data are interpolated for the period 1934-1937 by assuming that currency shares remain constant at the average of 1933 and 1938 values. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

India. Annual data from 1914 to 1945 in one currency (sterling) are available from United Nations (1948, p. 83). Foreign debt consists entirely of sterling obligations. Book value of outstanding debt amounts converted to US dollar amounts using (end-of-period) market exchange rates.

Japan. Annual data from 1914 to 1939 in three currencies (sterling, US dollar, French franc) are available from United Nations (1948, p. 93). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates.

Nicaragua. Annual data from 1914 to 1944 in two currencies (sterling, US dollar) are available from United Nations (1948, pp. 104-105). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates.

New Zealand. Annual data from 1937 to 1945 on bonds "due" in London and in Australia are available from United Nations (1948, pp. 100-103). Annual data from 1917 to 1938 on debt "domiciled" in London and Australia are taken from the New Zealand Official Year-Book. Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Norway. Annual data from 1914 to 1945 in five currencies (sterling, US dollar, French franc, Swedish crown and Swiss franc) are available from United Nations

(1948, p. 107). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates.

Panama. Annual data from 1915 to 1944 in one currency (dollar) are available from United Nations (1948, p. 110). Foreign debt consists entirely of dollar obligations. Data interpolated for the years 1917 and for 1923.

Peru. Annual data from 1918 to 1945 in three currencies (sterling, US dollar, French franc) are available from United Nations (1948, p. 114). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates.

Poland. Annual data from 1919 to 1939 in 13 currencies (sterling, US dollar, gold francs, Austrian gold crowns, Austrian gold florins, Austrian schillings, French franc, Italian Lira, Dutch florin, Norwegian kroner, Swedish kroner, Danish kroner and Swiss francs) are available from United Nations (1948, p. 117). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates. The gold debt data includes only debt in gold franc. Data on debt issued in Austrian gold crown and Austrian gold florin not converted to US dollar amounts due to missing exchange rate data and thereby discarded.

Portugal. Annual data from 1914 to 1946 in one currency (sterling) are available from United Nations (1948, pp. 120-121). Foreign debt entirely consists of sterling obligations. Book value of outstanding debt amounts converted to US dollar amounts using (end-of-period) market exchange rates.

Romania. Annual data from 1923 to 1942 in 14 currencies (sterling, US dollar, gold franc, gold lei, gold florin, gold crown, French franc, Swiss franc, Italian lira, Belgian franc, German Reichmark, Scandinavian crown, Czechoslovak crown and paper crown) are available from United Nations (1948, pp. 124-125). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates. Debt in gold franc (issued in 1923) converted to US dollar using the Franc Germinal 1914 parity (5.095 gold francs per US dollar). Data on debt issued in gold lei, gold florin, gold crown, Scandinavian crown and paper crown not converted to US dollar amounts due to missing exchange rate data and thereby discarded. In order to avoid a gap in the data series due to the change in the financial year from 31 December to March from 1931 onwards, we have assigned the data covering the period 1 January 1930-31 March 1932 to the year 1931.

Siam. Annual data from 1914 to 1941 in one currency (sterling) are available from United Nations (1948, p. 129). Foreign debt consists entirely of sterling obligations. Book value of outstanding debt amounts converted to US dollar amounts using (end-of-period) market exchange rates.

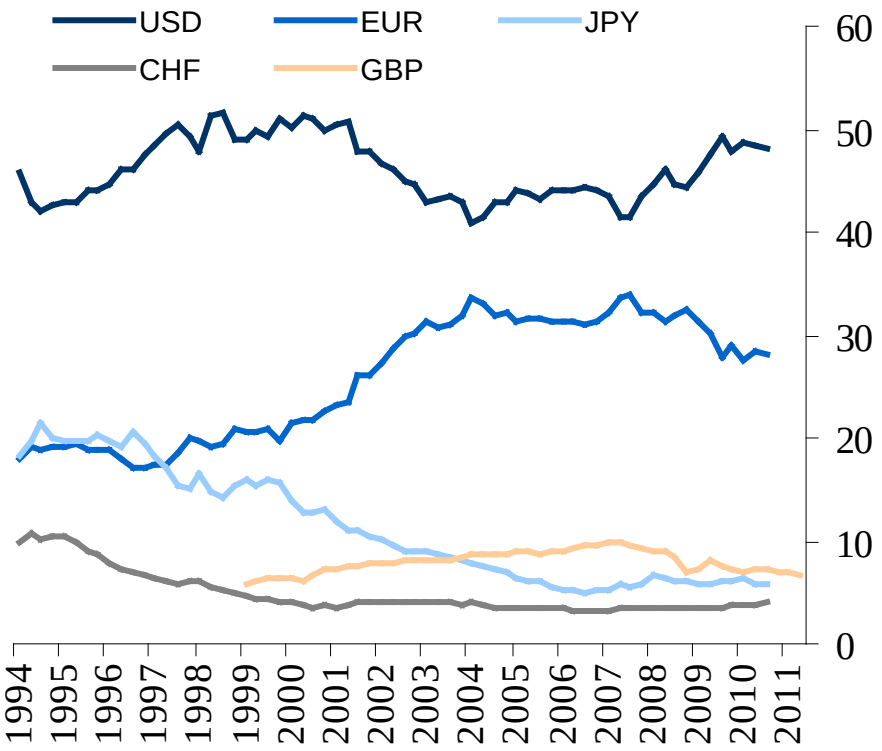
South Africa (Union of). Annual data for 1914 to 1947 on bonds “payable” in London are available from United Nations (1948, pp. 143-145). Book value of outstanding debt amounts reported in local currency converted to US dollar amounts using (end-of-period) market exchange rates.

Switzerland. Annual data from 1915 to 1933 in one currency (US dollar) are available from United Nations (1948, p. 1938). Foreign debt entirely consists of US dollar obligations.

Turkey. Annual data from 1933 to 1934 and from 1937 to 1938 in eight currencies (sterling, gold sterling, US dollar, gold dollar, French franc, German Reichmark, Swedish crown and Turkish lira) are available from United Nations (1948, p. 141). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates.

Uruguay. Annual data from 1914 to 1946 in four currencies (sterling, US dollar, gold franc and gold peso) are available from United Nations (1948, pp. 154-155). Book value of outstanding debt amounts in these currencies converted to US dollar amounts using (end-of-period) market exchange rates. Debt in gold franc (issued in or before 1914 converted to US dollar using the Franc Germinal 1914 parity (5.095 gold francs per US dollar). Debt in gold peso (issued in 1919) is converted to US dollar amounts using the exchange rate in 1919 (1.3698 ARS/USD).

<u>Appendix III</u>: Outstanding amounts of international debt securities
Selected currency shares
(As a % of total)



Notes: BIS, ECB and authors' calculations. International debt securities (bonds and notes and money market instruments) according to the so-called "narrow" definition (i.e. excluding home currency issuance (see ECB (various issues) as well as Detken and Hartmann (2000) and (2002)). The share of the euro prior to 1999 is the sum of the share of the euro legacy currencies, net of intra-euro area issuance. Both public and private debt is included here. Data are unavailable prior to 1999 for sterling.