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Reserve Currency Blocs: A Changing International Monetary System?

Camilo E. Tovar and Tania Mohd Nor

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Strategy Policy and Review Department

Reserve Currency Blocs: A Changing International Monetary System?

Prepared by Camilo E. Tovar and Tania Mohd Nor[†]

Authorized for distribution by Kristina Kostial

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Abstract

What is the extent of currency diversification in the international monetary system? How has it evolved over time? In this paper, we quantify the degree of currency diversification using regression methods of currency co-movements to determine the extent to which national currencies across the world belong to a reserve currency bloc. We then use these estimates to calculate the economic size of each currency bloc. A key contribution of our paper is that we quantify the size of the Chinese renminbi bloc. Our analysis suggests that the international monetary system has transitioned from a bi-polar system—consisting of the U.S. dollar and the euro—to a tri-polar one—that includes the renminbi. The dollar bloc is estimated to continue to dominate, having the largest share in global GDP (40 percent), followed by the renminbi (30 percent) and the euro blocs (20 percent). The geographical area of influence for the RMB bloc appears to be most evident among the BRICS' currencies. The British pound and the Japanese yen blocs appear to play minor roles.

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Author's E-Mail Address: ctovar@imf.org and tmohdnor@imf.org, correspondingly.

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I. INTRODUCTION

The international monetary system after World War II has been dominated by few currencies, with the U.S. dollar playing a leading role (IMF, 2016a and 2011; Zhou, 2009). Some see in the lack of diversification of global reserve currencies a source of weakness and vulnerabilities for the international monetary system, as it can lead to liquidity shortages, “exorbitant privileges,” excessive uphill capital flows, or incentivize weak fiscal discipline in reserve issuing countries, among others.² Others argue that the dominance of a few currencies has served the international monetary system well. For instance, it is often said that the dominant currencies have provided reliable and high-quality safe-haven assets in times of financial stress. Independent of these opposing views, the global economy has become increasingly multipolar. Significant structural shifts have underpinned this transformation—including the rapid expansion and increasing interconnectedness of the global economy and financial markets. Against this backdrop, a key issue is whether the transformation of the global economy has resulted in a more diversified system of reserve currencies.

Empirically assessing the degree of currency diversification in the international monetary system is a complex and multidimensional problem. For sure no single indicator captures the complexities associated with such assessment. Most academic and policy studies make such assessments based on the global economic or financial use and trading of reserve currencies. For example, the importance of a global currency can be assessed through the currency denomination of trade or financial assets (IMF, 2015a,b).³ In this paper we take an alternative approach, and gauge the degree of currency diversification by examining how reserve currencies influence currency fluctuations across the world and how this influence has changed over time. Or to put it differently, the paper examines the extent to which national currencies are anchored to reserve currencies.⁴ Using this approach, we delve into the economic influence of five major currencies across the world as determined by the currency composition of the IMF’s Special Drawing Rights (SDR) basket—the British pound (GBP),

² A discussion of liquidity shortages of U.S. dollars at the height of the crisis is presented in McGuire and Von Peter, (2009). For an analysis of the implications of uphill capital flows on the international monetary system see Csonto and Tovar (2017). For an overview on how the reliance on a single currency may distort fiscal discipline see Farhi et al. (2011) and Landau (2013). For a discussion on the role of the dollar on the international monetary system see Eichengreen (2011), Farhi et al. (2011), and Prasad (2014). A discussion on alternatives to the lack of currency diversification in the system see IMF (2016b), and Tovar (2017).

³ This is consistent with the notion that an international currency should fulfill several roles, including being a unit of account, a means of exchange, and a store of value. To varying degrees accomplishing such roles might also require the issuing country to allow the currency to be bought or sold (either in the spot or forward market); allow domestic and foreign firms to invoice their exports and imports in that currency; allow firms, financial institutions and individuals to hold the currency or financial assets denominated in that currency; and to issue marketable instruments denominated in such currency (See Kenen, 2012 and Blinder, 1996).

⁴ In this regard, the paper is also linked to a strand of literature that examines the evolution of exchange rate arrangements (e.g. Ilzetzi et al. 2017).

(continued...)

the Chinese renminbi (RMB), the euro (EUR), the Japanese yen (JPY), and the U.S. dollar (USD).⁵

The methodology employed in the analysis relies on Frankel and Wei's (1994) workhorse regression method for estimating the influence of major reserve currencies as captured by the co-movements of currencies across the world. Estimates using data over the period 1969-2015 allow us to determine the *absolute* and *relative* global share of output that is under the influence of each underlying reserve currency bloc (BIS, 2015; McCauley and Chan, 2014; Kawai, Masahiro and Shigeru Akiyama, 1998).⁶

However, employing Frankel and Wei's (1994) methodology for the analysis at hand has drawbacks. Specifically, since the RMB was pegged to the dollar or followed a basket of currencies at different points in time, the methodology generates a collinearity problem that constrains the ability to examine the relevance of the renminbi's currency bloc. Because of this, leading scholars in the field have concluded that “[n]o other international currencies compete at present with the dollar and the euro. The much-debated international role of the renminbi is a live future possibility but, at this stage, is difficult to quantitatively separate its role given its history of strong linkage to the U.S. dollar” (Ilzetzki et al., 2017, page 5).

In this paper we address this problem. To do so, we extend the analysis and use a modified approach proposed by Kawai and Pontines (2016). This methodology has only been applied to assess the existence of a RMB currency bloc in Asia countries, but not to gauge the existence of a RMB currency bloc at the global level. This approach allows us to obtain an alternative measure of the global influence of each major reserve currency, including the RMB. Hence, a key major contribution of our paper is to quantitatively gauge the size of the RMB bloc.

The two alternative frameworks complement each other. Frankel and Wei's (1994) methodology is useful to gain a historical perspective, while Kawai and Potines' (2016) approach allows us to quantify the RMB bloc. Our results using Frankel and Wei's (1994) methodology—which does not consider the RMB—confirm that the dollar is the most influential reserve currency in the world. Specifically, we find that on average over the period 2011-2015 the dollar bloc accounts for about 60 percent of global GDP. The euro bloc follows in order of importance, accounting for just over 26 percent of global GDP, while the

⁵ The notion of *influence* of a reserve currency and hence its role as a global nominal anchor has evolved over time. In the past, this influence could mainly be related to the extent to which national currencies were pegged to a reserve currency. With the advent of greater exchange rate flexibility and the structural shift in the global economy (e.g., the developments of financial markets, greater trade and financial integration), currency fluctuations are more likely to reflect changes in information that determines their value relative to a reserve currency (e.g., economic fundamentals, expectations, or news). Hence, in this paper we state that a currency belongs to a reserve currency bloc when its currency has been pegged to a reserve currency, or if changes in its valuation are mainly associated to the information set contained in the valuation change of a reserve currency.

⁶ As discussed in Section II.B, we allocate national currencies to currency using two alternative methods. One method assigns a national currency to a currency bloc based on the reserve currency that has the largest absolute influence. The alternative method aggregates the relative influence of each reserve currency on each national currency across the world.

pound sterling and the Japanese yen are found to play a secondary role accounting for just 7 and 5 percent of global GDP, respectively. The results using Kawai and Pontines' (2016) modified approach—which takes into account the RMB—confirm the dominance of the U.S. dollar bloc, but with a much smaller weight (about 40 percent of global GDP). This approach also shows that the renminbi bloc follows in order of economic importance, influencing about 30 percent of global GDP, surpassing the euro bloc, which influences about 20 percent of global GDP. The British pound and Japanese yen blocs are again found to have a small global influence, about 3 and 5 percent of global GDP, respectively.

Our results suggest that the international monetary system's transition from a bi-polar system—in which two currency blocs dominate, i.e., the dollar and euro—to a tri-polar one—which includes the renminbi bloc—is well underway. Despite this shift, the U.S. dollar continues to play a dominant role. Our results also indicate that the economic size of the RMB bloc is at this stage geographically constrained, as its influence mainly arises from the RMBs influence on the BRICS's currencies. At the same time, we find no evidence to suggest that the RMB is the dominant currency in Asia, by influencing exchange rates in the region or through Asian supply chains (Fratzcher and Mehl, 2013). Failing to find evidence that supports this hypothesis does not mean that the RMB does not have any influence across Asia's currencies.⁷

The paper also briefly explores how the size of currency blocs—as measured by its share in global GDP at purchasing power parity (PPP)—correlates with fundamental variables. Focusing on the USD, the EUR, and the RMB blocs, we show that the size of currency blocs is highly persistent. This is consistent with the notion that network externalities play a critical role in determining the use of reserve currencies. We also show that economic size of the reserve-issuing country appears to play a central role in supporting a currency bloc. Moreover, the analysis suggests that increased debt levels are correlated with a decline in the importance of the USD and the EUR currency blocs. Finally, current account surpluses appear to undermine the size of currency blocs.

The remaining of the paper is structured as follows. Section II presents the methodology and data employed, while Section III reports the results. Section IV briefly examines potential drivers of these results and, finally, Section V concludes.

II. METHODOLOGY AND DATA

This paper uses regressions methods to determine the extent to which national currencies co-move with major reserve currencies as determined by the IMF's SDR currency basket. These results are then used to calculate the economic relative importance of each currency by calculating the share of global GDP under the influence of each major reserve currency. Calculations thus follow two steps. The first step places each currency in a reserve currency

⁷ Some authors have argued that the world is headed to a multi-polar system in which the U.S. dollar dominates in the Americas, the euro in Europe, and the renminbi in Asia (Eichengreen, 2011).

bloc or zone: dollar, euro, pound, renminbi, or yen. To complete this step, we use two alternative allocation methods: an *absolute*—in which a national currency is assigned entirely to a bloc based on the dominant reserve currency—and a *relative* one—that only allocates the portion of the national currency that is influenced by each reserve currency. The second step calculates the share of global GDP-PPP that falls under the influence of each major reserve currency, that is, we calculate the economic size of the currency bloc.

A. Allocating currencies to a currency bloc

The methodology builds on the literature on currency blocs or zones (Frankel and Wei, 2008 and 1994; BIS, 2015; McCauley and Chan, 2014, and Kawai and Pontines, 2016). This literature uses Frankel and Wei’s (1994) approach as a starting point to estimate the influence of major international currencies in the implicit currency basket of individual economies. Specifically, it estimates an equation of the following form:

$$\Delta \log \left(\frac{x}{\eta} \right)_t = \alpha_0 + \alpha_1 \Delta \log \left(\frac{EUR}{\eta} \right)_t + \alpha_2 \Delta \log \left(\frac{GBP}{\eta} \right)_t + \alpha_3 \Delta \log \left(\frac{JPY}{\eta} \right)_t + \alpha_4 \Delta \log \left(\frac{RMB}{\eta} \right)_t + \alpha_5 \Delta \log \left(\frac{USD}{\eta} \right)_t + u_t \quad (1)$$

where x denotes an individual currency, so that $\Delta \log \left(\frac{x}{\eta} \right)_t$ captures the logarithmic change of the currency in terms of the numeraire currency, η , in period t ; α_k is the regression coefficients that captures the degree of co-movement across currencies, and u_t is the error term. As is standard in the literature, the change of the log-transformation is employed to ensure stationarity of the coefficients.

An issue arising with this methodology is how to define the value of each currency. That is, which *numeraire* should be employed. In principle, this will depend on whether the value of the currency is determined by a basket of currencies or not, and of the nature of shocks affecting the economy. One might want to choose a numeraire that minimizes the correlation between the error term and the numeraire currency. In practice, Frankel and Wei (1994) use the Swiss Franc, but other studies have selected the SDR (Frankel and Wei, 2008; Fratzscher and Mehl, 2013). In the absence of a clear dominant candidate, we follow instead the BIS (2015) which selects the U.S. dollar as the numeraire on the basis that by doing so the methodology assigns a currency to the dollar bloc if its movements against the dollar have nothing in common against the euro, the yen, or the renminbi. As shown later in Section III. D results are robust to this choice. Thus, we estimate the following equation:

$$\Delta \log \left(\frac{x}{USD} \right)_t = \alpha_0 + \alpha_1 \Delta \log \left(\frac{EUR}{USD} \right)_t + \alpha_2 \Delta \log \left(\frac{GBP}{USD} \right)_t + \alpha_3 \Delta \log \left(\frac{JPY}{USD} \right)_t + \alpha_4 \Delta \log \left(\frac{RMB}{\eta} \right)_t + u_t \quad (2)$$

In this framework, the *degree of influence* of each reserve currency on each individual national currency is captured by the coefficient attached to each reserve currency (i.e. α_k for $k = \text{EUR, GBP, JPY, and RMB}$). The exception is the U.S. dollar, as its degree of influence is

obtained as $\alpha_5 \equiv 1 - \alpha_1 - \alpha_2 - \alpha_3 - \alpha_4$. Also, a currency will be said to belong to a currency bloc if the weight of that reserve currency exceeds the weight assigned to other reserve currencies.

Estimating equation (2) with the RMB generates collinearity problems since the RMB remained fixed to the U.S. dollar for much of the sample period or its value was determined by a basket of currencies.⁸ This collinearity problem is well-known in the literature and has led researchers to attempt several fixes. Some studies have aimed at choosing sample periods in which the RMB displayed some degree of flexibility (Chen and Peng, 2009), others have aimed at removing the USD component from the RMB fluctuations (Fratzscher and Mehl, 2013). However, as shown by Kawai and Pontines (2016), it is unclear that these approaches help surmount the problem and conclude that the framework is not useful in providing stable, robust patterns of currency weights for the USD or the RMB.

In our paper, we start using Frankel and Wei's (1994) methodology. However, this methodology excludes the possibility of a RMB bloc. That is, we omit from the estimation the last term in the right-hand side of equation (2), i.e., $\alpha_4 \Delta \log \left(\frac{RMB}{USD} \right)_t$. Doing so can be justified from an econometric perspective to overcome the collinearity problem, but it comes at a cost of overestimating the degree of influence of the U.S. dollar. From an economic perspective it could be argued that the RMB internationalization is so recent that it does not bias the estimates. The RMB's internationalization at best started in 2005, and only began to pick up in 2009 as reflected by the onshore and offshore use and trading of the RMB. Indeed, it was at this latter date that the Chinese authorities started adopting explicit measures to support the internationalization of the RMB through the gradual opening of the capital account, lower regulatory barriers, easier market access for official institutions and long term private investors, the introduction of channels for repatriating RMB funds onshore, the implementation of domestic reforms, and the establishment of cross-border payments infrastructure and offshore liquidity (Nabar and Tovar, 2017).

Nonetheless, excluding the RMB from the analysis fails to recognize its increasing importance and can lead to misleading conclusions. The IMF's Executive Board recognized the increasing use and trading of the RMB when it included the currency in the SDR basket (IMF, 2015a,b). Hence, to bring the RMB into the analysis and to surmount the collinearity problem, we also implement Kawai and Pontines' (2016) modified methodology. Specifically, their framework relies on a two-step regression procedure. The first step removes the components of the movements in the RMB from the movements of other reserve currencies, including the U.S. dollar, and obtains the residuals from the following first step regression:

⁸ The Chinese exchange regime has changed over time. The renminbi has been pegged to the dollar at certain points in time, but also to a basket of currencies at other times.

$$\Delta \log \left(\frac{RMB}{NZD} \right)_t = \phi_0 + \phi_1 \Delta \log \left(\frac{USD}{NZD} \right)_t + \phi_2 \Delta \log \left(\frac{EUR}{NZD} \right)_t + \phi_3 \Delta \log \left(\frac{JPY}{NZD} \right)_t + \phi_4 \Delta \log \left(\frac{GBP}{NZD} \right)_t + \omega_t \quad (3)$$

Equation (3) can be interpreted as determining the weights accorded by the Chinese authorities to the major reserve currencies in their own exchange rate basket.⁹ In equation (3) all currencies are measured against the New Zealand dollar (NZD). This numeraire is selected because it is a freely floating currency, without capital controls and exchange controls.¹⁰ The estimated residuals of Equation (3), $\hat{\omega}_t$, are then used in the following second step regression:

$$\Delta \log \left(\frac{x}{NZD} \right)_t = \gamma_0 + \gamma_1 \Delta \log \left(\frac{USD}{NZD} \right)_t + \gamma_2 \Delta \log \left(\frac{EUR}{NZD} \right)_t + \gamma_3 \Delta \log \left(\frac{JPY}{NZD} \right)_t + \gamma_4 \Delta \log \left(\frac{GBP}{NZD} \right)_t + \gamma_5 \hat{\omega}_t + \varepsilon_t \quad (4)$$

where

$$\hat{\omega}_t = \Delta \log \left(\frac{RMB}{NZD} \right)_t - \left[\hat{\phi}_0 + \hat{\phi}_1 \Delta \log \left(\frac{USD}{NZD} \right)_t + \hat{\phi}_2 \Delta \log \left(\frac{EUR}{NZD} \right)_t + \hat{\phi}_3 \Delta \log \left(\frac{JPY}{NZD} \right)_t + \hat{\phi}_4 \Delta \log \left(\frac{GBP}{NZD} \right)_t \right]. \quad (4.a)$$

Next, subtracting the residuals, $\hat{\omega}_t$, on both sides of equation (4) and imposing the condition that the weights of the currencies on the right-hand of equation (4) add to one, i.e., $\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 + \gamma_5 = 1$, yields the modified version of Frankel and Wei's regression for any currency, x :

$$\Delta \log \left(\frac{x}{NZD} \right)_t - \hat{\omega}_t = \gamma_0 + \gamma_1 \left[\Delta \log \left(\frac{USD}{NZD} \right)_t - \hat{\omega}_t \right] + \gamma_2 \left[\Delta \log \left(\frac{EUR}{NZD} \right)_t - \hat{\omega}_t \right] + \gamma_3 \left[\Delta \log \left(\frac{JPY}{NZD} \right)_t - \hat{\omega}_t \right] + \gamma_4 \left[\Delta \log \left(\frac{GBP}{NZD} \right)_t - \hat{\omega}_t \right] + v_t \quad (5)$$

The estimation of equation (5) yields the implied RMB coefficient as $\gamma_5 = 1 - \gamma_1 - \gamma_2 - \gamma_3 - \gamma_4$. Just as with Frankel and Wei's methodology, the *degree of influence* of each reserve currency on each individual currency is captured by the coefficient attached to each reserve currency (i.e. γ_k for $k = 1, \dots, 5$ i.e., USD, EUR, JPY, GBP, and RMB). A currency will then be allocated to a currency bloc based on the degree of influence of that reserve currency. To this end, we use both an absolute and a relative concept.

⁹ Since 2005 China's exchange rate was announced to be based on the fluctuations of currencies in a basket. Section III.D shows that results are robust even when considering a wider reference basket of currencies for the RMB.

¹⁰ As shown in Section III.D results are robust to the choice of an alternative numeraire (e.g. the Swiss Franc).

(continued...)

B. Calculating the size of a currency bloc

The previous sub-section described the methodology to calculate the degree of influence of each reserve currency and explained how to allocate currencies to a reserve currency bloc. The next step is to use these results to measure the economic size of each bloc and determine how they have evolved over time.¹¹ Doing so provides insights into the evolution of the international monetary system by quantitatively gauging the changing influence of reserve currencies over time.

In reporting the size of currency blocs, we define two distinct measures: an *absolute* and a *relative* one. The *absolute* measure allocates a national currency to a reserve currency bloc based on the reserve currency with the largest influence in that country. The *relative* measure aggregates the relative influence of each reserve currency on each national currency across the world.

The economic size of each currency bloc is determined, firstly, by multiplying the estimated influence of each reserve currency on each national currency—either in absolute or relative terms—by the country’s annual share in global GDP in purchasing power parity (GDP-PPP) terms. This is then added across all countries to obtain the *economic size of each reserve currency bloc* or *influence zone*. Hence, in this paper the economic size of a currency bloc is measured as a share of global GDP. Nothing prevents us from measuring the relative size in terms of other variables, such as global trade, or other measures of global finance, including international transactions. However, since our objective is to measure the global influence, GDP-PPP is likely to be the most comprehensive measure and most readily available across all countries.

C. Data and estimation

We use end-of-period monthly exchange rates as reported by *IMF’s International Financial Statistics*, and annual gross domestic product at purchasing-power parity (GDP-PPP) data obtained from the *IMF’s World Economic Outlook* database. We also use two samples. The first is a global sample of 189 countries. Since some countries do not have data for the whole period, we also use a *balanced sample* of 130 countries for which we have complete data over the whole period of 1969 to 2015. The *balanced sample* is more appropriate to examine trends, while the *full sample* is better at providing an up-to-date snapshot of currency blocs.

Parameter estimates of equations (2) and (5) are obtained using ordinary least square regressions with 48-month rolling windows. In assigning countries to a currency bloc we assume that reserve-issuing countries belong to their own reserve currency bloc—nonetheless we also report what happens when we drop this assumption.¹²

¹¹ This approach resembles that of Kawai and Akiyama (1998).

¹² Coefficients are restricted to be one or zero for the few instances in which the estimated coefficients exceeded one or turned negative, respectively.

The introduction of the euro poses some challenges. To deal with it, we use as reserve currencies the Deutsche mark (DM) and the French franc (FF) prior to the introduction of the euro in 1999. Hence when estimating equations (2) and (5), we replace the euro term with two equivalent terms that include the DM and the FF. To obtain estimates of the euro, we take advantage of the fact that the DM and FF coexisted and were fixed to the euro since January 1, 1999.

III. ECONOMETRIC RESULTS

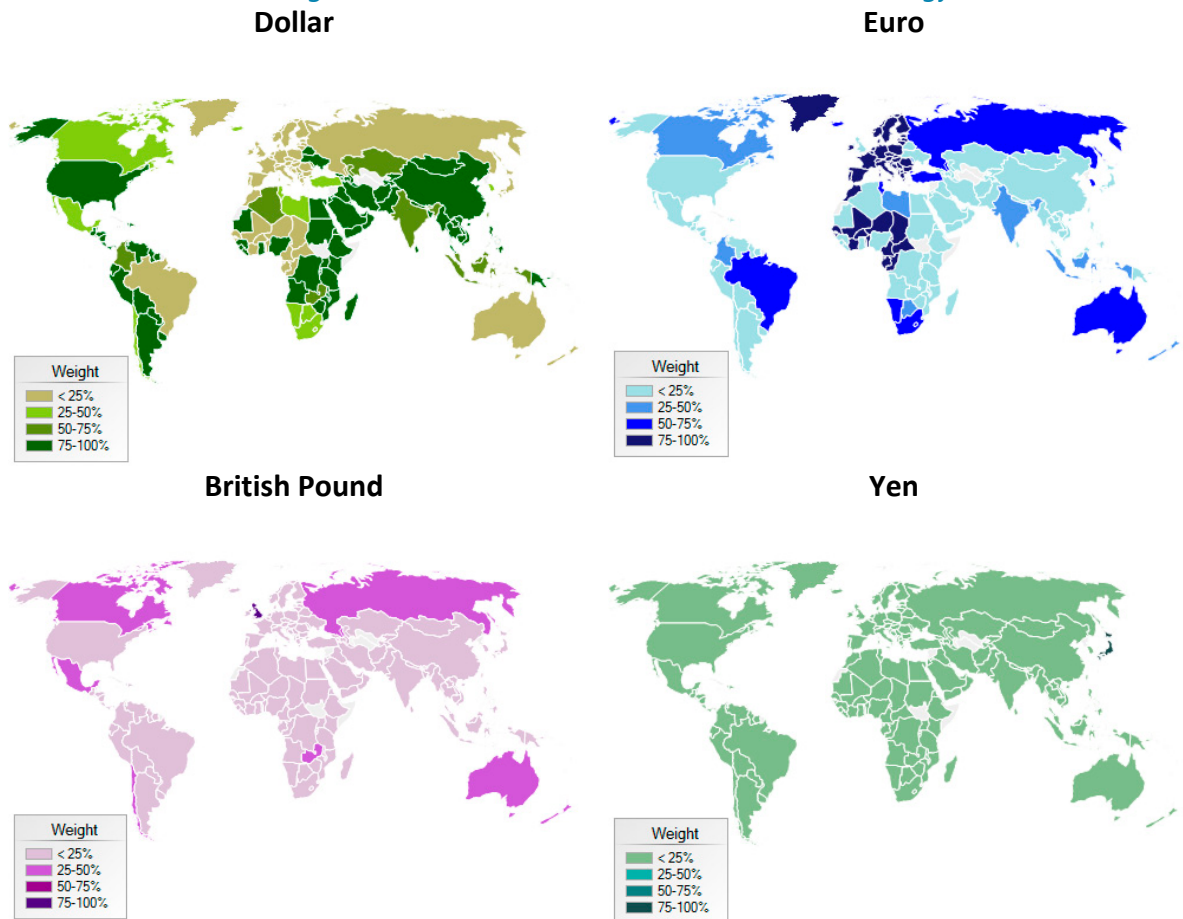
This section presents the econometric results of our analysis. We start reporting the influence of reserve currencies in each country and, building on this, we then report the size of each currency bloc.

A. Reserve currencies' influence of across the world

Results report the degree of co-movement of national currencies with each major reserve

Figure 1: Relative Influence of Reserve Currencies—A view without the RMB

(Average 2011-2015, Frankel and Wei's 1994 Methodology)



Source: IFS and WEO. Fund staff calculations.

Note: For definitions see text.

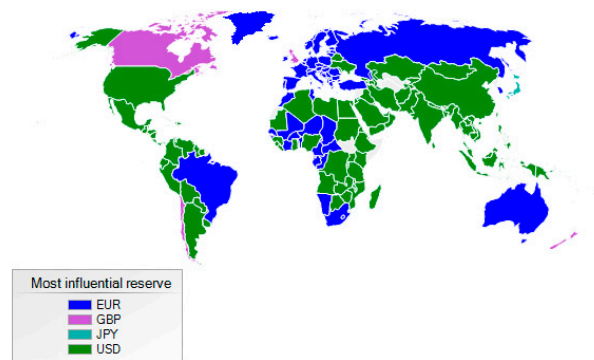
currency. For presentational purposes, we place the influence of each reserve currency into buckets (quartiles) depending on whether the reserve currency explains (i) less than 25 percent; (ii) between 25 and 50 percent; (iii) between 50 and 75 percent, or (iv) between 75 and 100 percent of the individual country's currency fluctuation. We use color coding to identify each quartile in Figures 1 through 3. Darker shadings suggest that a reserve currency has greater influence, while the lighter color shadings suggest that it has less. Since the estimated degree of influence of each reserve currency can vary overtime and to smooth out the effects of outliers, we report the average of the monthly coefficients obtained using rolling regressions with a 48-month window over the period January 2011-December 2015.¹³

A view without the RMB—Frankel and Wei's (1994) approach

We start the analysis without considering the RMB. Specifically, Figure 1 displays the full sample estimates of the influence of each reserve currency across the world using equation (2)—that is, employing Frankel and Wei's methodology. Estimates show that the dollar and the euro are the dominant reserve currencies in the international monetary system (Figure 1, 2, and Table 1). The dollar's dominance extends to 112 countries across all continents, while the euro's influence extends to 68 countries. Our analysis also makes evident the marginal role of the British pound, whose influence extends to just 5 currencies, including those of Canada, Chile, and New Zealand (Figure 1). Finally, the yen is found to have no significant influence beyond its own borders.

Figure 2 summarizes the results by assigning individual countries to a currency bloc based on the currency with the greatest degree of influence (i.e., the absolute measure). Our results using the full sample indicate that about 60 percent of the countries conform the dollar bloc, 37 percent the euro bloc, 3 percent the British pound bloc and 1 percent the yen (Table 1, third column). Results are robust for the balanced sample. The share of countries under the dollar and euro blocs is similar to that obtained by Ilzetzki et al. (2017). However, the geographic distribution differs somewhat.

Figure 2: Reserve Currency Blocs
(Absolute measure)



Source: IFS and WEO. Fund staff calculations.
Note: For definitions see text.

¹³ The potential shifts of the influence of a currency overtime is a well-known problem in the literature, see discussion in Kawai and Pontines (2016).

Table 1: Reserve Currency Blocs—Number of Countries
(Average 2011-15, full sample)

Currency bloc	Full Sample ^{1/}				Balanced Sample ^{2/}			
	Equation 2		Equation 5		Equation 2		Equation 5	
	Countries	Share (%)	Countries	Share (%)	Countries	Share (%)	Countries	Share (%)
Dollar	112	60.2	99	53.2	77	59.2	70	53.8
Euro	68	36.6	56	30.1	47	36.2	38	29.2
Pound	5	2.7	1	0.5	5	3.8	1	0.8
Yen	1	0.5	1	0.5	1	0.8	1	0.8
Renminbi	29	15.6	20	15.4

Sources: IFS and WEO. Fund staff calculations.

Note: Equation 2 corresponds to Frankel and Wei's (1994) approach, while Equation 5 corresponds to Kawai and Pontines' (2016) modified approach.

^{1/} Number of countries varies, with a maximum of 186 countries.

^{2/} 130 countries throughout the sample.

A view with the RMB—Kawai and Pontines' (2016) approach

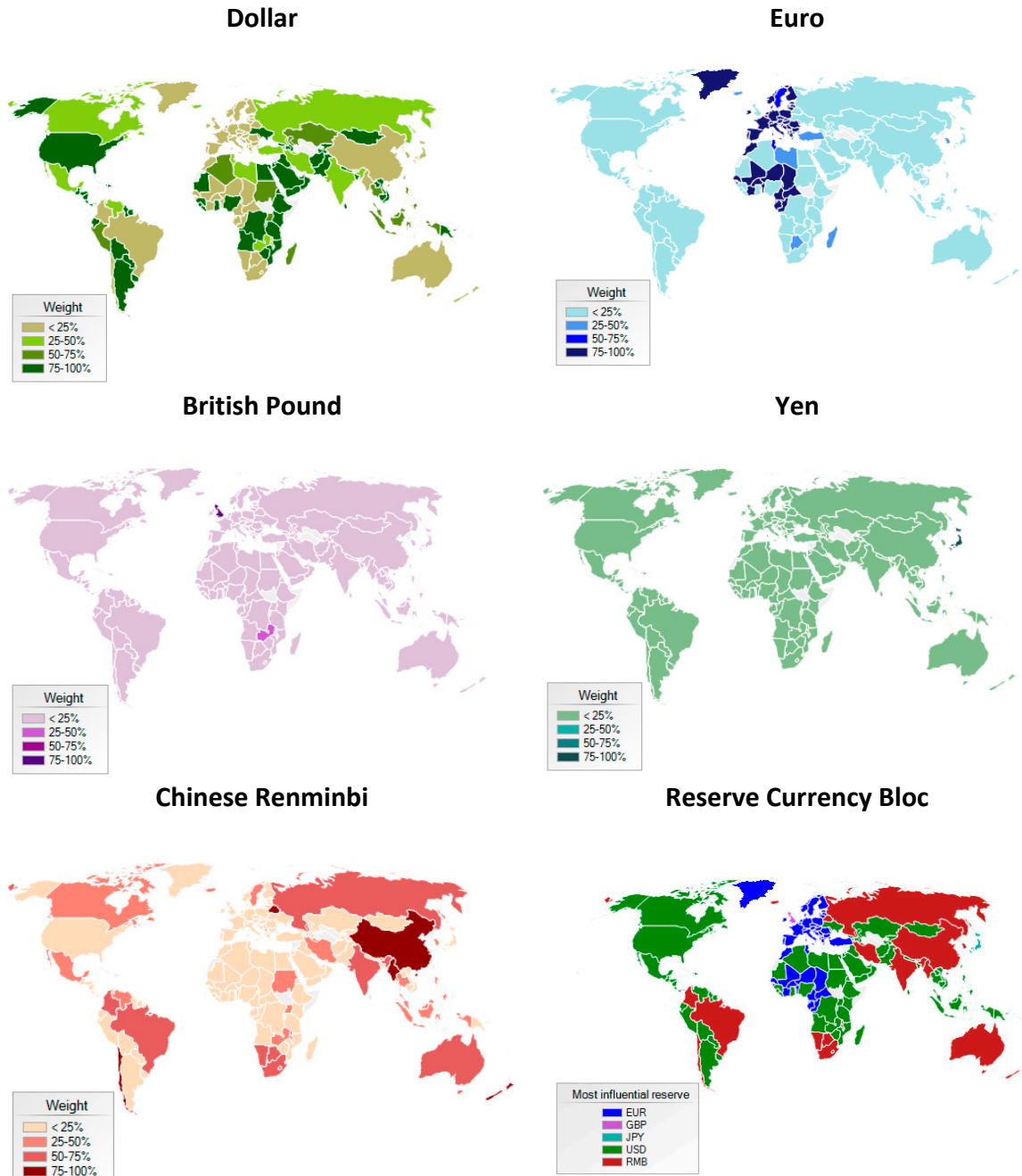
We now bring into the analysis the role of the RMB. Results using equation (5) confirm the dominance of the dollar bloc, which extends to about 53 percent of the currencies of the world—broadly in line with the results obtained using Frankel and Wei's approach (Table 1, fifth column). The euro bloc follows in importance, but its influence declines to 30 percent of the countries in the sample. The RMB's bloc is next, comprising 16 percent of the currencies. The model also estimates relatively marginal roles of the British pound and the Japanese yen.

Our estimates thus indicate the absence of an Asian RMB bloc. Rather, the dollar continues to play a large role in Asia. It is worth noticing that the RMB appears to influence the currencies of the *BRICS* countries,¹⁴ thus conforming a RMB bloc that covers these economies (Figure 3, bottom-right panel). In general, the growing influence of the RMB also appears in its estimated growing influence in driving the dynamics of currencies in some other large economies of Latin America (Chile and Colombia), the Middle East (e.g., Iran), and Australia (Figure 3, bottom-left panel). Our analysis also indicates that including the RMB in the analysis reduces the euro's influence, which mostly influences Europe and some countries in Africa. This contrasts with the results using equation 2 (i.e., Frankel and Wei's approach), which showed Russia and Brazil as part of the euro bloc.

Results must be interpreted with caution, as the methodology may overestimate the influence of the RMB. In particular, the methodology assumes that all coefficients in the right-hand

¹⁴ The BRICS countries comprise Brazil, Russia, India, China and South Africa. Together these economies account for about a quarter of world GDP and a population of three billion. Since 2009 these countries have been engaged and seeking a greater role in the world economy and its financial institutions (see Prasad, 2017),

Figure 3: Reserve Currencies Influence and Currency Blocs—A View with the RMB
 (Average 2011–2015, Kawai and Pontines’ 2016 Methodology)



Source: IFS and WEO. Fund staff calculations.
 Note: For definitions see text.

side of equation (5) add to one, formally, $\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 + \gamma_5 = 1$. However, if this is not the case, the estimate for the RMB will be biased. Intuitively, currency movements might not

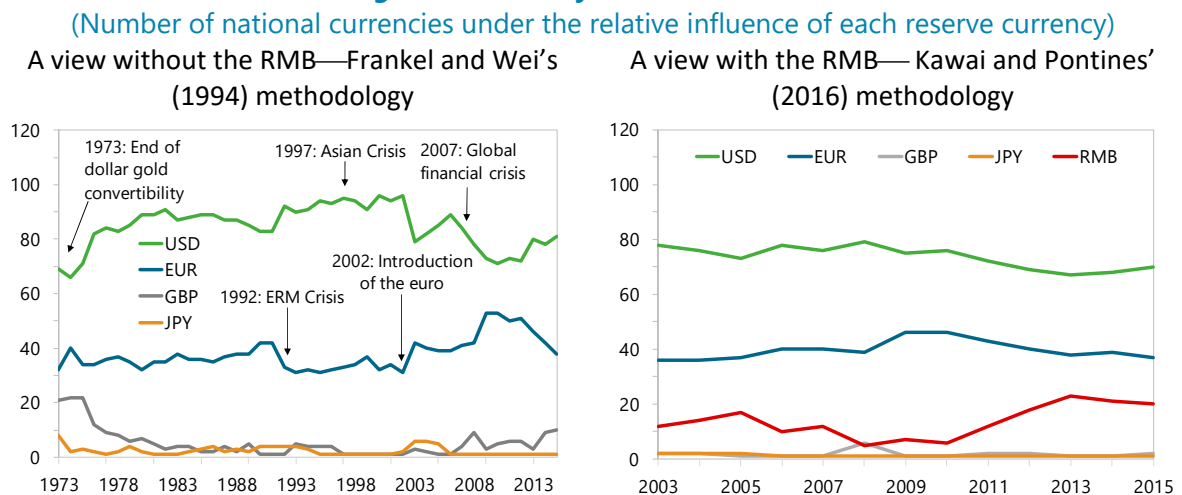
all be explained by the reserve currencies considered in our analysis, hence the methodology attributes any unexplained movement to the RMB. In this sense, our results for the RMB are best interpreted as an upper range estimate. To address potential concerns about the robustness of these estimates, in Section III.D we conduct sensitivity analyses to assess the robustness of our results and, if any, determine how wide is the bound range estimate of the RMB bloc.

B. Dynamics of currency blocs over time

So far, we have provided a snapshot of the current state of currency blocs. However, a key issue is how have currency blocs evolved over time? We address this by examining the dynamics of the number of countries in each currency bloc over time (Figure 4).

To ensure comparability over time we use a balanced sample, which is composed of 130 countries for which data is complete for the full period. Frankel and Wei’s methodology (Equation 2) is best placed to provide us with a historical perspective, but this is done at the expense of omitting the RMB from the analysis. For presentational purposes, we focus on the relative measure. Also, prior to 1999 the DM and the FF currency blocs are merged into a single series and reported as “euro.”

Figure 4: Currency Blocs Over Time ^{1/}



Source: Fund staff calculations.

Note: For definitions see text.

^{1/} Balanced sample of 130 countries.

Our estimates indicate a dominant dollar bloc (Figure 4, left-hand panel). The dynamics of the dollar bloc describe well the impact of major episodes that have affected the international monetary system over time (green line in Figure 4, left-hand panel). For instance, our estimates indicate a decline of the dollar’s influence in the early 1970s following the end of the dollar-gold convertibility. We also find that this episode had transitory effects, as the dollar rebounded, regaining its lost influence by the late 1970s. Its dominant position remained stable during much of the eighties—albeit with a slight declining trend—, but the

1992 crisis of the European exchange rate mechanism (ERM) appears to have given the dollar a new boost at the expense of the “euro” bloc.¹⁵

The dollar’s influence before the 21st century appears to have been quite high and stable. However, after peaking in 2002, the number of national currencies under the dollar bloc seem to have started to lose ground with the introduction of the euro. Then, following a brief rebound, the dollar again appeared to lose ground following the 2007-2008 global financial crisis. As discussed by Eichengreen (2011), at the time, some considered that the dollar was in jeopardy, that foreigners could lose faith in the dollar and move away from it as a unit in which to invoice and settle trade, denominate commodities, and conduct international financial transactions. Ultimately, this would imply that the dollar was at risk of losing its “exorbitant privilege” to the euro, the renminbi, or the book keeping claims issued by the International Monetary Fund known as the Special Drawing Rights. However, Eichengreen (2011) himself considers this view misleading. Our estimates support this latter view and indicate that the dollar’s influence has rebounded somewhat in recent years, recovering some of its lost ground, and remaining at historical average levels.

Kawai and Pontines’ (2016) methodology (Equation 5) allow us to bring the RMB into the analysis, thus offering an alternative picture, albeit for a narrower historical window of time (2003-2015). The shorter sample captures the RMB’s possible advent as a reserve currency (Figure 4, right-hand panel). The analysis also indicates the dominant influence of the dollar bloc and is consistent with our previous results. And it appears to confirm the decline of the dollar bloc’s influence following the 2007-2008 crisis—coinciding with the global financial crisis, the RMB bloc’s entry to the international scene, and since 2010 with China’s active policies to support the internationalization of its currency (Nabar and Tovar, 2017). However, these results need to be qualified, largely because the estimates also suggest that the influence of the RMB has not continued to progressed further since 2014.

Our results are therefore indicative of an international monetary system that has already shifted from a bi-polar bloc (comprised of the U.S. dollar and European or “euro” blocs) to a tri-polar currency bloc, that also includes the Chinese RMB. This characterization is in line with some findings in the literature (e.g., Fratzscher and Mehl, 2013). At the same time, our results indicate that the RMB’s increasing international role has lost steam more recently (for causes, see Lam, et al, 2017). In spite of these shifts, the dollar bloc appears to continue to have the greatest influence across the globe.

¹⁵ The European Exchange Rate (ERM) mechanism was a system introduced by the European Economic Community in March 1979 to reduce the exchange rate fluctuations and achieve monetary stability in Europe. This was intended to facilitate the introduction of the euro in 1999. The British pound initially did not join the ERM, but did so in October 1990. However, in September 1992 the pound was forced to leave the ERM after it come under pressures from financial speculators, in what is now called the “Black Wednesday” of September 16, 1992. Other countries breach the bands established by the ERM and had to return to the system with broader bands or adjusted central parities.

C. Economic size of currency blocs

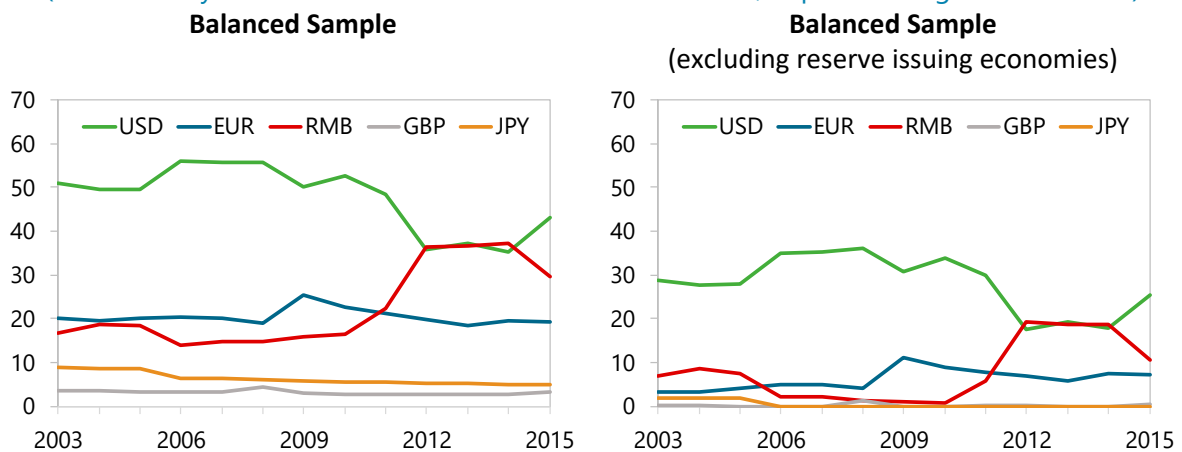
Having allocated each country's currency to a reserve currency bloc, it is now possible to calculate their economic size. We do this by calculating the global GDP-PPP share under the influence of each currency bloc. For completeness, we first report the economic importance of currency blocs obtained by using the absolute influence of reserve currencies (Figure 5) and then report the economic importance of currency blocs obtained by using the relative influence of each reserve currency (Figure 6)—see Section II.B.

It is important to keep in mind that the methodology employed affects the influence of each reserve currency bloc. This is because China's allocation to a currency bloc under each methodology is different. Since Frankel and Wei's methodology excludes the RMB, it automatically assigns China to the dollar bloc. By contrast, Kawai and Pontines' (2016) methodology which includes the RMB, allocates China to the RMB bloc. We focus most of the discussion on the results obtained with this last methodology, but also report complete results in Tables 2 and 3 and Figures 5 through 7.

Currency bloc's economic size measured by the *absolute influence* of reserve currencies

Our analysis indicates that the dollar bloc's size is the largest in the international monetary system, independently of the methodology employed (Table 2). Kawai and Potines' methodology estimates that the economic size of the U.S. dollar bloc reached an average share of about 40 percent of global GDP between 2011 and 2015. The RMB and the euro blocs are estimated at an average share of 33 and 20 percent of GDP, respectively. The results indicate that the dollar bloc's share in global

Figure 5: Economic Share of each Currency Bloc
(Measured by the absolute influence of reserve currencies, in percent of global GDP-PPP)



Source: IFS and WEO. Fund staff calculations.

Note: For definitions see text.

GDP is lower than the global share of international reserves or of dollar-denominated official foreign reserve assets. By contrast, the size of the RMB's bloc across the globe appears to exceed its own size as measured by the holdings of official foreign reserve assets denominated in RMB (Table 2).

Table 2: Economic Size of Currency Blocs
(Measured by the absolute influence of reserve currencies, average 2011-2015, in percent)

	Dollar	Euro	Pound	Yen	Renminbi
Currency Bloc					
Frankel and Wei's approach					
Full sample ^{1/}	62.4	26.3	6.6	4.7	...
Balanced sample ^{2/}	64.2	23.2	7.4	5.2	...
Kawai and Pontines' approach					
Full sample ^{1/}	40.7	19.5	2.5	4.8	32.5
Balanced sample ^{2/}	39.9	19.6	2.8	5.2	32.5
<i>Memo:</i>					
<i>Reserves shares</i> ^{3/}	63.3	20.3	4.5	4.5	...
<i>Official foreign reserve assets</i> ^{4/}	54.8	18.1	3.5	3.0	1.0
<i>SDR weights</i> ^{5/}	41.9	37.4	11.3	9.4	...
<i>SDR weights</i> ^{6/}	41.73	30.93	8.09	8.33	10.92

Sources: IMF's International Financial Statistics, COFER, and Survey on the Holdings of Currencies in Official Foreign Currency Assets. Fund staff calculations.

^{1/} 189 Countries

^{2/} 130 countries.

^{3/} As of 2014. At the time the RMB was not considered by the IMF a freely usable currency, and hence was not counted as part of a country's international reserves.

^{4/} As of 2016 Q3.

^{5/} Pre-October 2016 currency composition.

^{6/} Post-October 2016 currency composition.

It is possible to think that our estimates of the reserve currency bloc's size is driven by the size of the economy issuing the reserve currency. Hence, Figure 5 compares the economic size of each reserve currency bloc including and excluding the economy issuing the reserve currency (left-hand and right-hand panels, respectively). While there is a clear level effect, the results indicate that the ranking of the economic importance of each currency bloc is not driven by the presence or absence of the economy issuing the reserve currency. Moreover, they appear to confirm that the rising global influence of the RMB bloc is not exclusively associated with the increasing size of the Chinese economy itself, but reflects an expanding influence of the RMB beyond its own borders.

Currency bloc's economic size measured by the *relative influence* of reserve currencies

We now present a snapshot of the average economic importance of each currency bloc over the period 2011-2015—as measured by the relative influence of reserve currencies. For this purpose, we use both the full and balanced sample. We then examine the evolution of the currency bloc's size over time using the balanced sample.

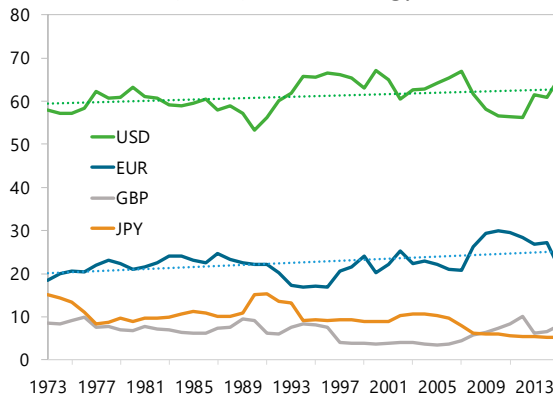
Our estimates using the Kawai and Pontines' methodology indicate that the dollar bloc's economic size reached an average share of 39 percent of global GDP over the 2011-2015 period. The RMB currency bloc is estimated to follow with an average share size of 31.6 percent of global GDP, and then the euro bloc with an average share size of 20.3 percent of global GDP (Table 3). The yen and the pound blocs are estimated to account for an average relative size of less than 6 percent of global GDP, respectively. Likely, the estimated importance of the RMB bloc reflects the large size of its constituents, including China itself.

Measured in PPP terms, we find that in recent years the RMB currency bloc has rivaled in size the U.S. dollar currency bloc (Figure 6).

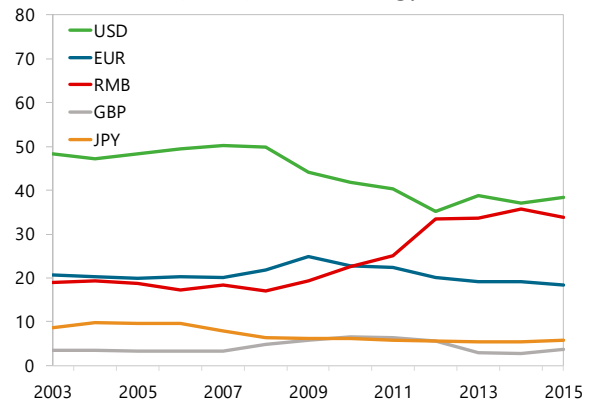
Figure 6: Size of Currency Blocs Over Time ^{1/}

(Measured by the relative influence of reserve currencies, in percent of global GDP-PPP)

A view without the RMB—Frankel and Wei's
(1994) Methodology



A view with the RMB—Kawai and Pontines'
(2016) Methodology



Source: Fund staff calculations.

Note: For definitions see text. Dotted lines correspond to linear trends.

^{1/} Balanced sample of 130 countries.

The evolution of the size of currency blocs over time corroborates the cycles described in Section 3.B (Figure 6). Nonetheless, our results suggest that the dollar bloc's relative economic influence displays a slight gradual upward trend when using Frankel and Wei's methodology. This appears to be mostly driven by the larger economic share of the dollar's constituents. However, we do not find a similar trend with Kawai and Pontines' approach. On the contrary, this approach suggests that the share size of the dollar bloc declined following the global financial crisis, and has stabilized since 2012. The results also appear to confirm the increasing economic importance of the RMB bloc (Figure 6, right-hand panel) and that since 2013 the steady increasing influence of the RMB has lost some steam.

As done earlier, we examine the relative size of a reserve currency bloc including and excluding the reserve-issuing economies. Results indicate that the underlying dynamics have a level effect, but the ranking is not driven by the economic weight of the reserve-issuing economies themselves (Figure 7). However, a comparison of Figures 6 and 7 indicate that the relative decline of the share size of the U.S. dollar bloc after the global financial crisis could have been sharper and its rebound more modest when excluding the reserve-issuing economies.

Table 3: Economic Size of Currency Blocs
(Measured by the relative influence of reserve currencies, average 2011-2015, in percent)

	Dollar	Euro	Pound	Yen	Renminbi
Currency Bloc					
Frankel and Wei's approach					
Full sample ^{1/}	59.0	27.7	8.3	5.0	...
Balanced sample ^{2/}	60.1	26.7	7.8	5.4	...
Kawai and Pontines' approach					
Full sample ^{1/}	39.0	20.3	4.0	5.2	31.6
Balanced sample ^{2/}	37.9	19.8	4.3	5.6	32.4
<i>Memo:</i>					
Reserves shares ^{3/}	63.3	20.3	4.5	4.5	...
Official Foreign Reserve Assets ^{4/}	54.8	18.1	3.5	3.0	1.0
SDR weights ^{5/}	41.9	37.4	11.3	9.4	...
SDR weights ^{6/}	41.73	30.93	8.09	8.33	10.92

Sources: IMF's International Financial Statistics, COFER, and Survey on the Holdings of Currencies in Official Foreign Currency Assets. Fund staff calculations.

^{1/} 189 Countries.

^{2/} 130 countries.

^{3/} As of 2014. At the time the RMB was not considered by the IMF a freely usable currency, and hence was not counted as part of a country's international reserves.

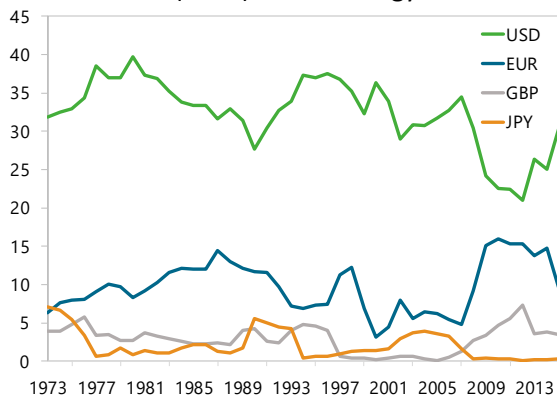
^{4/} As of 2016 Q3.

^{5/} Pre-October 2016 currency composition.

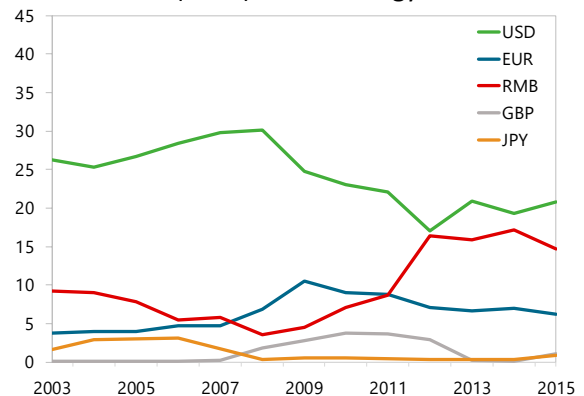
^{6/} Post-October 2016 currency composition.

Figure 7: Relative Size of Currency Blocs Over Time excluding Reserve Issuing Countries^{1/}
(Measured by the relative influence of reserve currencies, in percent of global GDP-PPP)

A view without the RMB—Frankel and Wei's
(1994) Methodology



A view with the RMB—Kawai and Pontines'
(2016) Methodology



Source: Fund staff calculations.

Note: For definitions see text.

^{1/} Balanced sample of 130 countries.

D. Robustness analysis

As discussed earlier, there are potential concerns about the robustness of these estimates, in particular, surrounding the importance of the RMB bloc. To address them, in this subsection, we examine the robustness of our results across several dimensions, mainly related to: (i) the selection of the numeraire currency; (ii) the inclusion of all COFER reserve currencies; (iii)

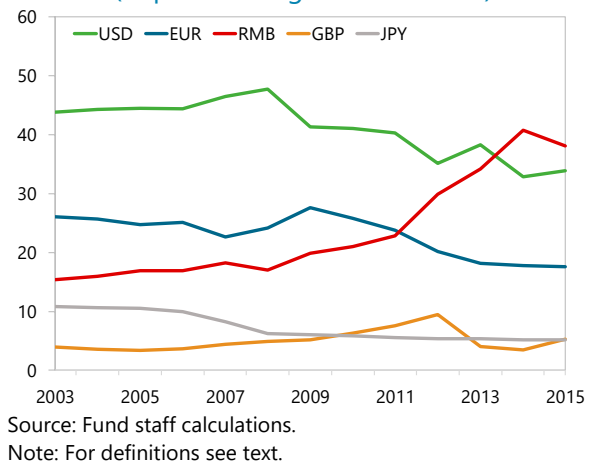
inclusion of additional currencies to control for the RMB's wider currency basket; and (iv) the role of additional controls. In describing the results, we place special emphasis on the results obtained using Kawai and Potines' methodology over a balanced sample of 130 countries.

Alternative numeraire currency

In the absence of clear theoretical guidance for the selection of the numeraire currency, it is natural to ask whether results are robust to the selection of the numeraire currency. Our benchmark analysis employs the NZD as the numeraire currency on the basis that the currency arrangement has a well-established freely floating record without capital controls (see Section II.A). However, the literature has used other numeraires. Moreover, some could claim that fluctuations of the NZD may reflect movements in the AUD, and therefore reflect the behavior of a commodity currency, thus biasing our results.

To address such concerns, we re-run the analysis using the Swiss Franc (CHF) as a numeraire. The CHF is perceived as a safe asset and considered by market participants a proxy for investing in gold. Average results over the period 2011-2015 for both measures of the absolute and relative influence are broadly similar to the benchmark specification. Albeit in these new estimates, we observe some weakening of the USD bloc in favor of the RMB bloc (Tables 4 and 5). A closer look at the point estimates shows that the relative size of the USD and the RMB blocs appears to switch. That is, the RMB bloc is estimated to surpass the USD bloc in 2014 (Figure 8).

Figure 8: Currency Bloc's Size using the CHF as Numeraire Currency
(In percent of global GDP-PPP)



Controlling for additional reserve currencies

Our benchmark results using Equation (5) may overestimate the size of the RMB's currency bloc. To address potential concerns about the accuracy of this estimate, we modify our benchmark empirical analysis to incorporate in our estimates all major reserve currencies reported in the IMF's data on the currency composition of official foreign exchange reserves (COFER). That is, we include in the estimation of Equation (5) three additional reserve currencies: the Australian dollar (AUD), the Canadian dollar (CAN), and the Swiss Franc (CHF).

Table 4: Economic Size Influence of Currency Blocs—Robustness Analysis 1/
(Measured by the absolute influence of reserve currencies, average 2011-2015, in percent of global GDP-PPP)

	Baseline	Baseline excluding reserve issuing countries	Robustness Analysis 2/			
			Alternative numeraire	Additional reserve currencies 3/	Wider set of reference currencies for the RMB	Additional controls
Dollar	39.9	22.0	38.1	37.1	39.6	40.3
Euro	19.6	6.9	19.2	16.6	19.9	17.3
Pound	2.8	0.1	4.3	2.7	2.8	4.2
Yen	5.2	0.0	5.2	5.2	5.2	5.2
Renminbi	32.5	14.7	33.1	28.7	32.5	32.9

Sources: International Financial Statistics and World Economic Outlook. Fund staff calculations.

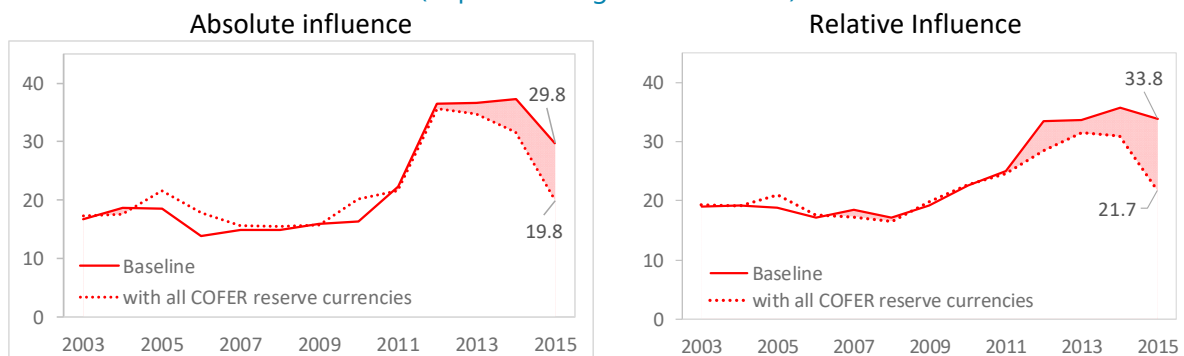
1/ 130 countries.

2/ For a description of the robustness analysis see text.

3/ Sum does not add to one as other reserve currencies are included in the estimation.

The range estimates are reported in Figure 9, both for the absolute and relative influence of a currency bloc. As shown, the range estimates put the average economic share size of the RMB's currency bloc—as measured by the absolute influence of the currency—somewhere between 29 percent (lower bound estimate) and 33 percent (upper bound estimate) of global GDP over the period 2011-2015 (Table 4).¹⁶ The average size of the RMB bloc measured by the relative influence of the reserve currency is estimated to fall somewhere between 27 and 32 percent of GDP over the same period (Table 5). Quite importantly, Figure 9 indicates that the dispersion of the range has widened somewhat in recent years, which may reflect the increasing role of some of these alternative currencies as safe haven assets.

Figure 9: Range Bound Estimate of the RMBs' Currency Bloc when Including Additional Reserve Currencies in the Baseline Specification
(In percent of global GDP-PPP)



Source: IFS and WEO. Fund staff calculations.

Note: For definitions see text.

¹⁶ We must note that estimates show minor changes to the size of the dollar or the euro's currency bloc, with most of the adjustment taking place in the estimates of the pound sterling and the Japanese yen.

Table 5: Economic Influence of Currency Blocs—Robustness Analysis 1/
(Measured by the relative influence of reserve currencies, average 2011-2015, in percent of global GDP-PPP)

	Baseline	Baseline excluding reserve issuing countries	Robustness Analysis 2/			
			Alternative numeraire	Additional reserve currencies 3/	Wider set of reference currencies for the RMB	Additional controls
Dollar	37.9	20.0	36.0	34.3	37.4	38.2
Euro	19.8	7.1	19.5	16.3	20.1	18.0
Pound	4.3	1.6	6.0	3.0	4.3	4.0
Yen	5.6	0.4	5.4	5.5	5.6	5.8
Renminbi	32.4	14.6	33.1	27.4	32.5	34.0

Sources: International Financial Statistics and World Economic Outlook. Fund staff calculations.

1/ 130 countries.

2/ For a description of the robustness analysis see text.

3/ Sum does not add to one as other reserve currencies are included in the estimation.

Controlling for a wider set of reference currencies for the RMB

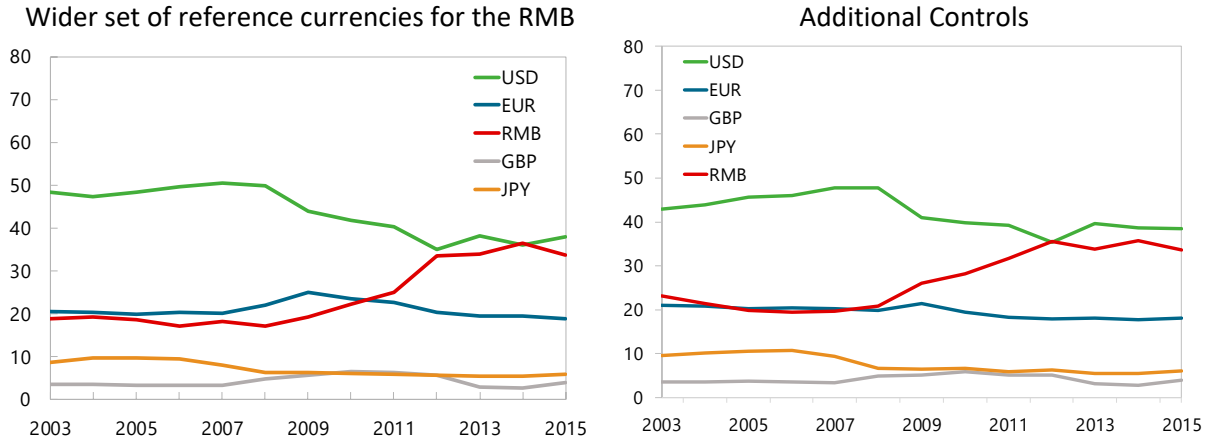
The value of the RMB was pegged to the dollar until 2005. Since then, China has been transitioning out of this peg. To this end, it is often argued that the currency has been allowed to float in a narrow margin around a fixed-base rate determined with reference to a basket of world currencies. This implies that the benchmark estimation of Eq. (3) could have a bias if it fails to include all relevant reference currencies. To check the sensitivity of our results, we include in the estimation of Eq. (3) eight additional currencies, including the Australian dollar (AUD), Hong Kong dollar (HKD), Malaysian Ringgit (MYR), Russian ruble (RUB), Singaporean dollar (SGD), Thai baht (THB), Canadian dollar (CAD), and Swiss franc (CHF). Including a wider set of reference currencies for the RMB appears to have little impact of the size of the RMB's bloc—for both measures of the absolute and relative influence of the reserve currency (Tables 4 and 5, and Figure 10, left hand panel).

Additional Controls

Finally, we checked whether our results are robust to the inclusion of additional control variables, such as the change in oil prices, global liquidity (captured by the spread between the U.S. short term interbank rate and the U.S. Treasury bill rate), or the degree of uncertainty (as capture by the VIX). Our results indicate that these additional controls in Eq.(4) do not have a significant impact relative to benchmark specification. Qualitatively, the baseline results appear to remain the same. If any, the main difference is the timing at which the RMB bloc is estimated to surpass the EUR bloc. With additional controls this is estimated to occur in 2008, while in the benchmark specification this only happens in 2011 (Figure 10, right hand panel).

Figure 10: Currency Blocs' Size—Sensitivity Analysis

(Measured by the relative influence of reserve currencies, in percent of global GDP-PPP)



IV. WHAT DETERMINES THE RELATIVE IMPORTANCE OF RESERVE CURRENCIES?

The importance of reserve currencies and, therefore, the size of a reserve currency bloc, is likely to be a function of the forces that determine the currency's global reserve status. That is, of the forces that make them attractive as a unit of account, medium of exchange (means of payment), and store of value. Research has shown that both the size and structure of the economy and financial markets matter, as well as its degree of integration and interconnection—e.g., as captured by the degree of financial integration and trade openness. Also, some authorities in the past have promoted the use of their currency while others deliberately chose not to support currency internationalization—as was the case with the German Deutsche mark in the 1970s when the authorities introduced capital controls to discourage its international use (Eichengreen, 2011; Nabar and Tovar, 2017).

The international influence of a currency is also likely to depend on its stability, which in turn hinges on the creditworthiness of the sovereign as captured by stable, sustainable, and predictable macroeconomic outcomes. These outcomes tend to manifest themselves in low and stable inflation, sustainable public and external positions, and strong institutions—including a reliable rule of law.

Finally, it is common to see in the literature that network externalities affect the persistence of reserve currencies' global influence. This together with the development of deep and liquid financial markets on-shore and off-shore—especially for sovereign debt trading—help induce a virtuous cycle that reinforces the influence of reserve currencies across the world (Eichengreen, 2011).

In this section, we briefly examine how these different factors correlate with the relative importance of each currency bloc. The estimates obtained using Kawai and Pontines' approach result in measures that have a short time span, which constrains their use for econometric analysis. Results obtaining Frankel and Wei's approach provide for a longer

time series, but two elements restrict its use for econometric analysis, particularly in a panel setting (the structural break associated with the introduction of the euro and the complementarity across the estimates for different currencies). Therefore, it is difficult to establish average relationships since the increase in the relative importance of one currency automatically implies a decline of the relative importance of the other currencies.¹⁷ Without aiming at making a comprehensive analysis, we document how key variables identified by the literature correlate with our different measures of the relative importance of a currency bloc. While these correlations do not imply causality, they do provide an idea of factors that would need to be considered when determining the size of a currency bloc.

Specifically, we examine the dynamics of the two measures of the relative importance of currency bloc over time vis-à-vis several proxy determinants identified by the literature.¹⁸ The proxy determinants considered are: (i) GDP global share as a proxy for the size of the reserve issuer currency (IMF-WEO); (ii) inflation as captured by the annual change in CPI inflation (IMF-WEO); (iii) the current account balance as percent of GDP (IMF-WEO); (iv) debt as captured by the ratio of central government debt to GDP (IMF FAD database); (v) trade openness as captured by the sum of exports and imports to GDP (World Bank), (vi) financial openness as captured by the sum of the reserve currency issuer external assets and liabilities as a percent of GDP (an updated version of Lane and Milesi-Ferretti (2007) database).¹⁹

We plot the level of the series over time and display the bivariate correlations between the measure of the relative importance of reserve currency blocs and the lagged difference of each proxy determinant.²⁰ Lagged variables are employed to establish some casual relationships, as opposed to potentially spurious relationships. As mentioned earlier, relationships over time are best captured by Frankel and Wei's approach. Nonetheless, we also display results using Kawai and Pontines' approach. Our analysis focuses on the U.S. dollar bloc, given its prominence (Figures 9-11), the euro bloc (Figures 12-14), and the renminbi bloc (Figures 15-16). Results for the British pound and the Yen currency blocs are reported in the Annex.

A. The U.S. dollar bloc

The analysis for the U.S. dollar bloc indicates that the *relative size of the U.S. economy* matters, particularly over the long run (Figure 11 and 12, upper-left panels). There also appears a negative relationship between *inflation* and the size of the dollar's currency bloc, as

¹⁷ We examined the possibility of a making logistic transformation of the currency bloc shares. However, the span of the series provides limited degrees of freedom to reach any substantive conclusion.

¹⁸ See for example the discussion in Frankel and Wei (2008).

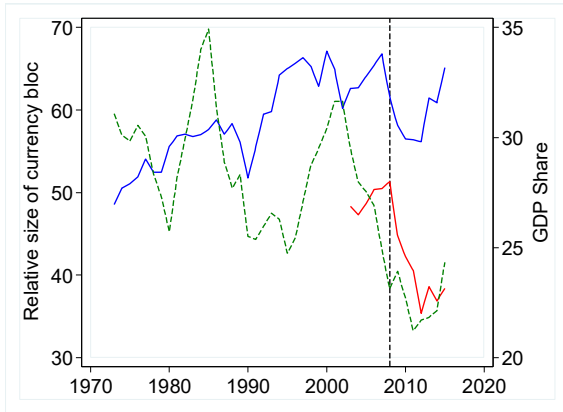
¹⁹ Financial matters for a reserve currency as it determines the degree of liquidity of the currency. We do not examine this dimension. See Nabar and Tovar, 2017, and IMF, 2015b. For an assessment of liquidity conditions in the trading of the reserve currencies examined in this paper.

²⁰ Inflation is not differenced.

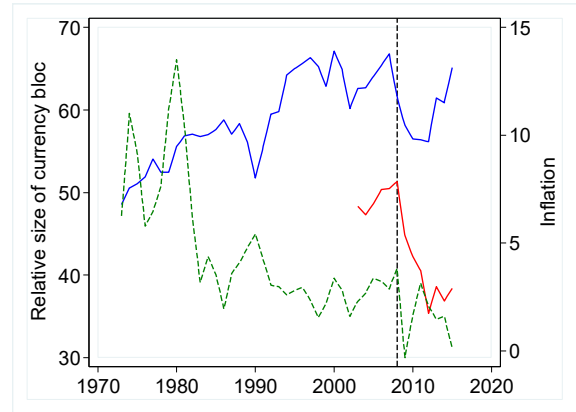
captured by Frankel and Wei's measure. However, this relationship seems to be evident until the onset of

Figure 11 Relative Importance of the U.S. Dollar Currency Bloc vis-à-vis Proxy Determinants ^{1/}

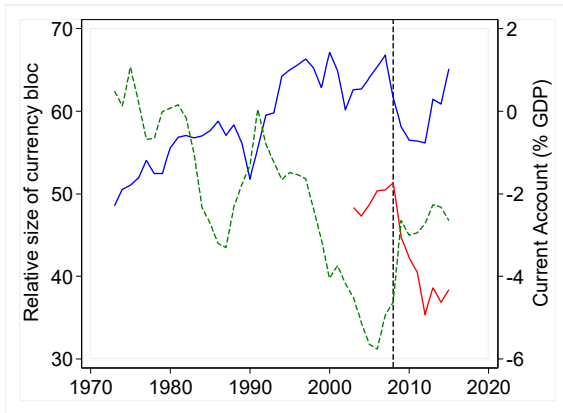
GDP Share, in percent



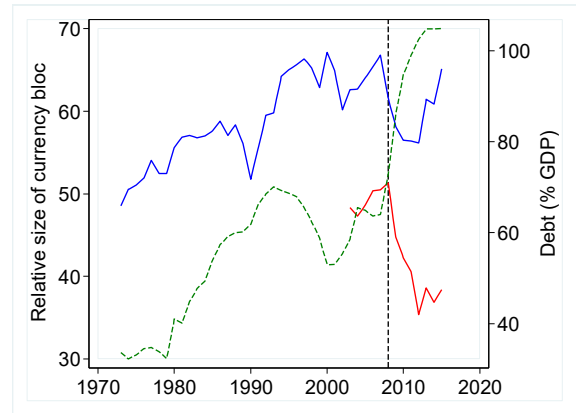
Inflation, in percent



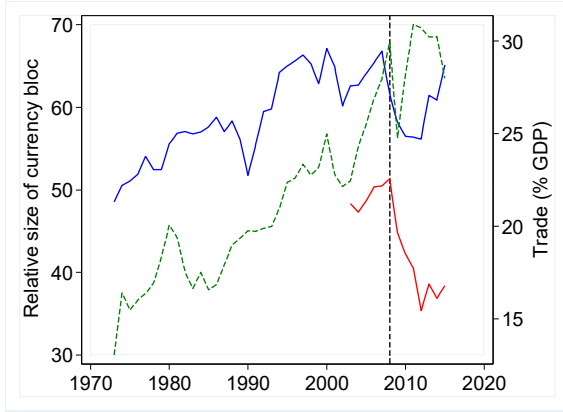
Current Account, as percent of GDP



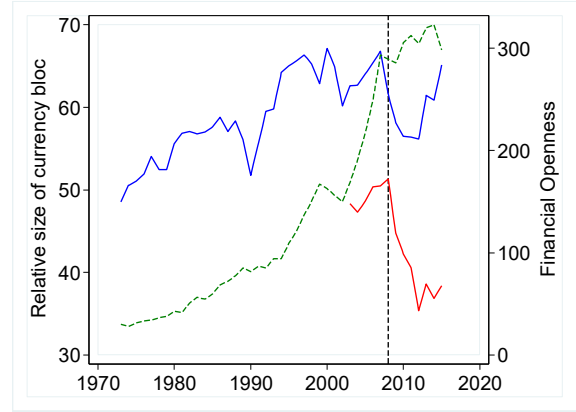
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

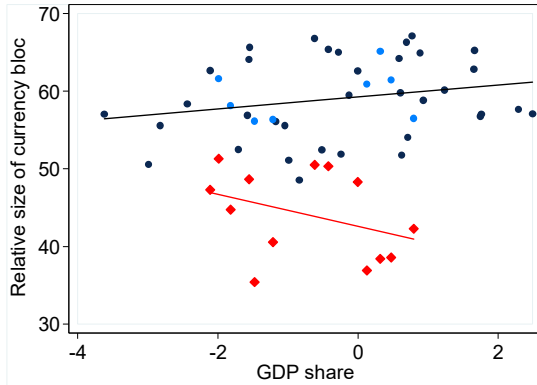


Source: IMF-IFS, IMF WEO, Milesi-Ferretti (2007), World Bank, author calculations.

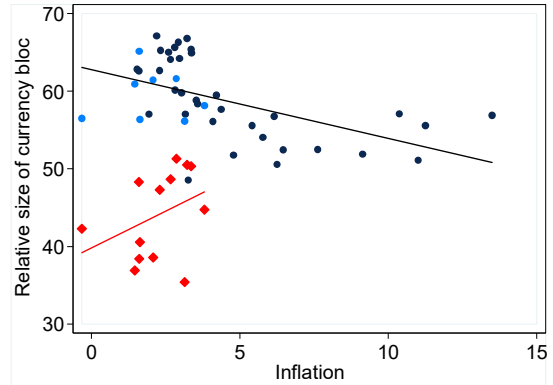
^{1/} The **blue** and **red** lines display Frankel and Wei's and Kawai and Potines' measure of the relative importance of a currency bloc, respectively (in percent). The **dashed green line** reports the proxy determinant. The **vertical line** marks the beginning of the global financial crisis in 2008. For definitions see text.

Figure 12 Relative Importance of the U.S. Dollar Currency Blocs vis-à-vis Proxy Determinants Simple correlations vis-à-vis difference lagged variables ^{1/}

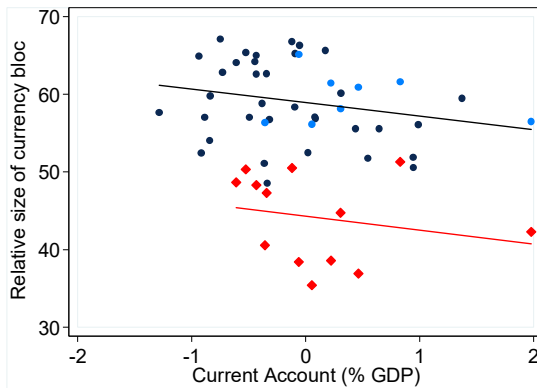
GDP Share, in percent



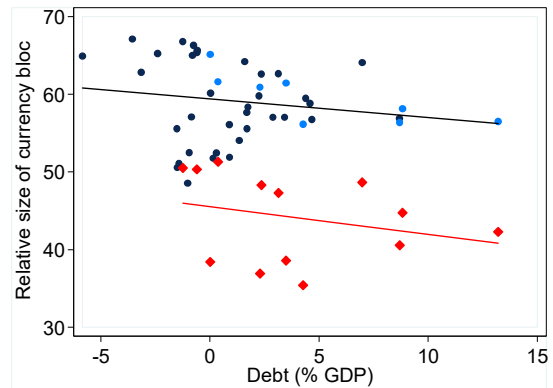
Inflation, in percent



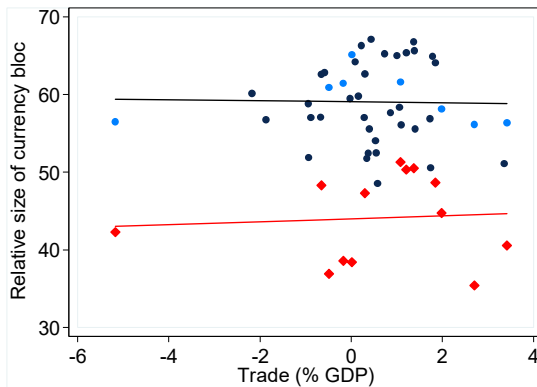
Current Account, as percent of GDP



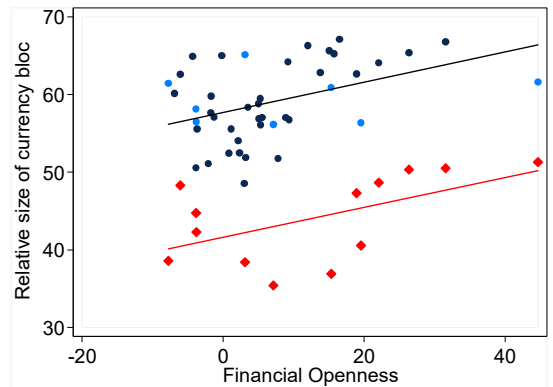
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP



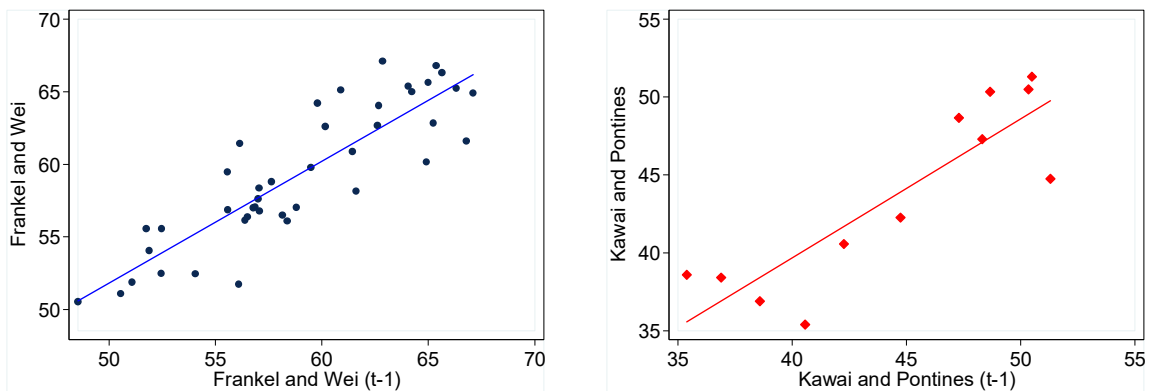
Source: Author calculations.

^{1/} **Dots** display Frankel and Wei's relative size of currency blocs. **Black dots** display the pre-2008 period, while **blue dots** display the post-2008 period. **Diamonds in red** display Kawai and Pontines' measure of relative size of currency blocs. The horizontal axis measures the change (except for inflation) of the variable lagged one period. **Lines** display fitted OLS regressions.

the global financial crisis (it is not apparent in Kawai and Pontines' measure, Figures 11 and 12, upper right-hand panel). In addition, current account deficits seem to be positively correlated with the relative importance of the dollar bloc (Figure 12). This could indicate that a stronger currency bloc is likely to increase the demand for dollar assets, strengthen the dollar valuation, and result in larger current account deficits. This process could reinforce over time, and hence larger deficits might reinforce the importance of dollar's currency bloc.

The analysis also indicates that increases in the debt are negatively correlated with the size of the dollar currency bloc. While not quite evident when analyzing the levels of the variables, it appears as if increases in debts levels undermine the importance of the dollar's currency bloc.²¹ Quite importantly, this relationship appears to have strengthened following the global financial crisis, which corresponds to the period in which debt in the U.S. jumped from roughly over 60 percent to over 100 percent. (Figure 12, middle-right panel). Moreover, the degree of financial integration seems to matter. That is, greater financial openness appears to be positively correlated with a stronger dollar bloc (Figure 12, bottom-right panel). The relationship seems less evident for trade openness.

Figure 13: Persistence of the Size of the U.S. Dollar Currency Bloc



Source: Author calculations. For definitions see text.

Note: The **black dots** and **red diamonds** show Frankel and Wei's and Kawai and Potines' measure of the relative importance of a currency bloc, respectively. **Lines** display fitted OLS regressions.

Finally, we examine the possibility of network externalities in determining the relative importance of the dollar bloc. For this purpose, we examine the degree of autocorrelation of the two measures of the relative importance of the dollar currency bloc. As displayed in Figure 13, the degree of autocorrelation is high and close to one, i.e. the regression line sits

²¹ The observation of the dollar bloc being associated with current account deficits and greater debt is nonetheless consistent with the modern view of the Triffin dilemma and the convergence to a multipolar system. According to it, central banks' demand for liquid assets across the world (e.g., dollar-denominated securities), in turn require the government to run continuing deficits or issue debt that is likely to be riskier than the corresponding liabilities. In such world, global growth for reserves is driven by deficits—not necessarily balance of payment deficits but government deficits. See Farhi et al. 2011, Obstfeld, 2011, and Csonto and Tovar, 2017.

near the 45-degree line, which is indicative of a high degree of persistence in both measures of the dollar currency bloc.

B. The euro bloc

We perform a similar analysis for the euro bloc. However, some caveats apply to the analysis. First, the euro is a relatively young currency that was formally introduced in 2002. This limits a historical analysis of the evolution of the relative importance of the euro bloc. Nonetheless, as done earlier, we report the joint relative importance of the French Franc and the German Deutsche Mark as a measure of the historical trend of the euro. Hence, for the analysis reported in this section the coverage of the proxy determinants differ prior to and after the introduction of the euro. In the former case, the proxy determinants only cover Germany and France, while in the latter case the coverage is for the euro area.

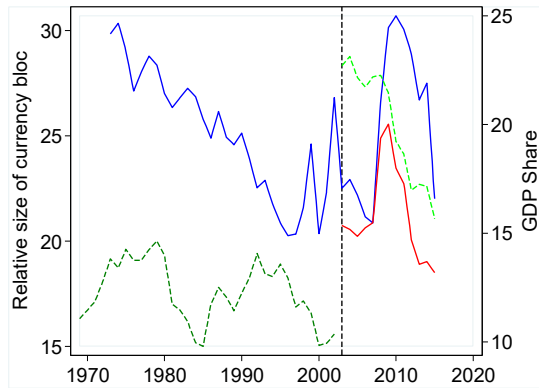
Two results appear to accompany the secular decline in the importance of the DM and the FF. First, the trending decline in relative importance of these currencies appears while there was limited progress in trade and financial openness, and a shrinking relative economic size of Germany and France. Second, standard macroeconomic discipline variables appear to have contributed little in supporting the relative importance of the FF and the DM in a relatively closed economy environment. That is, there does not seem to be any evidence that lower inflation, fiscal discipline or larger current account deficits contributed to increase the economic importance of the euro bloc. If any, in many instances the relationship appears to have worked in an opposite direction (this could reflect, for instance, that Germany actively discouraged the international use of the DM).

Our analysis indicates that the introduction of the euro did not result in a greater importance of the euro's currency bloc (Figure 14). It was only until after the global financial crisis that the euro bloc appears to have gained importance, but the gain was short lived. In 2010 the euro appears to have been hit by debt problems in several economies, resulting in an increase in debt levels from about 60 to over 90 percent of GDP in more recent years (mid-right panel in Figure 14).

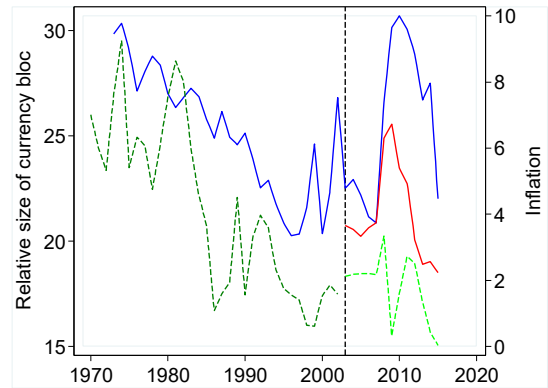
Finally, the economic persistence of the euro bloc appears to have been high, but much less than that for the dollar bloc (Figure 15). This suggests that appropriate policies that support the international role and credibility of the euro are likely to be more relevant than in the case of the dollar, which has a dominant position.

Figure 14 Relative Importance of the Euro Currency Bloc vis-à-vis Proxy Determinants ^{1/}

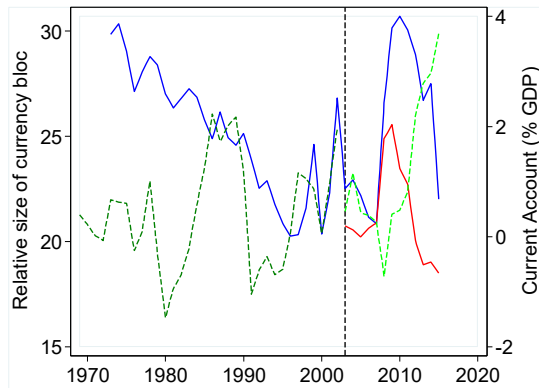
GDP Share, in percent



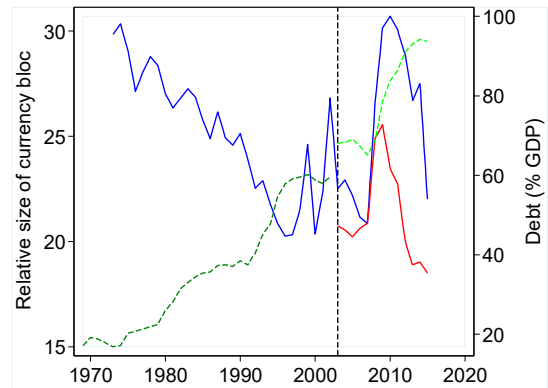
Inflation, in percent



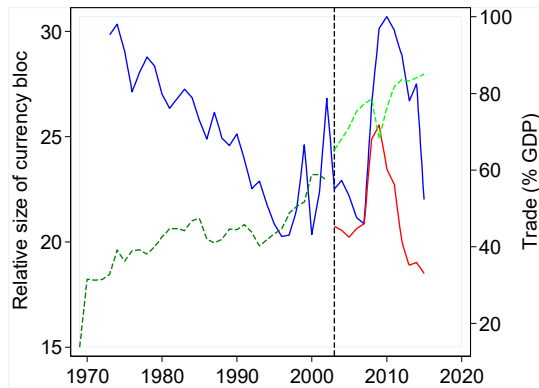
Current Account, as percent of GDP



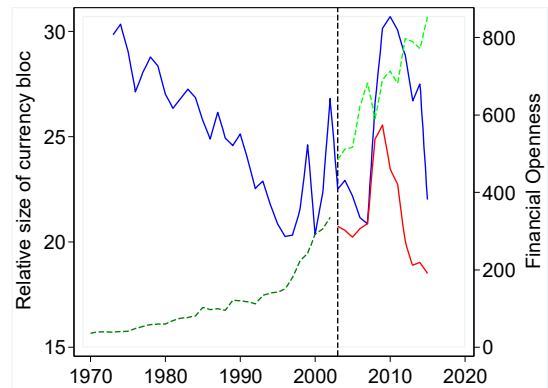
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

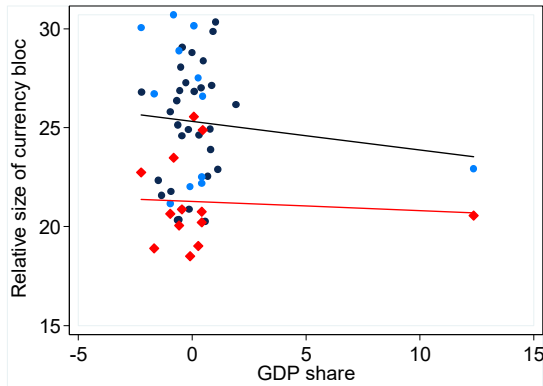


Source: IMF-IFS, IMF WEO, Milesi-Ferretti (2007), World Bank, author calculations.

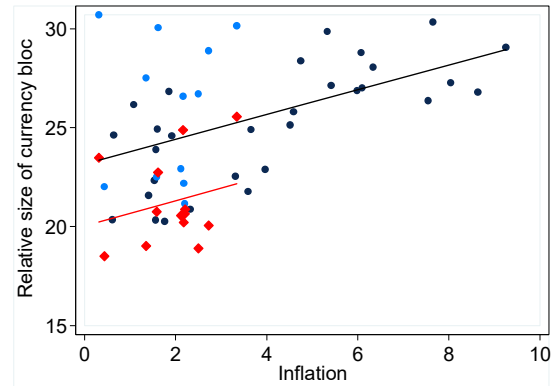
^{1/} The **blue** and **red** lines display Frankel and Wei's and Kawai and Pontines' measure of the relative importance of a currency bloc, respectively (in percent). The **vertical line** marks the introduction of the euro in 2002. The **dashed green lines** report the proxy determinant. The line is darker prior to the introduction of the euro and lighter afterwards. For definitions see text.

Figure 15 Relative Importance of the Euro Currency Blocs vis-à-vis Proxy Determinants
Simple correlations vis-à-vis difference lagged variables ^{1/}

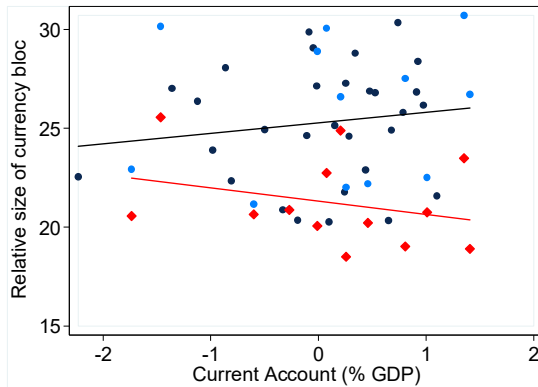
GDP Share, in percent



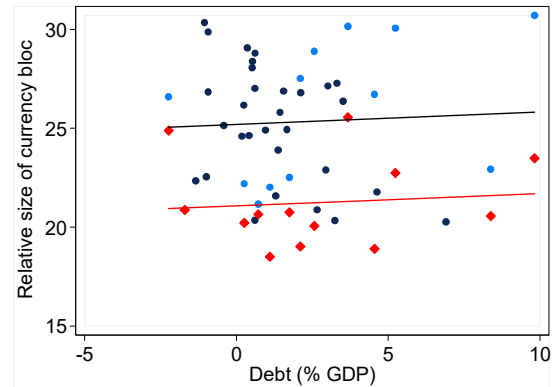
Inflation, in percent



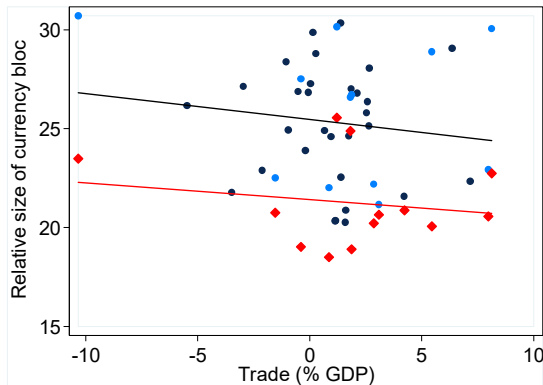
Current Account, as percent of GDP



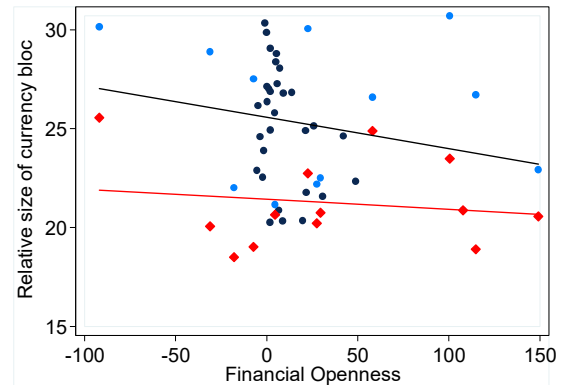
Debt, as percent of GDP



Trade Openness, as percent of GDP

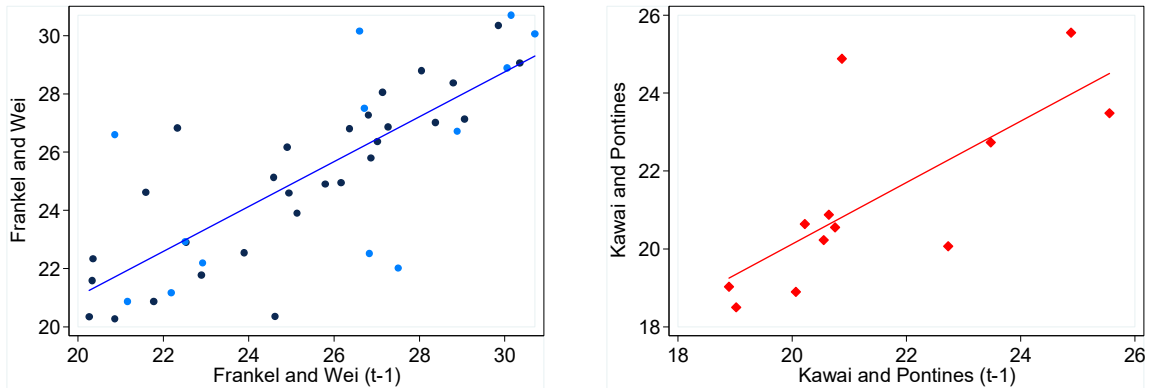


Financial Openness, as percent of GDP



Source: Author calculations.

^{1/} **Dots** display Frankel and Wei's relative size of currency blocs. **Black dots** display the pre-2008 period, while **blue dots** display the post-2008 period. **Diamonds in red** display Kawai and Pontines' measure of relative size of currency blocs. The horizontal axis measures the change (except for inflation) of the variable lagged one period. **Lines** display fitted OLS regressions.

Figure 16: Persistence of the Euro Currency Bloc

Source: Author calculations. For definitions see text.

Note: The **dots** and **diamonds** display Frankel and Wei's and Kawai and Pontines' measure of the relative importance of a currency bloc, respectively. The black dots represent the period prior to 2002, while the blue dots plot the period after the introduction of the euro. **Lines** display fitted OLS regressions.

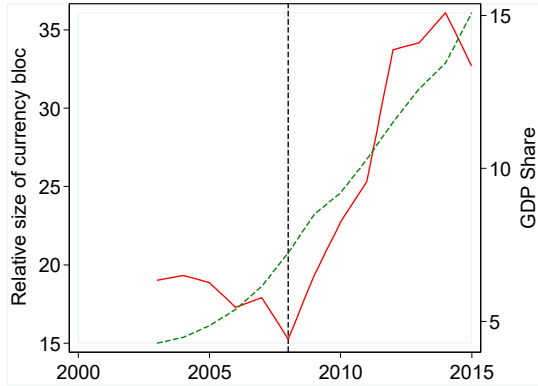
C. The renminbi bloc

The internationalization of the renminbi is a recent phenomenon (see Nabar and Tovar, 2017), and so is the increasing importance of the renminbi bloc. Our analysis suggests that the increasing share of the Chinese economy in the global economy has played a key role in this outcome (Figure 17 and 18). Also, current account surpluses might be negatively correlated, and therefore possibly have slowed down the expansion of the RMB bloc (Figure 18, left middle panel). Interestingly, debt concerns in China seem to have dented the expansion of the renminbi bloc, at least for the sample period. Nonetheless, this may have coincided with the global financial crisis and the European debt crisis, which dented the dollar and the euro blocs.

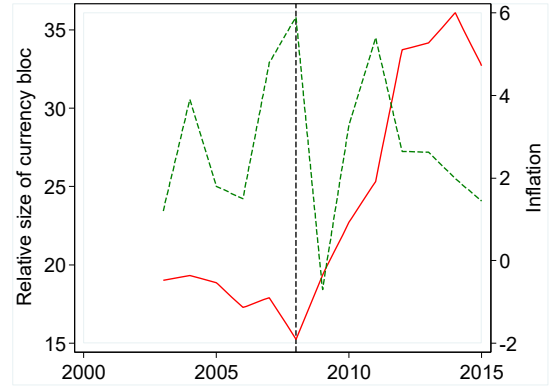
Overall, the analysis in this section suggests that currency blocs benefit from network externalities, and are therefore highly persistent—although susceptible to change—, and that the reserve issuer's economic size matters. Also, that debt considerations as a proxy for the credibility of the currency appear to be relevant, particularly following the global financial crisis. Finally, we find some indication that current account surpluses may undermine a currency bloc.

Figure 17 Relative Importance of the Renminbi Currency Bloc vis-à-vis Proxy Determinants ^{1/}

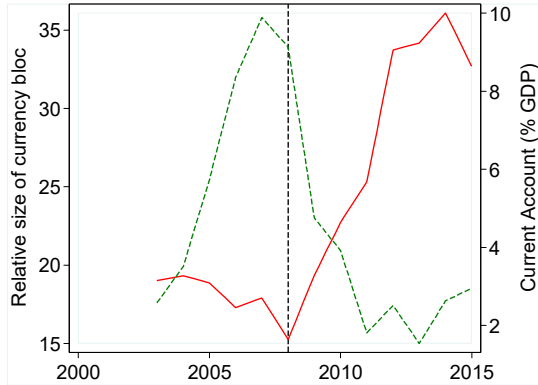
GDP Share, in percent



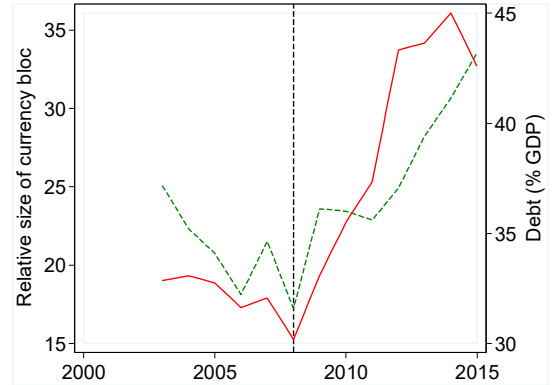
Inflation, in percent



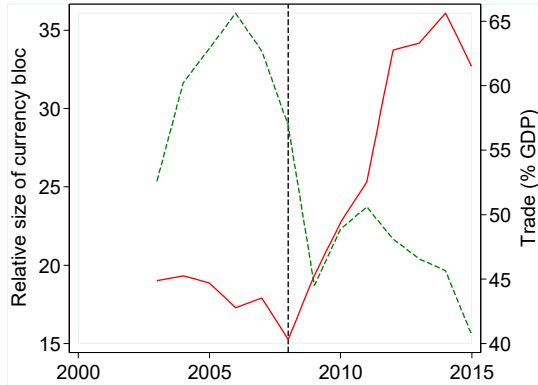
Current Account, as percent of GDP



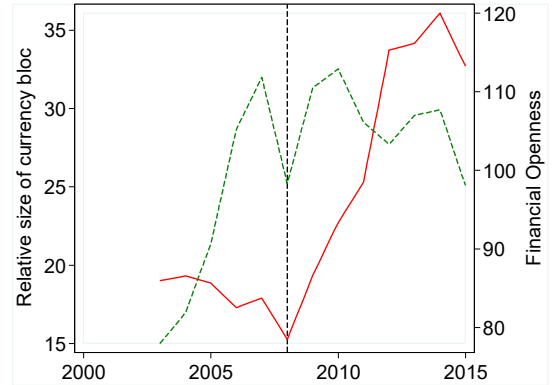
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

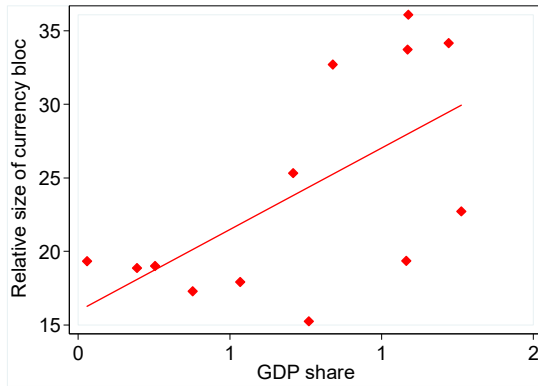


Source: IMF-IFS, IMF WEO, Milesi-Ferretti (2007), World Bank, author calculations.

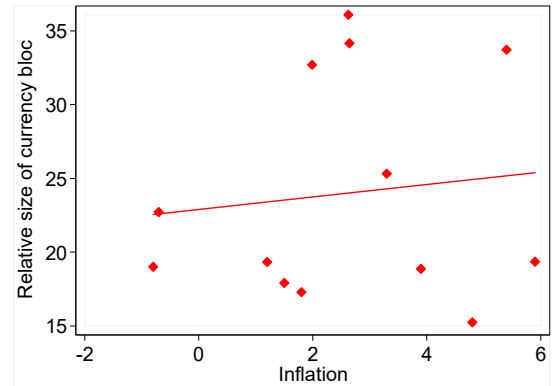
^{1/} The **red** line displays Kawai and Potines' measure of the relative importance of a currency bloc (in percent). The **dashed green line** reports the proxy determinant. The **vertical line** marks the start of the global financial crisis. For definitions see text.

Figure 18 Relative Importance of the Renminbi Currency Bloc vis-à-vis Proxy Determinants
Simple correlations vis-à-vis difference lagged variables ^{1/}

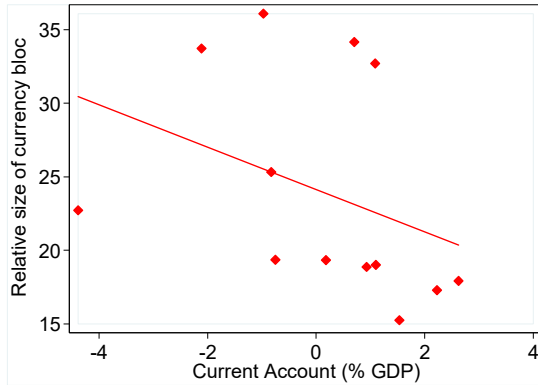
GDP Share, in percent



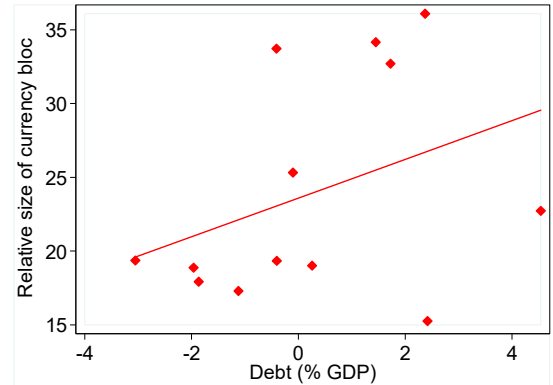
Inflation, in percent



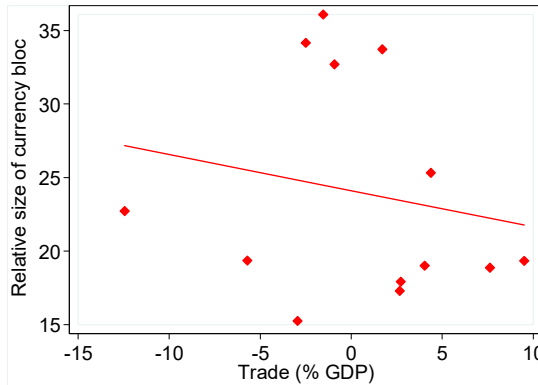
Current Account, as percent of GDP



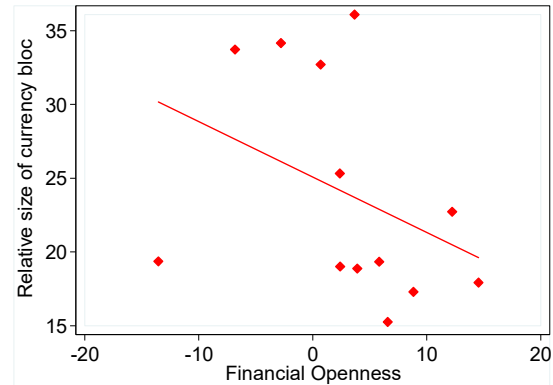
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP



Source: Author calculations.

^{1/} **Diamonds in red** display Kawai and Pontines' measure of relative size of currency blocs. The horizontal axis measures the change (except for inflation) of the variable lagged one period. **Lines** display fitted OLS regressions.

V. CONCLUSIONS

Measuring the degree of currency diversification in the international monetary system is a complex and multidimensional issue that can be approached in different ways. The most common approach is to examine the currency denomination of trade and financial assets. In this paper, we have taken an alternative approach. We have measured the degree of currency diversification by examining how reserve currencies influence currency fluctuations across the world and how this influence has changed over time. That is, we have assessed the extent to which national currencies are anchored to reserve currencies and become part of a reserve currency bloc.

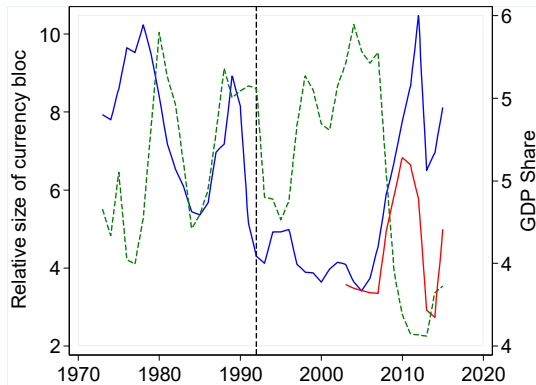
Our analysis appears to confirm the lack of reserve diversification in the international monetary system. Within the few currencies that dominate the global landscape, the U.S. dollar appears the most dominant. A key contribution of our analysis is that we have examined the influence of the RMB on the world's currencies, along with that of other traditionally major reserve currencies. Our estimates suggest that the RMB has gained in international influence, which is now significant, particularly among the BRICS' countries. Nonetheless, we found no evidence of an Asian RMB bloc. More broadly, these findings suggest that the international monetary system's transition from a bi-polar bloc (consisting of the U.S. dollar and European or "euro" bloc) to a tri-polar currency bloc (including the renminbi bloc) is underway.

Going forward, important lingering questions remain as to how the international monetary system will evolve. For example, will the renminbi bloc expand its influence? Will this be a sustained process, and will it be done at the expense of the U.S. dollar or of other currency blocs, such as the euro? While our results suggest that the degree of influence of a currency bloc is highly persistent, policies and their credibility matter. In the case of the RMB, policies to support its international role have played a key role (see Nabar and Tovar, 2017). Other challenges might come from new instruments, such as virtual currencies (e.g. bitcoin).

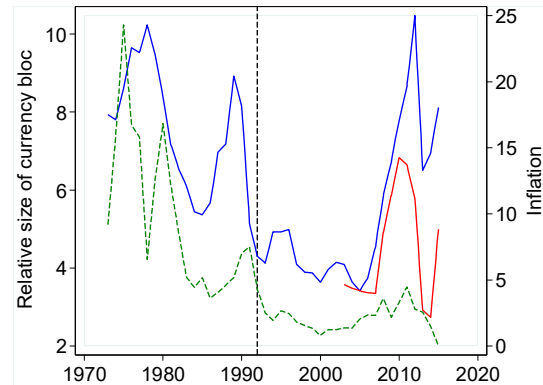
ANNEX

Annex Figure 1 Relative Importance of the British Pound Bloc vis-à-vis Proxy Determinants ^{1/}

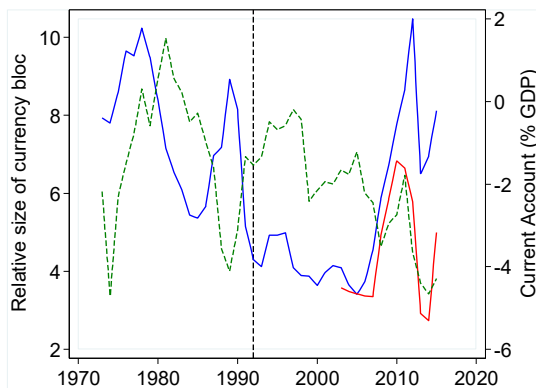
GDP Share, in percent



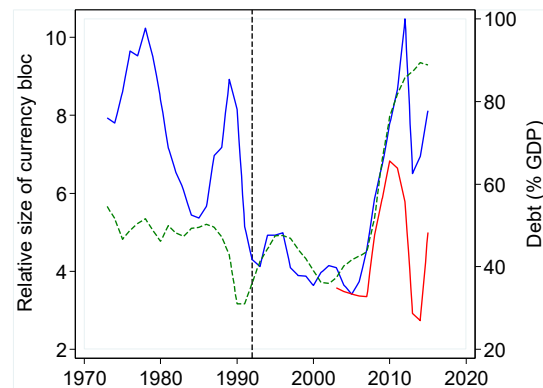
Inflation, in percent



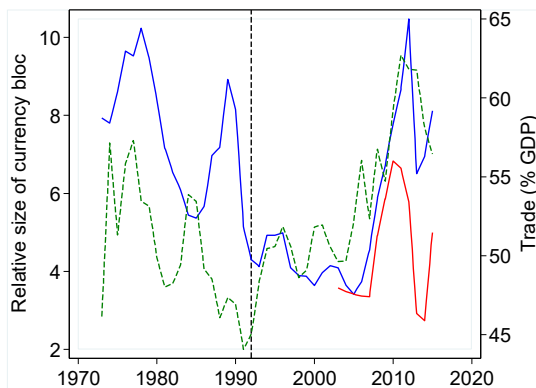
Current Account, as percent of GDP



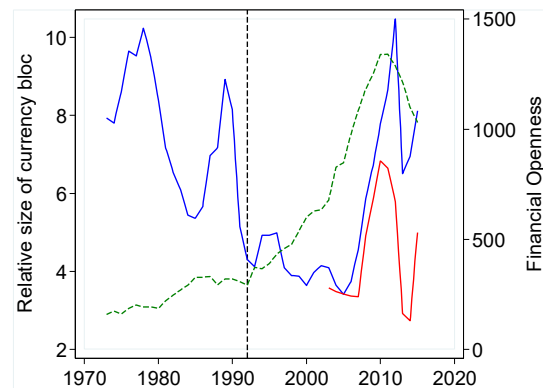
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

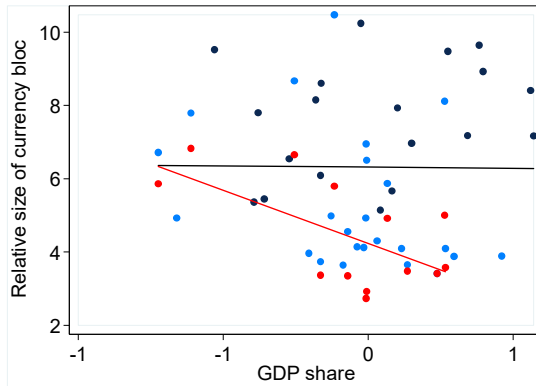


Source: IMF-IFS, IMF WEO, Milesi-Ferretti (2007), World Bank, author calculations.

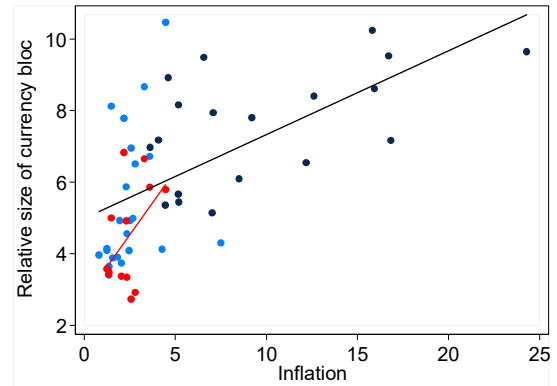
^{1/} The **blue** and **red** lines display Frankel and Wei's and Kawai and Potines' measure of the relative importance of a currency bloc, respectively (in percent). The **dashed green lines** report the proxy determinant. The line is darker prior to the introduction of the euro and lighter afterwards. The **vertical line** marks the 1992 Exchange Rate Mechanism (ERM) crisis. For definitions see text.

Annex Figure 2 Relative Importance of the British Pound Currency Blocs vis-à-vis Proxy Determinants Simple correlations vis-à-vis difference lagged variables ^{1/}

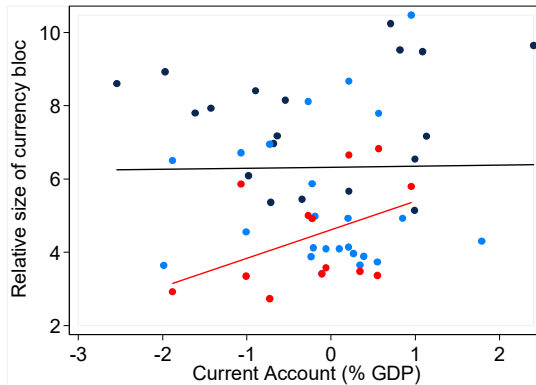
GDP Share, in percent



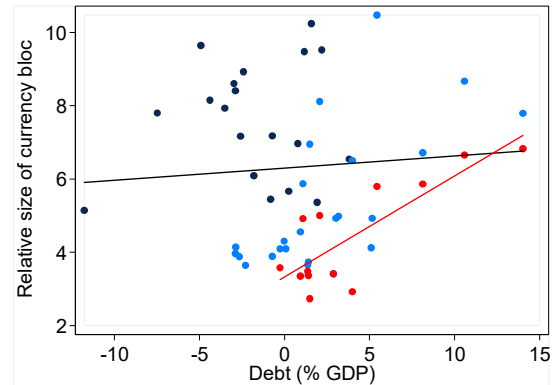
Inflation, in percent



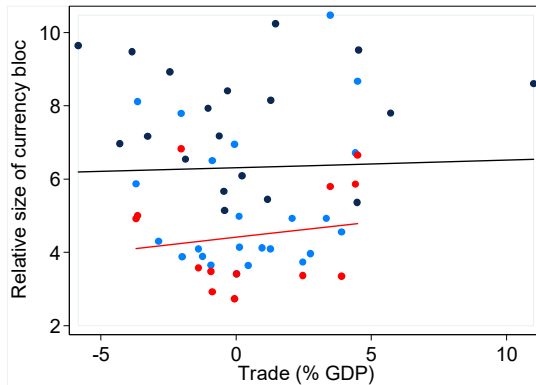
Current Account, as percent of GDP



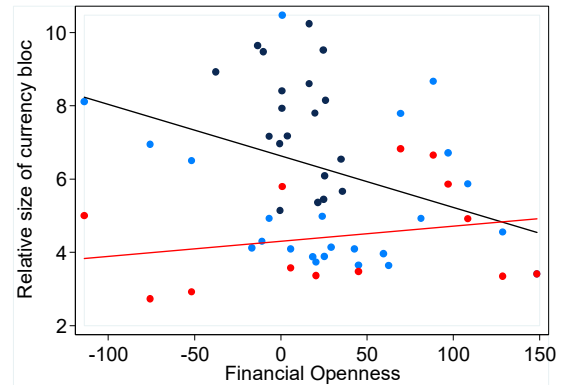
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

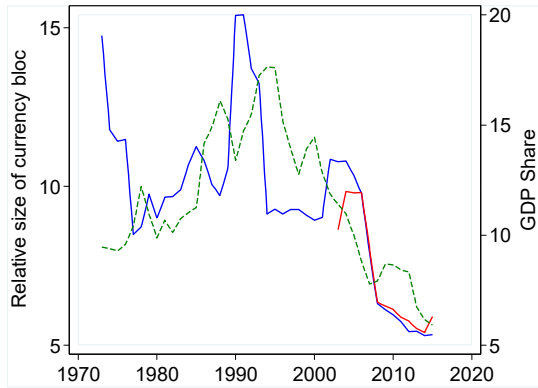


Source: Author calculations.

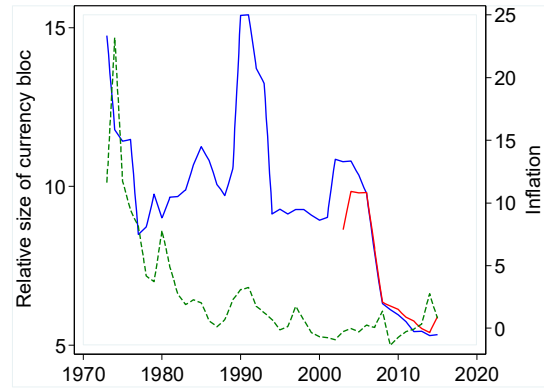
^{1/} **Dots** display Frankel and Wei's relative size of currency blocs. **Black dots** display the pre-1992 period—Exchange Rate Mechanism (ERM) crisis—, while **blue dots** display the post-1992 period. **Diamonds in red** display Kawai and Pontines' measure of relative size of currency blocs. The horizontal axis measures the change (except for inflation) of the variable lagged one period. **Lines** display fitted OLS regressions.

Annex Figure 3 Relative Importance of the Japanese Yen Currency Bloc vis-à-vis Proxy Determinants ^{1/}

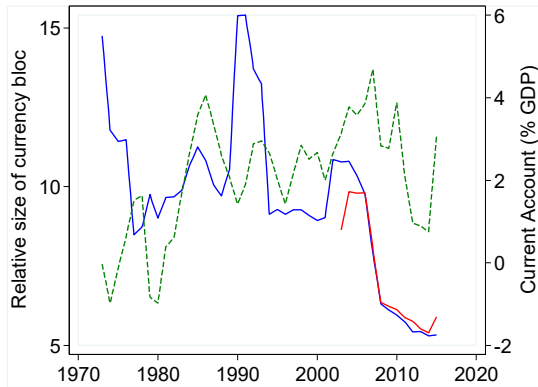
GDP Share, in percent



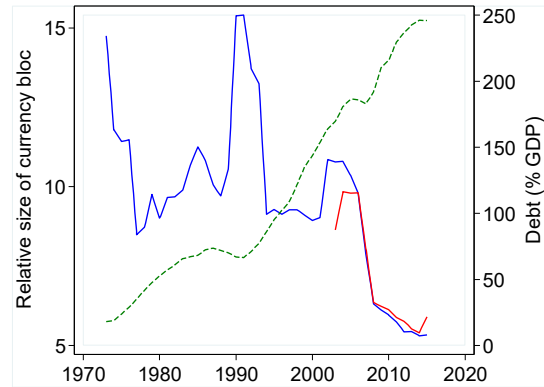
Inflation, in percent



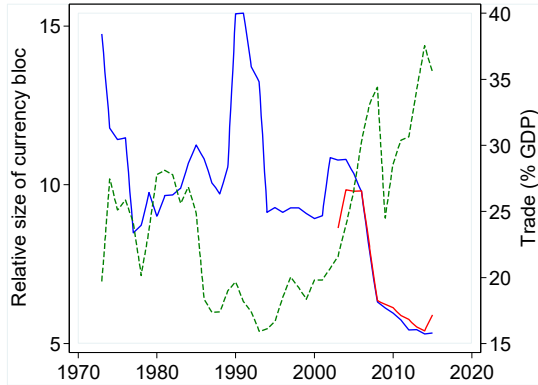
Current Account, as percent of GDP



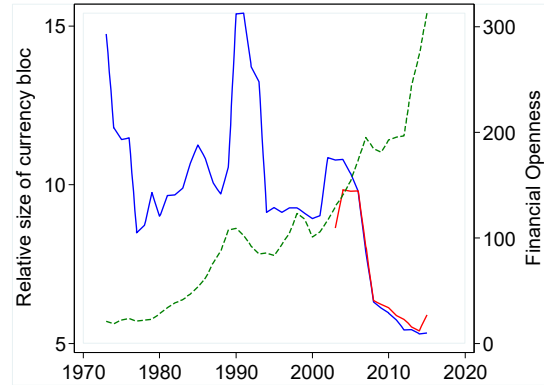
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP

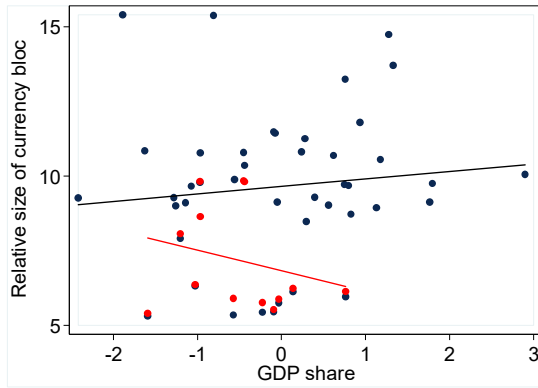


Source: IMF-IFS, IMF WEO, Milesi-Ferretti (2007), World Bank, author calculations.

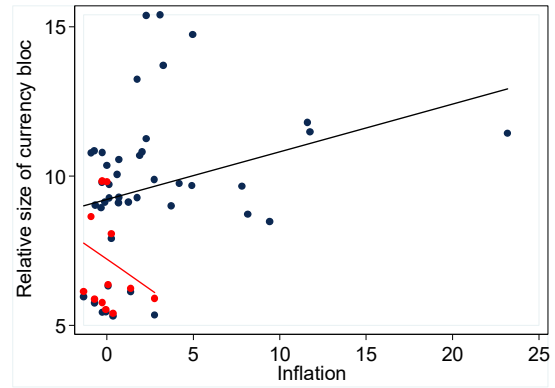
^{1/} The **blue** and **red** lines display Frankel and Wei's and Kawai and Potines' measure of the relative importance of a currency bloc, respectively (in percent). The **dashed green lines** report the proxy determinant. The line is darker prior to the introduction of the euro and lighter afterwards. The **vertical line** marks the introduction of the euro in 2002. For definitions see text.

Annex Figure 4 Relative Importance of the Japanese Yen Currency Blocs vis-à-vis Proxy Determinants Simple correlations vis-à-vis difference lagged variables ^{1/}

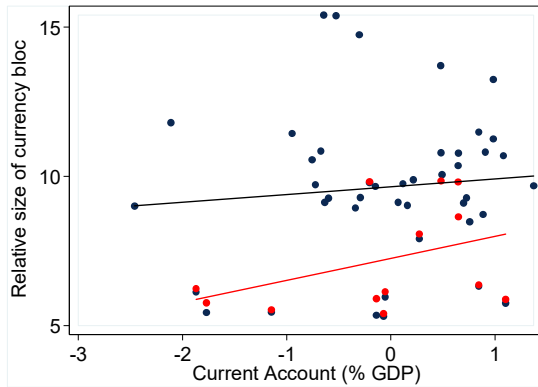
GDP Share, in percent



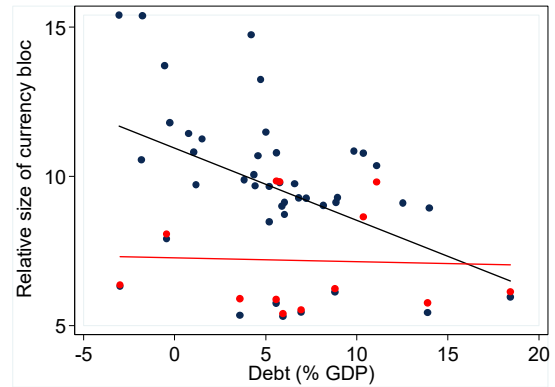
Inflation, in percent



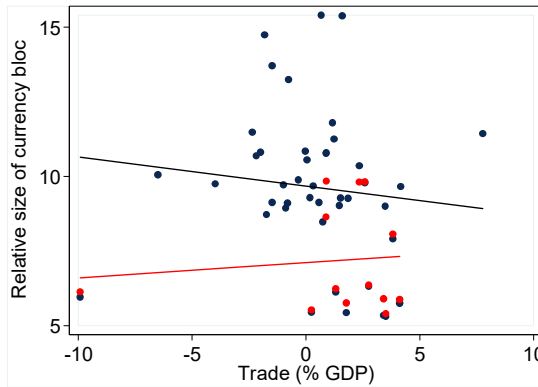
Current Account, as percent of GDP



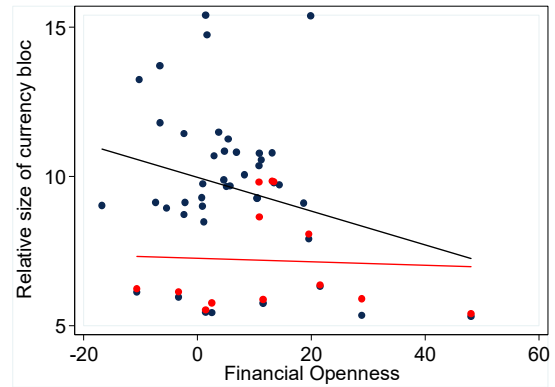
Debt, as percent of GDP



Trade Openness, as percent of GDP



Financial Openness, as percent of GDP



Source: Author calculations.

^{1/} **Dots** display Frankel and Wei's relative size of currency blocs. **Black dots** display the pre-2008 period, while **blue dots** display the post-2008 period. **Diamonds in red** display Kawai and Pontines' measure of relative size of currency blocs. The horizontal axis measures the change (except for inflation) of the variable lagged one period. **Lines** display fitted OLS regressions.

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