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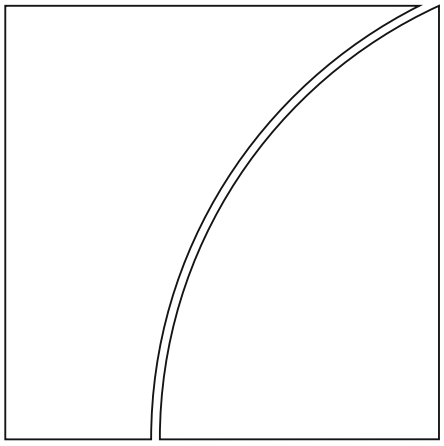

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by Hiro Ito and Robert N McCauley

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Keywords: global imbalances, current accounts, currency zones, international investment positions

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A key currency view of global imbalances

Hiro Ito and Robert N McCauley*

Abstract

This study divides the world into currency zones according to the co-movement of each currency with the key currencies. The dollar zone groups economies that produce well over half of global GDP. The euro zone now includes almost all of Europe and some commodity producers, but remains less than half the size of the dollar zone. The dollar zone share has shown striking stability despite big shifts across zones over time. These include the demise of the sterling zone and the expansion of the DM/euro from northwestern Europe to Europe and beyond.

Global imbalances differ from a currency perspective. In the 2000s, the dollar zone's current account disappeared by the onset of the Global Financial Crisis (GFC), even as the US current account plumbed all-time lows. The dollar zone's net international investment position also reached balance then. Thus, neither flow nor stock readings on the dollar zone supported widespread predictions in the early 2000s of an imminent dollar crash. In fact, most of the long-term widening of current accounts occurred within currency zones, where by construction currency risk is limited.

Our account of the dollar's dominance rests not on the US economy's size but rather on the size of the dollar zone. In such a world, the rise of another large economy poses the question not of relative size but rather of re-alignment of third currencies. What if the renminbi becomes a key currency alongside the dollar and the euro? Already some emerging market currencies are co-moving with the renminbi against the dollar. On current evidence, a renminbi zone would shrink the dollar zone, and widen its current account deficit.

Keywords: global imbalances, current accounts, currency zones, international investment positions

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Contents

1. Introduction

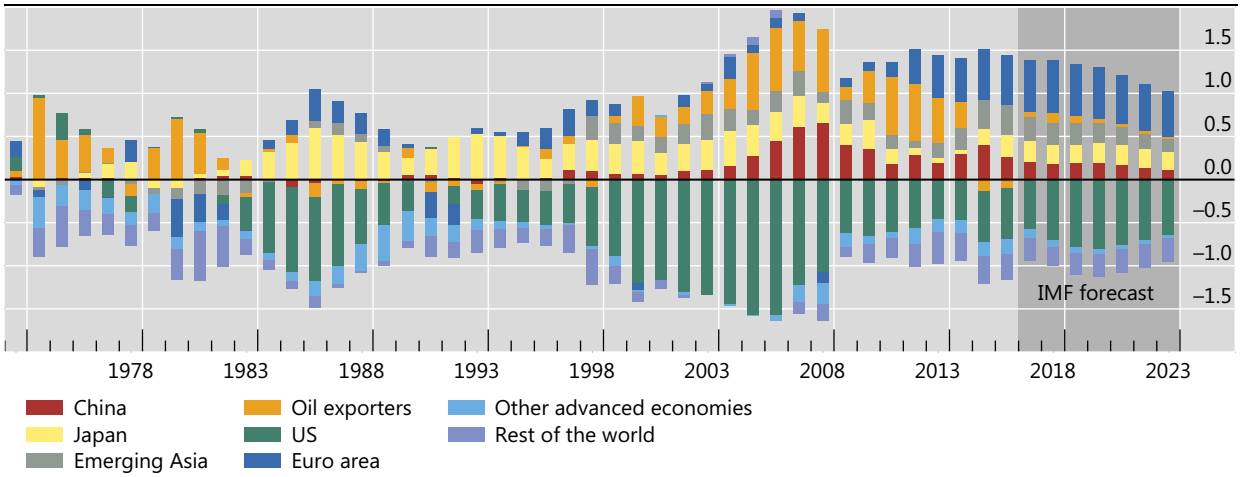
The standard view of global imbalances focuses on current accounts by country. Graph 1 plots surpluses and deficits as positive and negative percentages of global GDP, from the onset of generalised floating currencies in 1973 as far as to 2023 using IMF projections.

Observers take the imbalances to be unsustainable and subject to disorderly and costly "correction" when they reach a substantial share of global GDP. Thus, when the US deficit reached 1% of global GDP and 3% of US GDP in the mid-1980s, major countries negotiated macroeconomic and exchange rate policies to reduce them. When the US deficits reached almost 1½% of global GDP in the mid-2000s, and over 5% of US GDP, leading international economists warned of a sharp decline in the US dollar's value, or even a dollar crisis. Krugman (2007) foresaw the dollar reaching its Wile E Coyote moment, when its lack of fundamental support would become evident and its fall would be rapid (see also Summers (2004), Edwards (2005), Obstfeld and Rogoff (2005) and Setser and Roubini (2005)).

Following Avdjiev et al (2016), we insist that use of the major currencies, notably the dollar and the euro, spans national borders. The burden of our argument is that the US current account cannot be analysed in isolation, but only in relation to that of the dollar zone defined by economies with currencies that are relatively stable against the dollar. In such economies, cross-border investing and borrowing in the dollar incurs less currency risk than doing so in the euro or yen. Indeed, investors show "zone bias" in the currency composition of their portfolios; this reduces currency risk relative to that arising from the global portfolio. Because key currencies anchor other currencies and external portfolios show zone bias, global imbalances require a zone, not national, analysis.

Standard view of global imbalances by country, 1973–2023

As a percentage of world GDP — Graph 1



Sources: IMF, World Economic Outlook.

A historical analogy is the sterling area that came into existence after the pound depreciated in 1931 and persisted into the 1970s (Schenk (2010)). As long as economies like Australia, India, Portugal, Sweden and New Zealand borrowed in

sterling, held official reserves in sterling, and placed private investments in sterling, then the relevant current account for sterling was that of the sterling area, not that of the United Kingdom (Drummond (2008)).

Our argument advances in four steps. Our first step is to use the inductive technique of Haldane and Hall (1991) and Frankel and Wei (1996) and following Kawai and Akiyama (1998, 2000), McCauley and Chan (2014), BIS (2015) and Ito and Kawai (2016), to divide economies among currency zones according to the co-movement of their currencies. An economy forms part of the dollar zone not only if its currency is pegged to the dollar, but also to the extent that its floating currency varies less against the dollar than against euro, yen or sterling. As discussed below, this can result not only from exchange rate policy but also from follow-the-leader monetary policy. It can also arise from market forces, operating against the backdrop of trade links in accord with the gravity model.

Our first major finding is that the dollar zone spans 50-60% of the world economy, not just the US economy's share of a fifth to a quarter. This share is smaller than that of Ilzetzki et al (2017), who find that the dollar zone covers 70%+ in recent years, but similar to the 60% of Tovar and Nor (2018), who use much the same technique as we do. We observe this consistently despite major tectonic shifts. The sterling zone disappeared by the 1970s. And the Deutsche mark and later the euro zone spread out from its core in north western Europe and in recent years gained at least partial adherence from commodity currencies.

Our second step is to allocate each country's current account and international investment position to the 3 or 4 zones according to its currency's loading on the key currencies. We thereby reduce the dimension of global imbalances from N economies to 3-4 currency zones. This paper uniquely takes this step.

Our second major finding is that surpluses elsewhere in the dollar zone have offset the US current account deficit to a varying but often significant extent. As a result, the time profile of the dollar zone's current account very much differs from its US counterpart. In particular, after the Asian financial crisis of 1997-98, growing surpluses in dollar-anchored Asia offset the widening of US deficits. Indeed, on the eve of the Great Financial Crisis (GFC), when many feared a dollar collapse, the dollar zone approached current-account balance. Surpluses and deficits piled up dollar claims and debts that imposed relatively little currency risk.

Our third step is to decompose global imbalances into imbalances *between* zones and those *within* zones. We thereby reinterpret the widening of current accounts before the GFC, which observers took as evidence for the globalisation of portfolios.

Our third major finding is that the long widening of global current accounts before the GFC (Faruqee and Lee (2009)) took place more *within* currency zones than *between* them. Asset and liability positions denominated in the key currency of a zone by definition imply less currency risk, so our finding points to *home bias* yielding to *zone bias* rather than to globalised portfolios. Moreover, since the GFC, the much-remarked narrowing of global imbalances occurred only *within* zones.

Our fourth step is to assess the consequences of the renminbi becoming a key currency, a possibility investigated by Subramanian and Kessler (2013), Fratzscher and Mehl (2014), Eichengreen and Lombardi (2017) and Marconi (2017). For this exercise, we suspend our prior that only the dollar, euro and yen show the trading volumes (means of payment) and use as units of account and stores of value that qualify them as key currencies. We analyse data from 2015-17. In this period, the IMF brought the

renminbi into its Special Drawing Right (SDR), and the Chinese authorities' August 2015 reform of the renminbi fixing marked a structural break in the co-movements between the renminbi and other emerging currencies (McCauley and Shu (2018)).

Our fourth major finding is that the renminbi as a key currency would shrink the dollar zone and widen its current account ceficit. If the dollar's role includes its use as an anchor for the Chinese currency, then the answer to "The international role of the dollar: does it matter if this changes?" (Goldberg (2011)) must be yes.

This study joins recent work that emphasises the global uses of the dollar and their interdependence. As noted, Ilzetzki et al (2017) also identify currency anchors using a different technique; we use their results in a robustness check below. Gopinath and Stein (2018) emphasise dollar invoicing as a driver of the dollar share of official foreign exchange reserves; Ito et al (2015) considered dollar anchoring of currencies as an alternative driver. The emphasis of this body of work on the dollar's external role as anchor or unit of account differs from the conventional approach, as seen in Eichengreen et al (2017), of using the size of the US economy as the driver of the dollar share of official foreign exchange reserves.

The rest of this paper is in five sections. Section 2 estimates the key-currency weights for each non-key currency and then uses them to form currency zones. Section 3 aggregates individual economies' flows and stocks into currency zone current accounts and external positions. Section 4 decomposes global imbalances into those between zones and those within zones. Section 5 reports on the economic consequences of the renminbi taken as a key currency. Section 6 concludes.

2. Estimating currency zones

This section divides the world economy output into currency zones, finding that the US dollar zone covers a fairly consistent 50-60% of world GDP. This consistency obtains even though currencies have tended to shift from the dollar to the euro zone over time. Economies remaining in the dollar zone have tended to grow faster, offsetting its geographic shrinkage.

We first estimate how much each currency co-moves with the US dollar, the euro (or the Deutsche mark (DM) before the euro's introduction in 1999[1]), the Japanese yen and the British pound. Our choice of these key currencies is a prior that reflects their pre-eminent turnover in the central bank Triennial Survey of foreign exchange (BIS (2016)). From 1999 to 2015, they comprised the IMF's SDR, which the renminbi joined in that year. We drop the sterling after the demise of its zone in 1976. (We return to the renminbi in Section 5 below.)

The co-movement of currencies arises from exchange rate policy, monetary policy and underlying trade relations.[2] Policy fixes the Hong Kong dollar and the Bulgarian lev to the dollar and the euro, respectively. Policy also governs the Singapore dollar, managing it against its trade-weighted basket. The authorities may

[1] Before the euro, the SDR included the French franc, suggesting symmetry with the DM. However, their Bretton Woods parity changes and later performance in the ERM point to "DM dominance" (Fratzscher and Mehl (2014)).

[2] See further discussion and references in McCauley and Shu (2018).

intervene in the market less systematically to stabilise the dollar exchange rate, as in Dooley et al (2004). Elsewhere, the setting of policy interest rates with reference to that of a major central bank can link the two exchange rates (Hofmann and Bogdanova (2012); Hofmann and Takáts (2015)). For instance, the Norges Bank explicitly discusses the spread of its policy rate over that of the ECB, and the kroner shares most of the euro's moves against the dollar. Trading relations matter as well: the Mexican peso and the Polish zloty tend to co-move with the dollar and euro, respectively, consistent with each one's predominant trading partner.

The key currency weights for each currency for each time period are estimated using a method based on Haldane and Hall (1991) and Frankel and Wei (1996).[3] The estimated weights indicate the extent that an economy belongs to each zone.

Specifically, we estimate the following:

$$\Delta e_t^{i/\$} = \alpha_i \ + \beta_{i€t}\Delta e_t^{€/\$} + \beta_{i¥t}\Delta e_t^{¥/\$} + \beta_{i£t}\Delta e_t^{£/\$} + \varepsilon_{it} \quad (1)$$

Here, $e_t^{i/\$}$ is the bilateral exchange rate of home currency *i*, against the dollar (USD) while $e_t^{h/\$}$ on the right-hand side of the equation is the exchange rate of the euro (DM before 1999), yen and the British pound against the dollar. The movements of each currency against the dollar on the left-hand side are reduced to a weighted average of the movements of the euro, yen and pound against the dollar on the right-hand side, leaving a residual of idiosyncratic movement. Thus, $\hat{\beta}_{iht}$, the estimated coefficient on the rate of change in the exchange rate of key currency *h* vis-à-vis the US dollar in period *t*, represents the weight of currency *h* in the behavioural basket. The dollar's weight is calculated as $\hat{\beta}_{i\$t} = 1 - \left(\hat{\beta}_{i€t} + \hat{\beta}_{i¥t} + \hat{\beta}_{i£t}\right)$. For a currency pegged to the US dollar (eg the Hong Kong dollar), then $\sum_{h=1}^{H} \hat{\beta}_{ih} = 0$ so that $\hat{\beta}_{i\$t} = 1$. Similarly, for a currency pegged to the euro (eg the Bulgarian lev), $\hat{\beta}_{i€t}$=1. When the Russian authorities monitored and intervened to limit fluctuations in a dollar-euro basket with 45% euro (ECB (2013, p 67)), the regression estimated betas of about one-half for the dollar and the euro.

We estimate weights for the currencies of each of our 172 sample economies (see Appendix 1) for 1970-2017 over rolling windows of 36 months. Hence, the coefficients $\hat{\beta}_{iht}$ vary over time at the monthly frequency. We exclude monthly observations of any currency that depreciates by 10% or more against the dollar to prevent outliers during currency crises from producing spurious weights.[4] The key currencies' weights are set at the value of one. That is, each home country of the key currencies is taken to centre its own currency zone.

We convert the monthly weights into annual weights by following certain rules. In particular, any significantly negative $\hat{\beta}_{iht}$ is taken to be a missing value, while a statistically insignificant negative $\hat{\beta}_{iht}$ is replaced with the value of zero. Likewise, any $\hat{\beta}_{iht}$ that is significantly greater than one is taken to be a missing value, while a $\hat{\beta}_{iht}$ that is insignificantly greater than one is replaced with the value of one. Once estimated betas outside the unit interval are thereby censored to zero or one or taken to be missing values, the average of the months becomes the annual observation.

[3] Haldane and Hall (1991) applied their technique to sterling over a period that included both Bank of England management and relatively free floating, while Frankel and Wei (1996) sought to discover weights in an undisclosed official basket. See also Bénassy-Quéré et al (2006), Ito and Kawai (2016), Kawai and Akiyama (1998, 2000) and Kawai and Pontines (2016).

[4] Relatedly, Ilzetzki et al (2017) exclude countries where annual inflation reaches 40%.

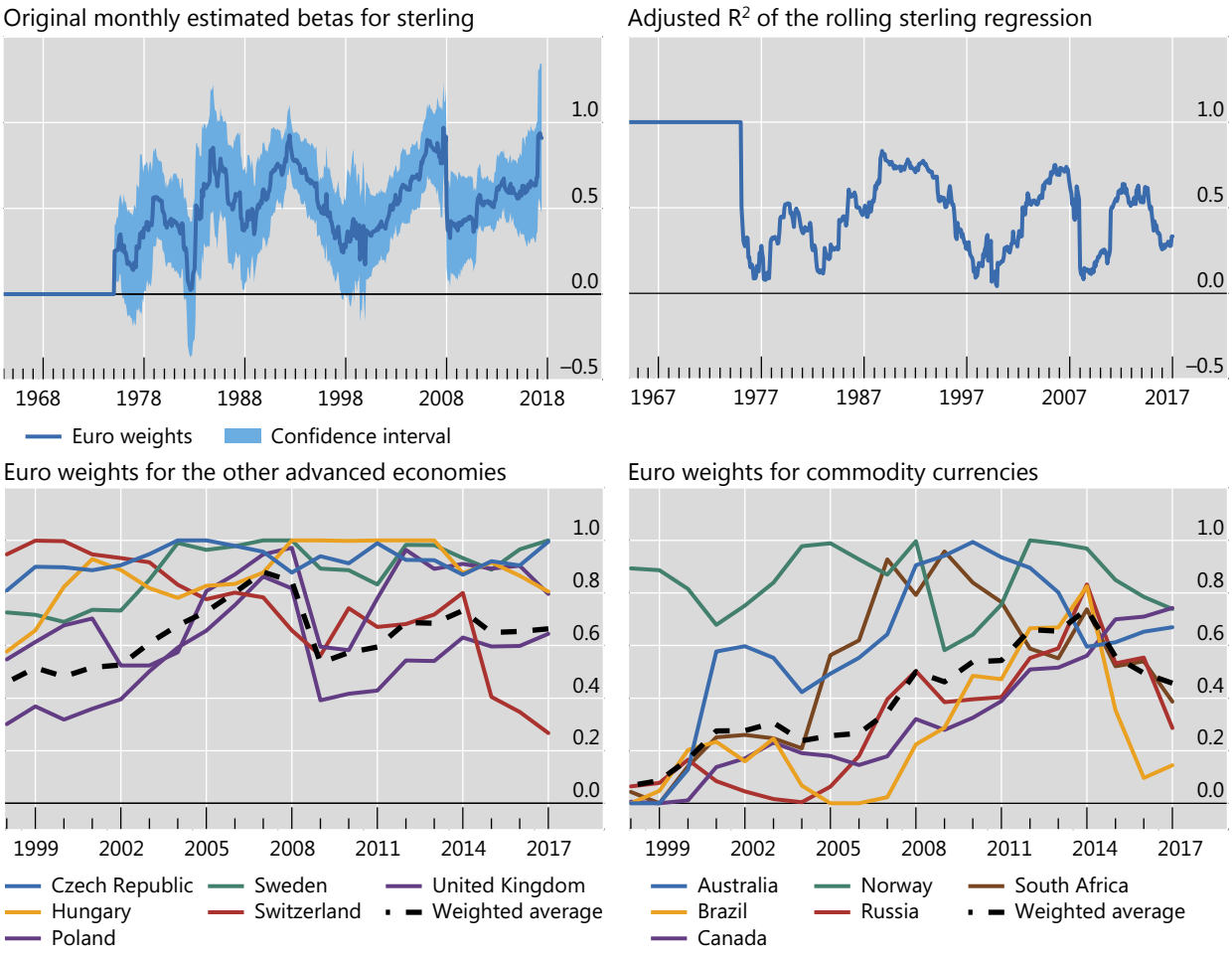
Before turning to the results, it is useful to address three questions that equation 1 provokes. Can the dollar appropriately serve as numeraire? Should only significant estimates be used? Does the monthly frequency of the data influence the results?

Does using the dollar as numeraire change the results? No: Ma and McCauley (2011) demonstrate that the same Frankel-Wei results obtain with the dollar or SDR as numeraire.

In particular, could the choice of the dollar as numeraire spuriously place floating currencies in the dollar zone? Again, no is the answer. Consider sterling, which has floated cleanly, ie without official intervention, since 1992. Graph 2 (upper left-hand panel), which plots the monthly estimated weights for sterling ($\hat{\beta}_{£€t}$), confirms the finding of Haldane and Hall (1991) that sterling's co-movement with the DM against the dollar rose from the mid-1970s to 1989. Since September 1992, the beta on the DM/dollar and then the euro/dollar has varied and averaged 0.57, not far from the share of the euro area in UK trade. Other European floating currencies, the Czech crown, the Hungarian forint, the Polish zloty, the Swedish kroner and the Swiss franc, likewise with the dollar as numeraire do not spuriously land in the dollar zone (Graph 2, lower left-hand panel). In principle, the degree of flexibility and the currency anchoring are separate questions.

Euro/DM weights for sterling, advanced economy and commodity currencies

Graph 2



Sources: IMF, *International Financial Statistics*; authors' estimates.

Should we worry about the significance of the estimates? In principle, yes. Using the dollar as numeraire, sterling's beta on the DM/euro differed significantly from zero except in months when the beta was unusually low, ie less than 0.25. The adjusted R-squared of the regression likewise rose and fell with the euro beta (Graph 2, upper right-hand panel).

The questions of the numeraire and significance are closely related. The literature's use of the Swiss franc appealed to the sense of a small, neutral country and currency, but in fact served to make most of the estimated betas highly statistically significant. With their Swiss franc numeraire, Frankel and Wei (1996) found significant betas for the dollar/swiss franc on two-year intervals in 56 out of 56 cases, and for 8 out of 8 of the East Asian currencies for the full 14-year sample period. Reporting using the dollar as numeraire, they would have shown a significant Swiss franc (proxying the DM) beta (ie (1 - estimated beta) > (2 * standard error) for only 27/56 and 4/8 of the cases, respectively. In short, the choice of a "neutral" numeraire that was quite volatile against the dollar made for significant results.[5]

Our use of monthly data works against significant estimates but reflects a defensible trade-off. Higher frequency data produce more statistical significance. But monthly data allows us, like Tovar and Nor (2018), to analyse all the economies in the IMF's International Financial Statistics in a comparable fashion. No doubt, the identification of turning points where a currency leaves one zone and joins another requires higher frequency data. But monthly data fit with our analysis of global imbalances, a slow-moving macroeconomic process.

Graph 3 shows currency geography as of four dates from the last days of Bretton Woods until now: 1968, 1985, 2001 and 2017. Note that we apportion economies to currency areas in proportion to the weights estimated from equation (1), unlike Ilzetzki et al (2017) in whose analysis the winner takes all.[6] Three big changes over time in currency geography emerge.

First, the sterling zone disappeared in the 1970s. The top panel shows that the mostly Commonwealth countries in shades of red followed sterling's 1967 devaluation. By the mid-1970s, the sterling zone had shrunk to little more than the United Kingdom (Schenk (2009, 2010), Schenk and Singleton (2015)). Moreover, Haldane and Hall (1991), writing at the Bank of England, analysed sterling's exchange rate as determined by the dollar/DM rate, rather than a key currency in its own right, starting in 1976. Accordingly, we drop sterling from our key currencies as of 1976.

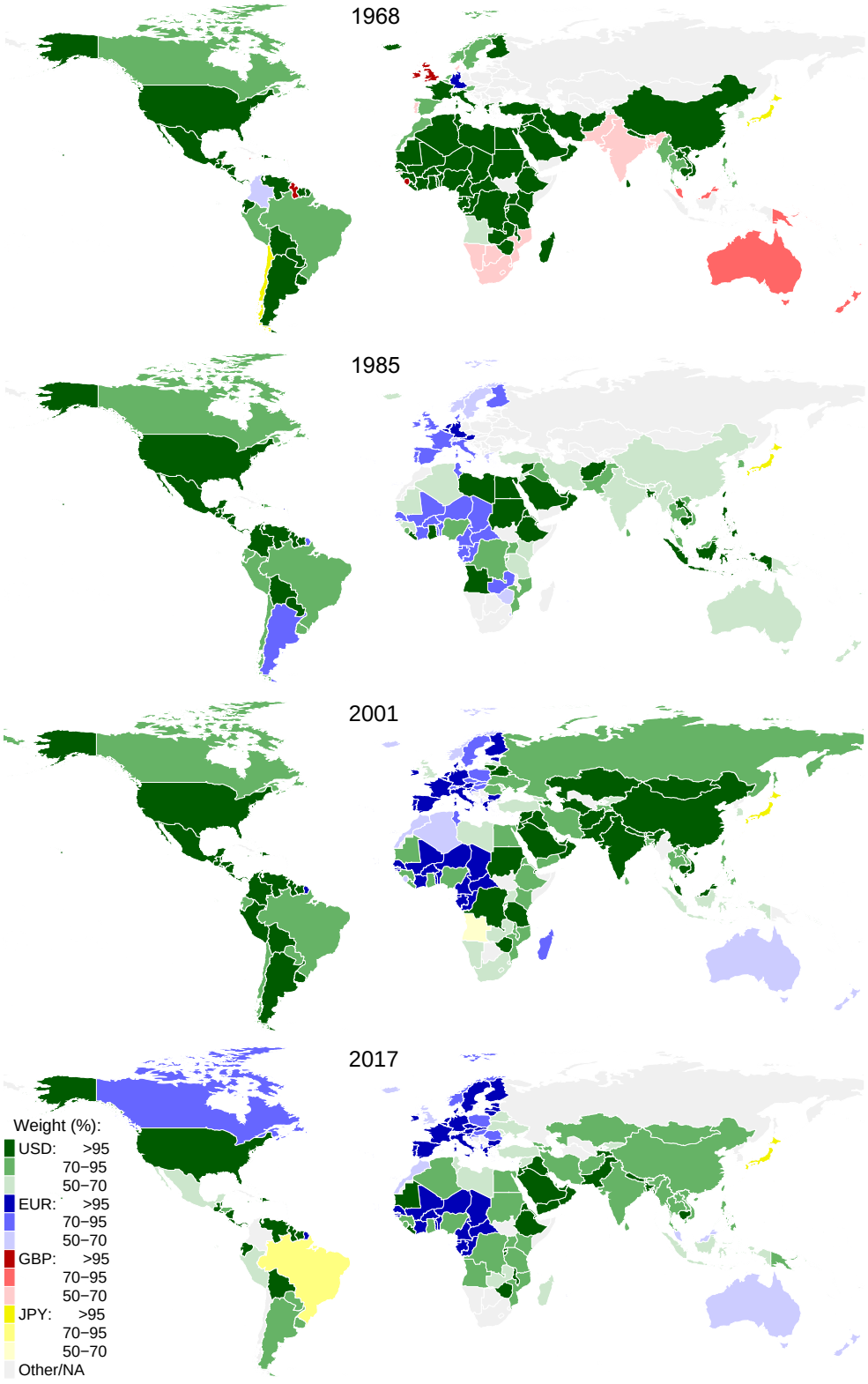
By contrast, we retain the yen in our regressions on the strength of its number three position in currency turnover, even though a yen zone outside Japan never gained much ground. Brazil's partial assignment to the yen zone in 2017 seems odd, but the yen may be proxying for the renminbi (see Section 5 below).

[5] By the same token, using the dollar as numeraire, the absence of a response of the Hong Kong dollar/US dollar rate to the euro/dollar or yen/dollar is itself evidence of its dollar link. Of course, Frankel and Wei (1996) had to construct, because they could not observe, Swiss franc exchange rates. For the Asian currencies they examined, Datastream's Friday London closing data would have padded Asian closing rates, introducing 5 to 8 hours of non-simultaneity in observations of exchange rates. Such errors in variables served to lower parameter estimates, especially using daily data (Frankel and Wei used weekly data).

[6] Tovar and Nor (2018) call the former the "relative" method and the latter the "absolute" method. Appendix 2 compares our approach and that of Ilzetzki et al (2017) to identify currency zones.

Estimated currency zones in 1968, 1985, 2001 and 2017

Graph 3



The boundaries shown on this map do not imply acceptance by the BIS.

Sources: IMF, *International Financial Statistics*; authors' estimates.

Second, the DM and then the euro zone solidified its hold in Western Europe and spread eastward in the 1990s and 2000s. After the fall of the Berlin Wall, the authorities managed the Czech crown and Polish zloty against baskets including the dollar and the DM (McCauley (1997)). As these currencies moved to floating, their economies integrated with the euro area, and their monetary policies reacted to the ECB's, they joined the euro zone. The Russian rouble may be on the same path.

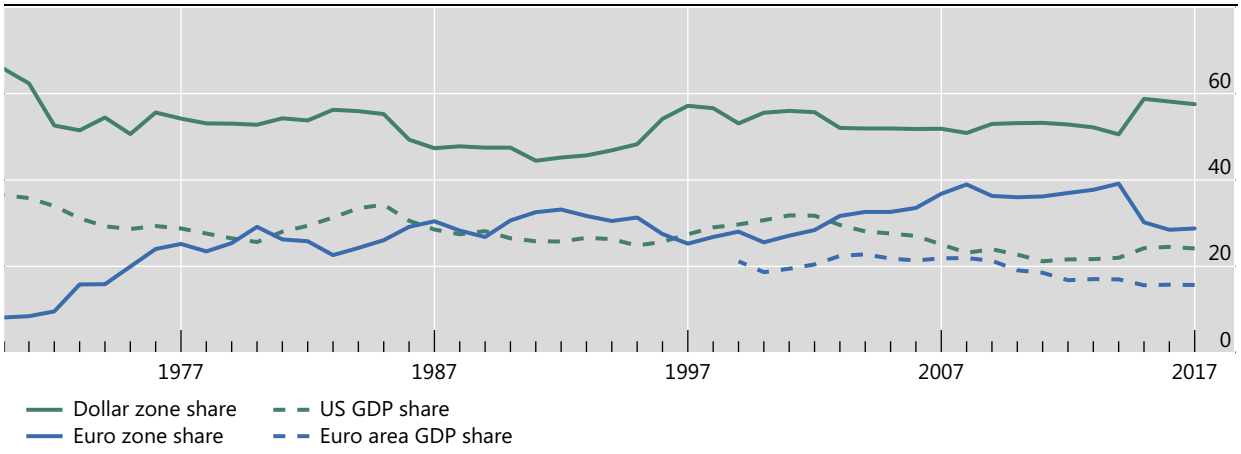
Third, starting in the late 1990s, the commodity currencies tended to move the dollar zone to a more intermediate position between the dollar and the euro. Graph 2, lower right-hand panel, shows this for the Australian, Brazilian, Canadian, Norwegian, Russian, and the South African currencies. Timing and extent vary but the overall rise on the euro's estimated coefficient over 20 years is striking.[7]

We conjecture that the co-movement of commodity currencies with the euro/dollar reflects such co-movement by commodity prices. Intriguingly, "fair value" regressions for commodity currencies run by central banks and outside economists assign powerful roles to the terms of trade, essentially commodity prices (Kohlscheen, et al (2017)). Could it be that the euro's introduction enlarged the DM zone, and thereby enhanced the euro's influence on commodity prices and thus on commodity currencies? The answer lies outside the scope of this work.

Combining currency geography and GDP, the dollar and euro zones have more heft than the US and euro area economies, respectively (Graph 4). In each case, growth of the share in the rest of the zone has offset the shrinkage of the US or euro area economy's share of global GDP.[8]

Currency zone and home share in global GDP: dollar and euro

As a percentage of world GDP — Graph 4



Sources: IMF, International Financial Statistics and World Economic Outlook; authors' estimates.

Given the geographical extension of the DM/euro zone evident in Graph 3, it is *prima facie* puzzling that the dollar zone has retained a 50-60% share of global activity. The puzzle goes away when one recalls unbalanced growth. East Asia has

[7] The euro weight of the Russian rouble and South African rand has recently declined to below 0.5 (unshaded in Graph 3) with a rising yen weight.

[8] As noted, the yen zone, not shown, never gained much ground, and the Japanese economy's own global world GDP share has shrunk.

grown faster from a starting point in the dollar zone and, the Singapore dollar apart, East Asian currencies have moved only gradually into an intermediate position between the dollar and the euro.

3. Currency zone current accounts and external positions

This section first presents and discusses current accounts of the key currency zones. Second, it presents zone net international investment positions. Third, it draws the implications of IMF forecasts through 2023 for the current accounts of the four currency zones.

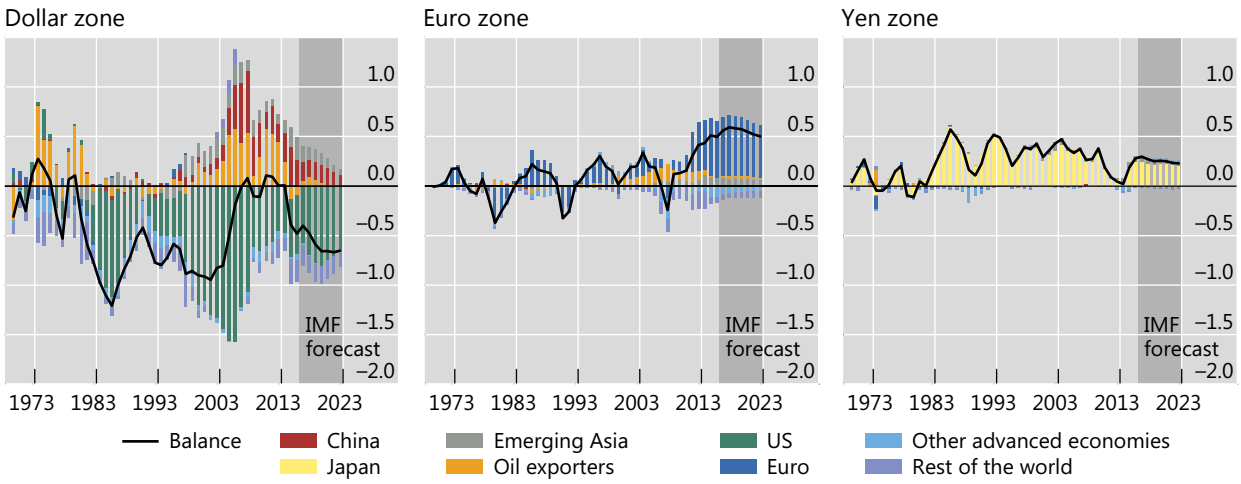
3.1 Currency zone current accounts

Using the estimated weights for country *i* in year *t* for currency zone *h* as $\hat{\beta}_{iht}$, where $\sum_{h=1}^{H} \hat{\beta}_{iht} = 1$, the current account balance of country *i* divides into the four key currency zones (ie $CAB_{it} = \sum_{h}^{H} \hat{\beta}_{iht} \cdot CAB_{it}$). For currency zone *h*, country *i*'s contribution to the currency zone current account is $\hat{\beta}_{iht} \cdot CAB_{it}$.

Graph 5 plots as percentages of world GDP at market values the contribution to the dollar (left-hand panel), euro (centre panel) and yen (right-hand panel) zones of the current account balances of China, Japan, the United States, the euro area, other advanced economies, oil exporters, emerging Asia, and the rest of the world (ROW).[9]

Currency zone current account, 1973–2023

As a percentage of world GDP — Graph 5



Sources: IMF, International Financial Statistics and World Economic Outlook; authors' estimates.

[9] We follow the IMF's definition of country groups. Appendix 1 lists our sample countries.

That is, $\frac{\widehat{\beta}_{iht} \cdot CAB_{it}}{WorldGDP_t}$ for the just-named individual major country *i* and $\frac{\sum_j^J \widehat{\beta}_{jht} \cdot CAB_{jt}}{WorldGDP_t}$ for the 5 country groups composed of J_1 through J_5 economies.[10] In each panel, the solid black line indicates the current account balance of the respective currency zone.

Before turning to the results, it is worthwhile to consider whether our zone current accounts reflect the myriad debatable choices that Section 2 describes or whether a very different method gives the same result. For instance, what if we use the "winner take all" assignment of currencies to zones of Ilzetzki et al (2017), rather than our proportional, Frankel-Wei assignment? Appendix 2 finds that the dollar zone current account based on one approach is nearly identical to that on the other.

We take away three observations about the currency zone current account balances:[11] the contrast between the dollar zone and US current accounts; the profile of the euro zone balances; and the contrast between current account adjustment to crises in the dollar and euro zones.

First, the dollar zone current account (Graph 5, left-hand panel, black line) contrasts sharply with the US current account (the blue bars) after the late 1990s . *US current account deficits* started in the early 1980s and they widened from 2001 through 2006, averaging 1.2% to 1.6% of world GDP. Then international economists started sounding the alarm about the sustainability of the US current account deficit, and the risk of a dollar plunge and a costly adjustment.

However, the *dollar zone's current accoun*t flattened out at less than 1% of global GDP after the Asian financial crisis and subsequently narrowed to approach balance in 2007 on the eve of the GFC.[12] In the years around the GFC, surpluses in China, elsewhere in emerging Asia and in oil exporters offset the US current account deficits.[13] Thus, while the US current account reached its all-time nadir in 2006, the dollar zone current account reached near balance. So-called global imbalances amounted to imbalances *within* the dollar zone. There, investors and borrowers both show dollar bias in their portfolios (see Section 4), rendering less likely a sudden stop in response to heightened perception of currency risk.

With the dollar zone near current account balance on the eve of the GFC, the rapid appreciation of the dollar in 2008-09 at the height of the GFC was less surprising. Moreover, as we demonstrate below, the zone's international investment position was also near zero.

Second, the euro zone (and before it, the DM zone) has tended to run surpluses except after the second oil shock and German re-unification (Graph 5, centre panel). That said, the scale of its recent surpluses has no precedent.

Third, the current account adjustment in the wake of the recent euro area sovereign crisis differs from the pattern observed after crises in the dollar zone. There, whether the crisis hits the periphery, as in 1982 and 1997, or the centre, as in 2007-08,

[10] For 2017-2023, we apply the 2017 currency weights to IMF forecasts of current account balances.

[11] Since we do not count sterling as a key currency after 1975, we omit it.

[12] Current account balances are subject to errors and omissions, so that current accounts in Graph 3 do not add up to zero. Currency zones' balances may also be affected by errors and omissions.

[13] Contrast to the savings glut of Bernanke (2005), a non-monetary model with unspecified source of Asian preference for US investment.

current accounts tend to redistribute themselves within the dollar zone. Thus, when commercial banks cut off credit to Mexico, Brazil and Argentina in 1982, a US current account deficit appeared and widened as the counterpart to the narrowing Latin American current account deficits. While the US current account hardly contributed to the dollar zone deficit before 1982, by 1984-85, the US current account deficit had widened to account for almost its entirety. Again, when commercial banks cut off credit to Thailand, Indonesia, Malaysia and Korea in 1997-98, the US current account deficit widened as the East Asian current accounts swung into surplus.[14] And when commercial banks and bond investors cut off credit to highly leveraged US households in 2007-08, there were again offsets within the dollar zone. In particular, narrowing surpluses in East Asia, especially China, and of oil-exporting countries accompanied a substantial narrowing of the US deficit even while the dollar zone remained near balance. In sum, major crises in the dollar zone seem to lead to a redistribution of current accounts *within* the zone.

No such pattern holds in the euro zone in recent years. After commercial banks cut off borrowers in peripheral Europe in 2011-12, their swing from deficit to surplus met no offset in either a narrowing of the surplus in core Europe or a widening of the deficit in the euro zone outside the euro area (ie the aggregate in Norway, Sweden, Poland, Czech Republic, Hungary, and others). As a result, the euro zone's current account swung into an unprecedented surplus of 0.5% of world GDP.

3.2 Currency zone investment positions

Deriving in like manner international investment positions for currency zones, we find a dollar zone *position* that reinforces the message above of near balance in the dollar zone current account *flow* in 2007. Valuation effects apart, current account balances cumulate into net investment positions. Net investment positions – stocks rather than flows – matter because portfolio theory points to the interaction of home bias and the distribution of wealth. Even as the dollar zone ran a balanced current account in the mid-2000s, a large international investment *liability* could have left it vulnerable to changes in investors' expectations or risk aversion.

Our starting point is the conventional net investment positions of the same countries and country groups as above (Graph 6, based on Lane and Milesi-Ferretti (2001, 2007 and 2017)). Owing to current account deficits, the United States became a debtor country in 1985 (strictly speaking a country with net international investment liabilities, including equity positions). It has since unevenly accumulated larger net liabilities, which have reached over 10% of global GDP. As in Tille (2003), the US borrows dollars to invest in assets denominated in other currencies, so the depreciation of the dollar from 2002-10 reduced its net liabilities, despite ongoing deficits. The dollar's appreciation since then has boosted US liabilities. In aggregate, what became the euro area is reported to be a debtor since German re-unification in the early 1990s, but euro area surpluses after the sovereign credit strains of 2011-12 have brought the reported position to near zero (Fidora and Schmitz (2018)).[15]

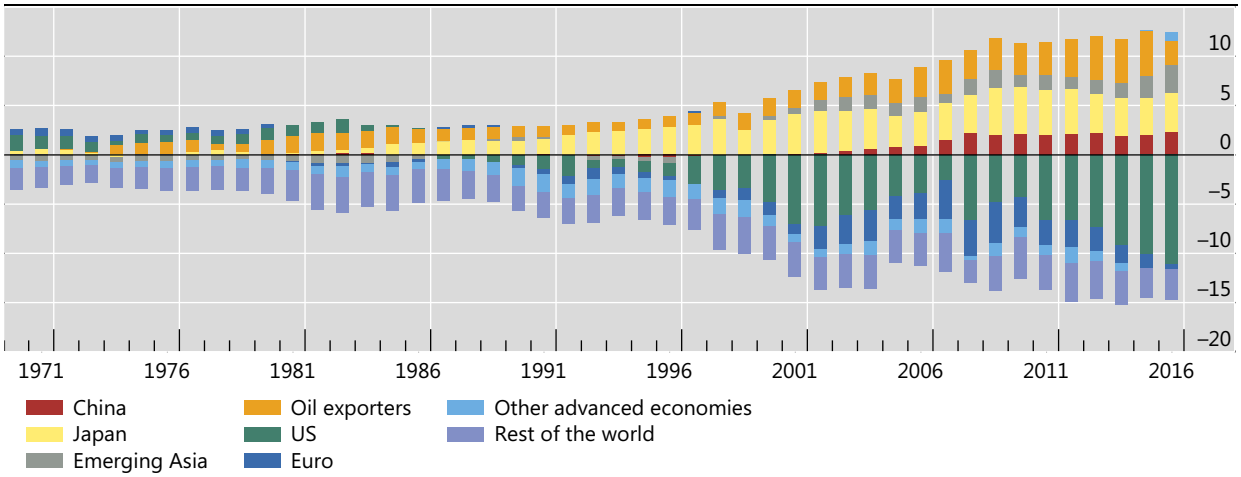
[14] Gruber and Kamin (2007) explain East Asia's current account surpluses after 1997 with a crisis dummy.

[15] Milesi-Ferretti et al (2010) suggest that undercounting of euro area holdings of portfolio equity (ie, mutual funds) in Luxembourg and Ireland result in understatement of the euro area international investment position.

Net international investment position by country, 1970–2016

As a percentage of world GDP

Graph 6



Sources: Lane and Milesi-Ferretti (2017); IMF, *World Economic Outlook*; authors' estimates.

To some extent, Japan's position provides a mirror image of that of the United States, as its creditor position has unevenly increased since the early 1980s. Oil exporters have been persistent creditors since the first oil shock of 1973, and their positions have increased, especially in the second half of the 2000s. China joined the creditor countries in the mid-2000s, but the scale of its position has not reached that of Japan.

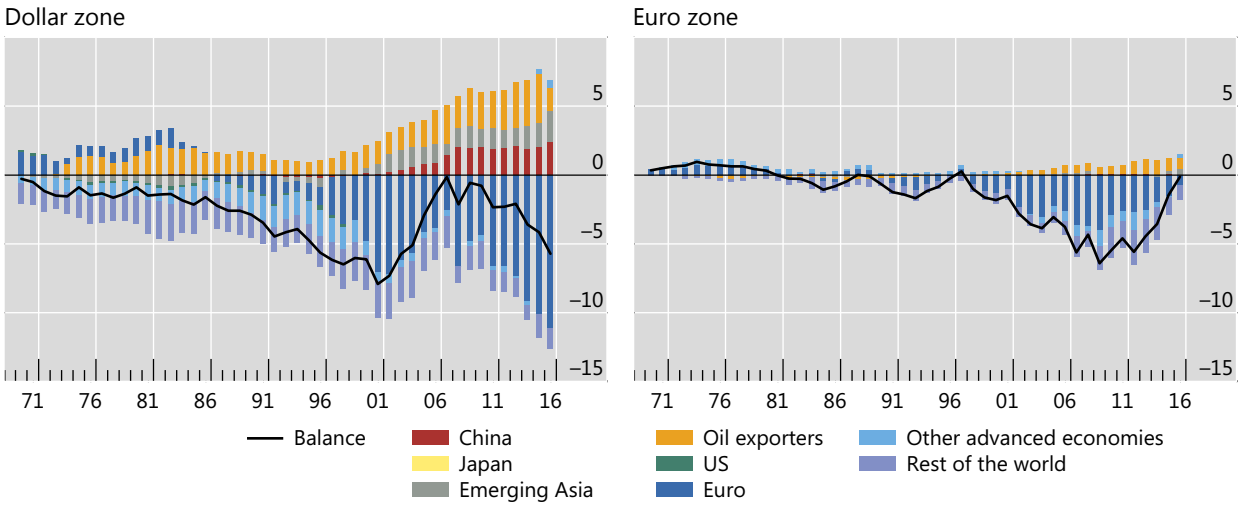
Net investment positions look different on a zone basis for the dollar but not for the euro. The dollar's role as a funding currency for the rest of the world is evident in the dollar zone's negative international investment position in the mid-1970s and into the 1980s, even before the United States incurred net liabilities. More recently, after a long deterioration in the 1980s and 1990s, the dollar zone's net international investment position was approaching balance before the GFC (Graph 7, left-hand panel). This reflected not only the dollar valuation effect just described, but also the rapid growth of China's net international assets. Thus, around the GFC, economies with currencies that were relatively stable against the dollar in Asia and the Middle East had net international *asset* positions that offset the US net international *liability*. The dollar zone's net investment position offers another piece of evidence that suggests that the emphasis on global imbalances at the national level before the GFC might well have been misplaced.

The dollar zone provides a new perspective on the evolution of international asset positions in the crisis year of 2008. Against prominent economists' predictions, the outbreak of the acute phase of the GFC saw the dollar appreciate sharply (McCauley and McGuire (2009)). This caused the US net international liabilities to balloon (Benetrix et al (2015)), providing what Gourinchas et al (2010) call insurance to the rest of the world in times of stress. A key observation in Graph 7 is that the US position deteriorates in 2008 (blue bar lengthens) by more than that of the dollar zone (decline in black line). The difference shows that members of the dollar zone receive much of the payout on Gourinchas et al's disaster insurance. For instance, the appreciation of the price of US Treasury bonds in 2008 lifted the value of China's reserve assets.

Net investment position by currency zones, 1970–2016

As a percentage of world GDP

Graph 7



Sources: Lane and Milesi-Ferretti (2017); IMF, *World Economic Outlook*; authors' estimates.

Since 2010, the US and dollar zone have seen parallel developments. With the levelling off of China's surplus after the GFC, the deterioration in the US net international position between 2010 and 2016 has found reflection in the dollar zone net investment position.

While the US and dollar zone positions generally differ, the euro zone's position looks more like that of the euro area proper. Both the euro zone and euro area positions have approached balance. In effect, Norway and Sweden's creditor position is more or less balanced against net liabilities in central and eastern Europe and elsewhere.

3.3 Outlook for currency zone current accounts

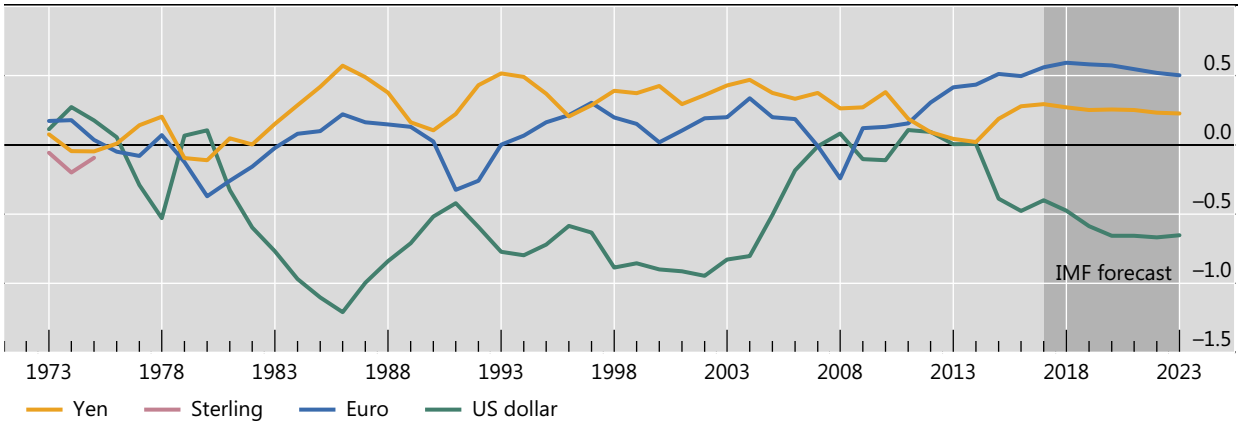
Looking forward to 2023, the April 2018 projections of the IMF (2018) of current accounts, along with unchanged currency geography, point to a dollar zone current account on a sharply downward path. This outcome reflects a projected modest widening of the US current account deficit at the centre. It also reflects a progressive narrowing in the current account surpluses of mainland China and a disappearance of those of Southeast Asia. Oil exporters, which, other than Russia and Norway, mostly remain in the dollar zone, are projected to enjoy a near-term widening of their surpluses, but then to experience their narrowing, as the oil price subsides and spending catches up with revenues. Taken together, these projections take the dollar zone's projected current account deficit to over 0.5% of world GDP, last seen in the early 2000s (Graph 8).

For its part, the euro zone current account surplus is projected to continue to widen through 2019, before narrowing slightly into 2023. The euro zone surplus at over a half percent of global GDP is far wider than the equivalent surpluses of the DM zone before 1999 or of the euro zone in the euro's early years. The yen-zone (essentially the Japanese) current account surplus is forecast to dwindle over time from 0.25% of global GDP.

Currency zone current account balances, 1973–2023

As a percentage of world GDP

Graph 8



Sources: IMF, International Financial Statistics and World Economic Outlook; authors' estimates.

Thus, in a few years we may look back on the period when the dollar zone current account was near balance around the GFC as exceptional. *If* the IMF's projections prove accurate and *if* currency zones are stable, dollar zone and euro zone current accounts could figure in the dynamics of the dollar/euro exchange rate as they mostly have not since the euro's introduction.

4. Decomposing global imbalances: across vs within zones

This section decomposes global current accounts into those across zones and those within zones. This decomposition sharply qualifies two widely accepted propositions.

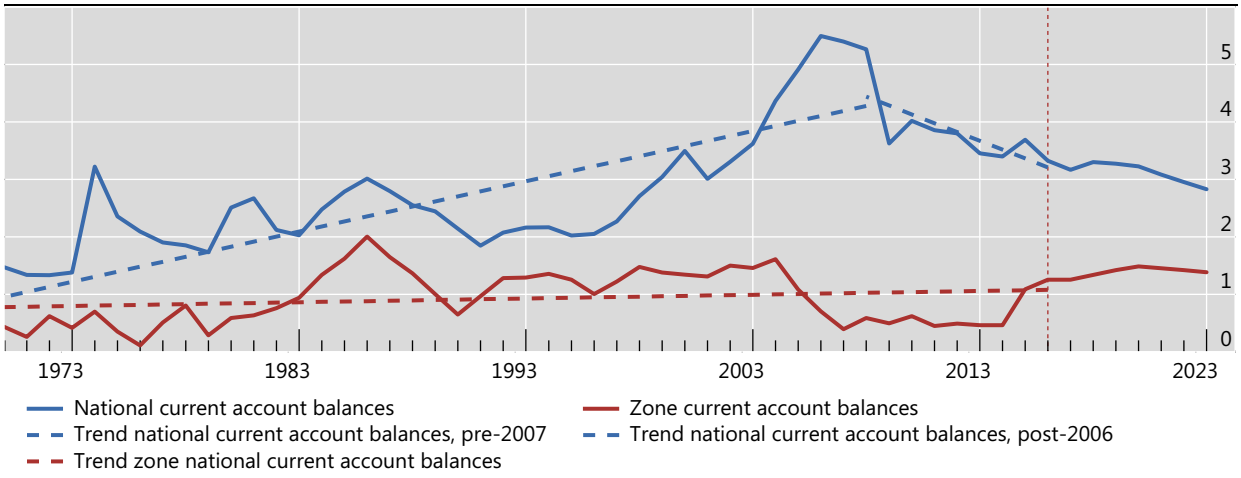
The first is that, at least before the GFC, home bias constrained global portfolios less and less over time. Greenspan (2003) famously mused that an "expanding universe" of portfolios subject to waning home bias had made it far easier for countries to run current account deficits. Faruqee and Lee (2009) found that the dispersion of current accounts had trended higher in the 45 years, 1960-2005. In particular, the sum of absolute values of current accounts as a ratio of global GDP had risen from 1.5% to over 5% (Graph 9, solid blue line). Through 2008, the trend line (dashed blue line) showed aggregate current accounts had widened at the rate of 0.88% of global GDP per decade (*p*-value 0.000).

The proposition was correct, but only a half-truth. There was hardly any trend towards wider imbalances *across* currency zones. In Graph 9 the red line shows the sum of the absolute values of currency zone current accounts as a share of global GDP. These show a statistically insignificant trend at the rate of only 0.065% per decade (*p*-value 0.191).

The other proposition revealed as half-true is that global imbalances have trended down since the GFC. Updating Faruqee and Lee (2009) through 2016, aggregate current accounts have sharply contracted since 2006. In particular, they have trended down at the rate of 1.54% per decade. This trend has seemed to support the idea that global imbalances have diminished.

Aggregate absolute value of current account balances

Sum of absolute value of current account balances as a percentage of world GDP — Graph 9



Sources: IMF, International Financial Statistics and World Economic Outlook; authors' estimates.

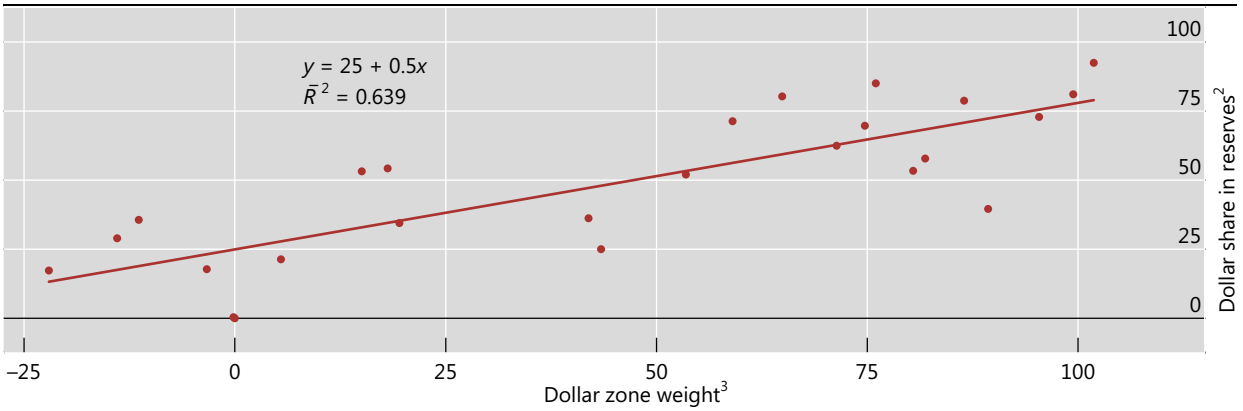
From the perspective of currency zone current accounts, however, current account imbalances have not contracted since 2006. If anything, there is a trend towards larger absolute values of cross-zone imbalances.

The concentration of imbalances within zones is consistent with zone bias in portfolios, as shown in BIS international banking and international securities data. In particular, dollar zone investors favour the dollar in investing and borrowing abroad.

The line-up of portfolios with currency zone membership is evident in the limited national data on official foreign exchange holdings and in broadly available data on international bank deposits and loans as well as on international bond issuance. For 25 economies that disclose at least the US dollar share of official foreign exchange reserves, the co-movement with the dollar of the respective domestic currency accounts for two thirds of the variation in the dollar share of reserves (Graph 10). Thus, dollar zone economies in Latin America and East Asia mostly accumulate dollar

The dollar's pulling power influence FX reserve allocation[1]

Graph 10



[1] Country-specific dollar zone weights plotted against the dollar's share in the country's FX reserves, 2014. [2] For Colombia, New Zealand, Philippines and Turkey, earlier data used. [3] Average over four years.

Sources: National data; BIS calculations as compiled by McCauley and Chan (2014).

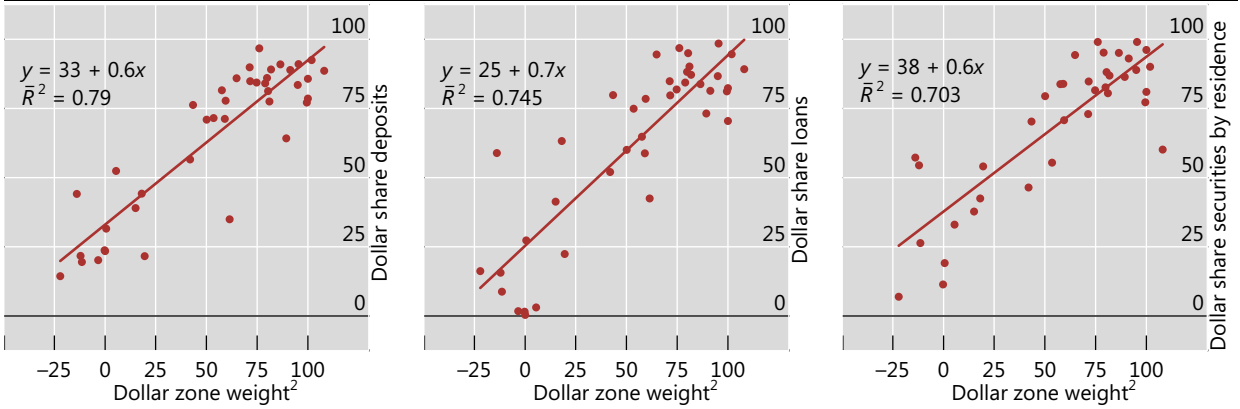
reserves. Economies around the euro area hold lower shares of dollars in their reserves.

For broader samples covering all sectors, the co-movement of domestic currencies with the dollar lines up with the currency composition of external assets and liabilities. In particular, dollar zone members hold a larger dollar share in their cross-border holdings of bank deposits (Graph 11, left-hand panel). They owe a larger dollar share in their cross-border bank loans (centre panel). And they owe a larger dollar share in their international bonds outstanding (right panel).

Why are these relationships so strong? One interpretation emphasises that investing and borrowing in the key currency of one's zone leads (by construction) to a lower variance of returns, on external assets or liabilities. Zone bias economises on currency risk in an international portfolio.

On this view, the Faruqee and Lee (2009) finding does not point to home bias yielding to truly global portfolios. Instead, home bias has yielded to zone bias.

The dollar's pulling power influences private sector portfolios[1] Graph 11



[1] Country-specific dollar zone weights plotted against the share of bank deposits, bank loans and residents' debt securities in the corresponding foreign currency totals, 2014. Includes the public sector. [2] Average over four days.

Sources: National data; BIS, international debt securities and locational banking statistics; BIS calculations.

5. The renminbi as a key currency?

As noted above, several studies have investigated whether the renminbi is becoming a key currency in the sense of anchoring currencies that share its movements against (other) major currencies. The end-November 2015 IMF decision to include the renminbi in the SDR as of October 2016 gave impetus to such studies. Moreover, in the lead-up to that decision, the reform of the renminbi's daily fixing in August of 2015 took an important step. It seems to have marked a break point, with a greater degree of co-movement observed after then (McCauley and Shu (2018)). What might be the effect of the renminbi on key currency geography and thereby on the key currency view of global imbalances?

There are good reasons to judge that it is too soon to tell. Daily moves of the renminbi remain tethered to the dollar. Its annualised volatility remains in the low single digits, well below the high single digits or double-digits of euro/dollar and yen/dollar. In BIS (2016) the renminbi's share of turnover of 4% still lagged well

behind not only that of the dollar or the euro but also the yen (22%), and sterling (13%).[16] On this view, consideration of the renminbi as a de facto key currency should wait until the results of the 2019 or even the 2022 survey.

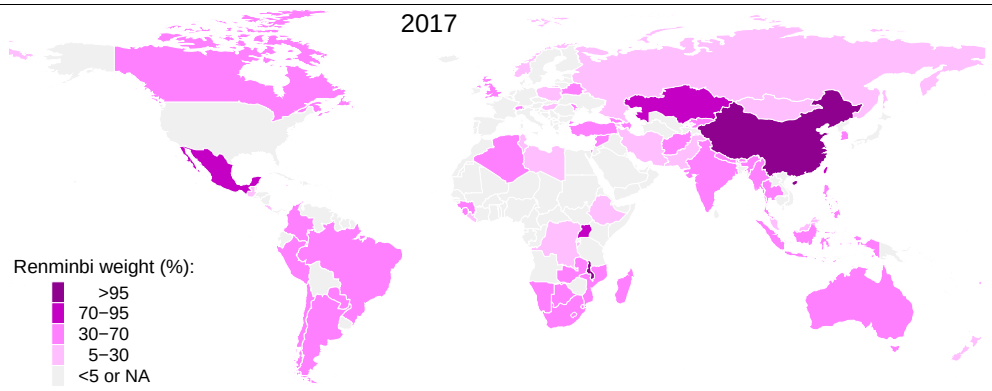
That said, this section re-runs equation (1) using the euro, yen *and renminbi* as regressors for the years 2015-2017, and, *mutatis mutandis*, following our procedure above. Since this exercise treats the renminbi as a key currency, it removes Chinese GDP, its current account and international investment position from the dollar and euro zones. The point is to measure the extent to which non-key currencies move with the renminbi against the dollar, euro and yen. To the extent that they do, their GDP, current accounts and investment positions are also removed from the dollar and euro zones and allocated to the posited renminbi zone.

Based on 2015-17 exchange rates, many neighbouring and commodity currencies share most of the renminbi's movements against the dollar. We extend the analysis beyond Asian currencies, like Tovar and Nor (2018). Not only major Asian currencies, like the Korean won, Taiwan dollar, Indian rupee, and Indonesian rupiah but also commodity currencies share more than half of the renminbi's movements against the dollar. In particular, these include the Brazilian real, the Colombian and Mexican pesos and the South African rand, as well as many minor Asian and African currencies for a total of 24 such currencies. Tovar and Nor (2018) find 29 currencies co-moving with the renminbi, but characterise it as not an East Asian grouping but rather as a grouping around the BRICS. We *do* find an important Asian grouping and that the Russian rouble *does not* share renminbi's moves against other key currencies.

On the prior assumption that the renminbi is a key currency, this evidence suggests a sizeable renminbi zone (Graph 12). One caveat is that the August 2015 observations figure prominently in this result, which can be seen as an outlier problem. Then, the Chinese authorities reformed the renminbi's daily fixing, and the largest monthly change to that date occurred. That month, emerging market currencies co-moved with the renminbi against the other key currencies. However, one could argue that the renminbi move represented an autonomous policy move to which other currencies responded and thus that the observations are not outliers to be discarded.

Renminbi zone

Graph 12



The boundaries shown on this map do not imply acceptance by the BIS.

Sources: IMF, *International Financial Statistics*; authors' estimates.

[16] IMF (2015) found that the renminbi lagged on share of global bank deposits and bonds as well.

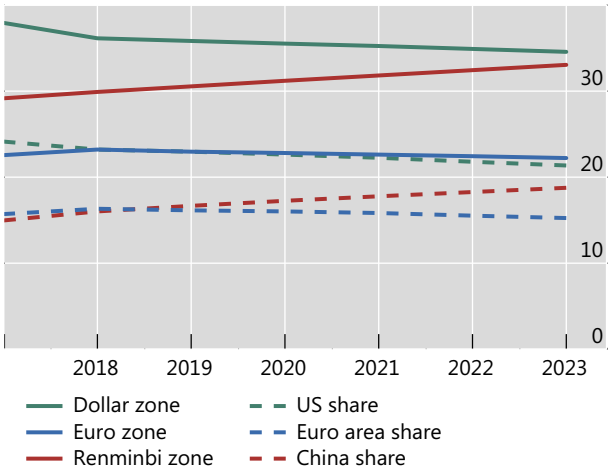
Altogether the GDP share of the renminbi zone in 2017 is about 30% of global GDP at market prices (Graph 13, left-hand panel). This compares to Tovar and Nor (2018) at 15.4%, using a variant of Frankel Wei. On the 2015-17 evidence, at least, the renminbi zone comes more at the expense of the dollar zone (-20%) than of the euro zone (-5%). Taken at face value, this evidence points to an unequal bipolar world be giving way to an unequal tripolar world (Tovar and Nor (2018)). On IMF growth projections and unchanged currency geography, unequal growth would take the renminbi zone to parity with that of the dollar zone by 2023.

Turning now to currency zone current accounts, at least based on 2015-17 exchange rates, the dollar zone would run a larger current account deficit in this tripolar world (Graph 13, right-hand panel). In fact, in the years through 2020, the dollar zone current account would resemble the US current account. On this evidence, the formation of a renminbi zone would remove surpluses from the dollar zone.

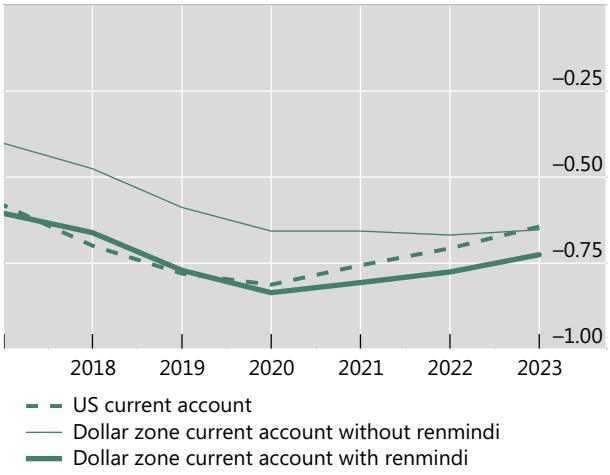
Effect of renminbi as a key currency

As a percentage of world GDP — Graph 13

GDP shares for dollar, euro and renminbi zones



Current account for dollar zone with and without renminbi as key currency



Sources: IMF, International Financial Statistics and World Economic Outlook; authors' estimates.

6. Conclusions

International finance, in general, and global imbalances in particular, look different when the key currencies rather than economies are taken to be the unit of analysis. Contrary to the very wide, and to many worrisome, US current account deficit in the mid-2000s, we have shown that the dollar zone current account was near balance.[17] Countries whose currencies co-moved with the dollar, whose investors therefore saw dollar investments as posing relatively low exchange-rate risk, were running current account surpluses that offset the US deficits.

[17] But see Borio and Disyatat (2011) for an argument that the emphasis on current account imbalances as a global risk is misplaced.

Looking forward, IMF projections imply that the dollar zone will return to the sizeable deficits that were last seen in the mid-1980s. On this view, the dollar zone current account deficit would be larger than it has been since the euro came into existence 20 years ago.

On current evidence, if the renminbi becomes a key currency, it would carry a substantial share of global GDP out of the dollar zone. This would leave the dollar zone deficit all the wider.

Appendix 1: Country list (172 economies)

China
Japan
United Kingdom
United States
Euro area
Austria
Belgium
Cyprus (2008-)
Estonia (2011-)
Finland
France
Germany
Greece (2001-)
Ireland
Italy
Latvia (2014-)
Lithuania (2015-)
Luxembourg
Malta (2008-)
Netherlands
Portugal
San Marino
Slovakia (2009-)
Slovenia (2009-)
Spain
Other advanced economies
Australia
Canada
Denmark
Cyprus
Estonia
Greece
Iceland
Israel
Latvia
Lithuania
Malta
Slovakia
Slovenia
United Kingdom
Emerging Asia
Hong Kong
Indonesia
India
Korea
Malaysia
Philippines
Singapore
Taiwan
Thailand
Vietnam
Oil Exporters
Algeria
Angola
Bahrain
Brunei
Congo, Rep.
Gabon
Iran, Islamic Rep.
Iraq
Libya
Nigeria
Norway
Oman
Qatar
Saudi Arabia
Trinidad and Tobago
Turkmenistan
United Arab Emirates
Venezuela, RB
Other Countries
Afghanistan
Albania
Antigua and Barbuda
Argentina
Armenia
Aruba
Azerbaijan
Bahamas, The
Bangladesh
Barbados
Belarus
Belize
Benin
Bhutan
Bolivia
Botswana
Brazil
Bulgaria
Burkina Faso
Burundi
Cote d'Ivoire
Cambodia
Cameroon
Cape Verde
Central African Rep
Chad
Chile
Colombia
Comoros
Congo, Dem. Rep.
Costa Rica
Croatia
Djibouti
Dominica
Dominican Rep
Ecuador
Egypt, Arab Rep.
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Fiji
Gambia, The
Georgia
Ghana
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hungary
Jamaica
Jordan
Kazakhstan
Kenya
Kiribati
Kuwait
Kyrgyz Republic
Lao PDR
Lebanon
Lesotho
Liberia
Madagascar
Malawi
Maldives
Mali
Mauritania
Mauritius
Mexico
Micronesia, Fed, States
Moldova
Mongolia
Morocco
Mozambique
Myanmar
Namibia
Nepal
Nicaragua
Niger
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Poland
Romania
Russian Federation
Rwanda
Sao Tome and Principe
Samoa
Senegal
Seychelles
Sierra Leone
Solomon Islands
South Africa
Sri Lanka
Sudan
Suriname
Swaziland
Syrian Arab Republic
Tajikistan
Tanzania
Togo
Tonga
Tunisia
Turkey
Uganda
Ukraine
Uruguay
Vanuatu
Yemen, Rep.
Zambia
Zimbabwe

Appendix 2: Ilzetzki, Reinhart and Rogoff's dollar zone current account

Although Ilzetzki et al (2017; henceforward, IRR) share with us the goal of identifying currency zones, their approach differs from ours in several ways. First, and most importantly, IRR assign each currency a single, dominant anchor currency for each country-year. In effect, IRR let the "winner take all". We generate continuous weights between one and zero for each candidate anchor currency.

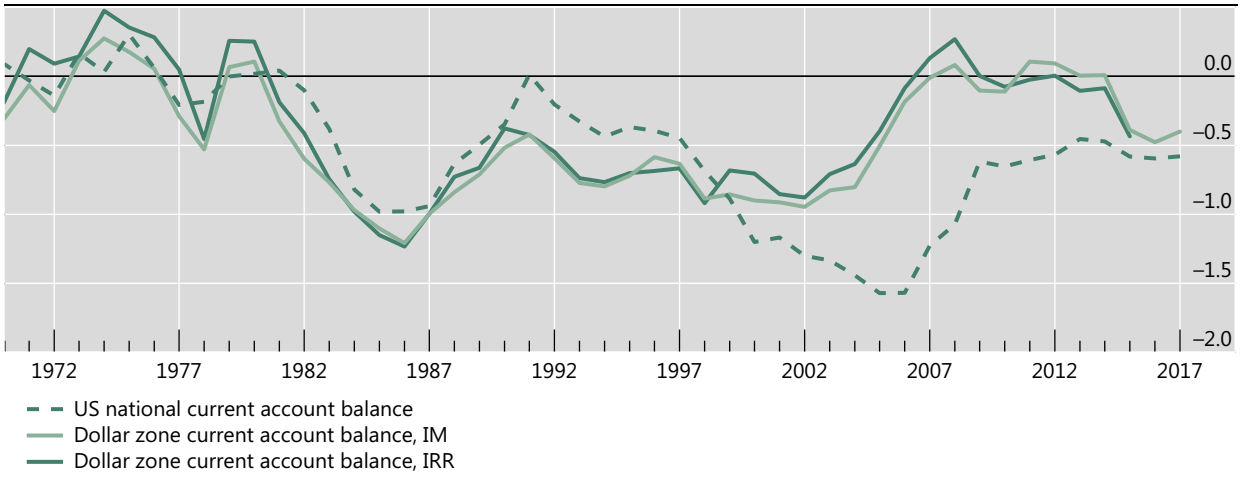
Second, IRR exclude the country-years when the rate of inflation exceeds 40%, dubbing the currency "freely falling," and assigning it no anchor currency. We exclude months of dollar depreciations in excess of 10% but still attach high inflation currencies to an anchor.

Third, IRR assign even key currencies to the zones of other key currencies according to an algorithm. For example, Japan belongs to the US dollar zone from 1948 to 1977, and the UK, Germany, and France belong to it until 1972.* We choose key currencies ex ante and assume each to centre its own currency zone, assigning a weight of one. We let the data speak on the demise of the sterling zone and hypothesise the renminbi as a key currency in Section 5. Finally, a methodological difference: IRR take a variance ratio approach whereas we use a regression approach.

Appendix Graph A compares the US dollar-zone current account based on our currency zone identification method (i.e., the same as Figures 5 and 8) with the one based on that of Ilzetzki et al (2017). They differ little. Thus, our finding on the dollar zone's current account is robust to using a very different method of identifying the dollar zone.

Dollar zone current account balances: Ito-McCauley vs Ilzetzki, Reinhart and Rogoff

As a percentage of world GDP — Graph A



Sources: Ilzetski et al (2017); IMF, *International Financial Statistics* and *World Economic Outlook*; authors' estimates.

* As an additional minor difference, we exclude the Soviet bloc currencies, while IRR put them in a rouble bloc.

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