

The Dollar Hegemon?

Evidence and Implications for Policy Makers

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Abstract

This paper reviews the central role of the US dollar in the global trade, financial and monetary systems. The dominance of the US dollar as an invoicing, issuance, anchor and reserve currency has increased over time, especially so and somewhat paradoxically since the end of the Bretton Woods system. The dollar is now the ‘hegemon’ currency. I propose an explanation based on the growing complementarities between the role of the dollar for international trade and for international financial transactions. I also discuss the implications for policymakers of living in a ‘dollar world.’ The paper concludes with a discussion of some possible challenges to the dollar’s hegemony.

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1 Introduction

In his insightful account of the Great Depression, Charles P. Kindleberger spelled out the elements of a theory of ‘hegemonic stability’ for the international monetary system (Kindleberger 1973).¹ Writing in 1981, he summarized his view as follows:

‘I argue(d) that for the world economy to be stable, it needs a stabilizer, some country that would undertake to provide a market for distress goods, a steady if not countercyclical flow of capital, and a rediscount mechanism for providing liquidity when the monetary system is frozen in panic. [...]

Britain, with frequent assistance from France, furnished coherence to the world economy along these lines during the nineteenth century and through the “belle époque.” The United States did so from 1945 (or perhaps 1936) to 1968 (or 1963 or 1971).’ Kindleberger (1981, p247)

According to Kindleberger, the benevolent leader or ‘hegemon’ actively stabilizes the global system by supporting free trade and open capital markets, by coordinating macroeconomic and financial policies, and by acting as a lender of last resort providing much needed international liquidity in times of crisis.² The currency issued by the center country plays a critical role for each of these different functions. Since at least 1945, that currency is the U.S. dollar.

First, the dollar is the currency of choice for trade invoicing, international security issuance, or cross-border banking (Gourinchas, Rey and Sauzet 2019). Over the last half century, this has greatly helped promote an open global environment for international

¹Kindleberger himself never used the term ‘hegemonic stability.’ The label was later coined by international relation specialists, in part inspired by his work. According to Keohane (1980), hegemonic stability postulates that “hegemonic structures of power, dominated by a single country, are most conducive to the development of strong international regimes whose rules are relatively precise and well obeyed.”

²Historians of Greek antiquity establish a distinction between ‘hegemonia’, i.e. leadership via persuasion and trust, and ‘arkhe’, i.e. leadership via force and power. See Coeuré (2018) for a recent analysis emphasizing this distinction in monetary affairs.

trade and financial transactions, facilitating international trade and exchange .

Second, in part because of its prominence in trade and financial transactions, the dollar is also the main currency of intervention for central banks, as well as the currency in which they accumulate the largest share of their official reserves. Not surprisingly, it is also the dominant anchor currency, i.e. the currency against which central banks aim to stabilize their own (Calvo and Reinhart 2002, Ilzetzi, Reinhart and Rogoff 2019). This role of the dollar as both an intervention currency and an anchor currency helps propagate U.S. monetary policy impulses from the center to the periphery, and provides a common component to the global monetary environment. The spillovers of U.S. monetary policy to the rest of the world are further strengthened by the importance of dollar funding for global banks' balance sheet, as well as the increasing length and complexity of global supply chains (Bruno and Shin 2015, Bruno, Kim and Shin 2018, Kalemli-Özcan, Kim, Shin, Sørensen and Yesiltas 2014).

Lastly, because the dollar is also viewed as the safest currency, it is a key determinant of private investors' demand for stores of value. In times of crisis, markets freeze and the demand for dollar safe assets spikes. Preventing a full market collapse requires aggressive provision of dollar liquidity. This can only be provided by the U.S. Federal Reserve, either directly to domestic banks and the foreign subsidiaries of global banks via its discount or repo windows, or indirectly via central bank swap lines (Farhi, Gourinchas and Rey 2011). It follows that a proper analysis of the U.S. hegemon is an analysis of the dollar dominance in international trade, finance and monetary affairs: the US hegemon is a dollar hegemon.

The simple reality is that we live in a dollar world: on the real side, where dollar invoicing is dominant; on the financial side, where dollar funding is essential to global banks and non-financial corporations; and on the policy side, where dollar anchoring and

dollar reserves are prevalent. If anything, this dominance of the dollar has increased over time. [Section 2](#) starts by reviewing the key historical developments that help us understand the emergence of this dollar hegemon while [Section 3](#) analyzes the current roles of the dollar as an international currency. The dominance of the dollar has important implications for policymakers which we discuss in [Section 4](#). The dominance of the dollar matters for the transmission of various shocks to local economies. It matters for the way in which monetary policy operates, and the choice of exchange rate regime. It matters for the exposure to global financial shocks, and last but not least, it matters for the global stability of the international financial system. [Section 5](#) explores, speculatively, how the system might evolve and concludes.

2 The Emergence of the Dollar Hegemon.

The introductory quote from Kindleberger makes clear that he viewed the suspension of gold convertibility, first in 1968 for the private market, then in 1971 for foreign central banks, as the beginning of the end of the era of uncontested U.S. monetary leadership. [Fig. 1](#) reports the value of the US dollar against the German Deutsche Mark, the Japanese Yen, the Swiss Franc and the British pound between 1969 and 1989, rebased to 100 in January 1969. The dollar depreciated nominally between 20 and 40% against the first three currencies between 1971 and 1974. [Fig. 2](#) reports the US share of world output between 1950 and 2016. It declined from 25% in 1950 to 18% in 1971, mostly as Western Europe and Japan, devastated by the destructions of the second world war, rebuild their economies. Many contemporary observers shared similar worries: foreign exchange volatility, coupled with a substantial decline in the value of the dollar against other potential international currencies, rising US inflation in the 1970s and a decline in the share of the US in world output could undermine confidence in the dollar as an international currency ([Aliber 1973](#), [McKinnon 1974](#), [Rueff 1971](#)).

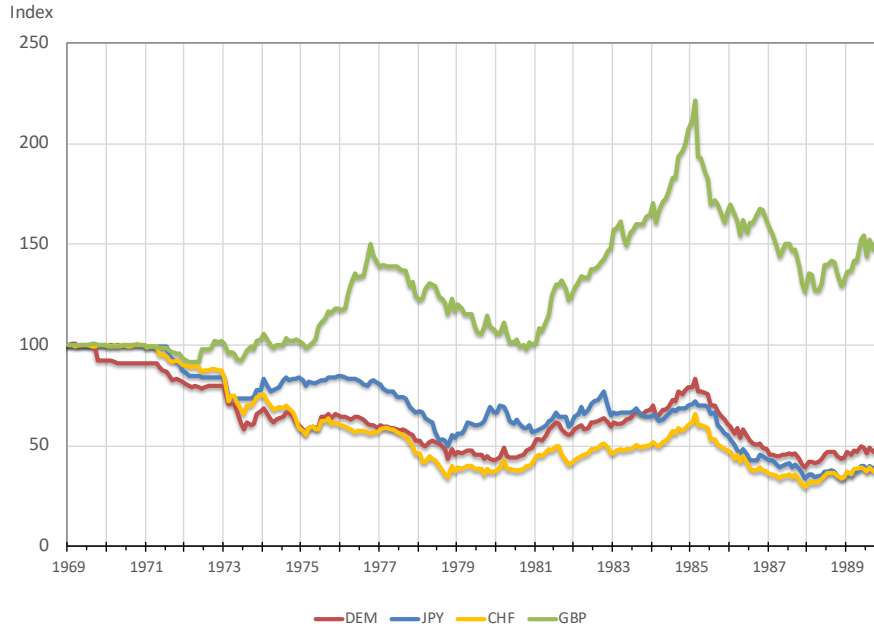


Figure 1: Major Exchange Rates. Source: Global Financial Database. The figure reports the value of the US dollar in terms of the german Deutsche Mark (DEM), Japanese Yen (JPY), Swiss Franc (CHF) and British pound (GBP). Exchange rates are normalized at 100 in Jan. 1969. A decrease in the index is a depreciation of the dollar.

Quite the opposite happened. As a number of scholars observed early on, the transition to floating exchange rates had little impact on the use of the dollar as an international currency (see [Cooper 1973](#), [McKinnon 1979](#), [Mundell 1973](#), [Whitman 1974](#) and [Kenen 1983](#)). Astonishingly, while the end of the Bretton Woods era was triggered by a run on the dollar, it ushered in the era of the global dollar standard, of the dollar hegemon, that is still with us to this day. Put simply, since 1971 the centrality and dominance of the dollar has increased in all dimensions. In the words of [Mundell \(1973, p390\)](#), “the dollar assumed greater monetary importance than gold.”

Part of the increased importance of the dollar reflects somewhat mechanically the collapse of the soviet bloc in the late 1980s, and more generally, the transition of centrally planned economies to market principles, with accompanying trade and financial liberalizations. Yet, it also goes beyond this simple accounting. As an illustration, consider the

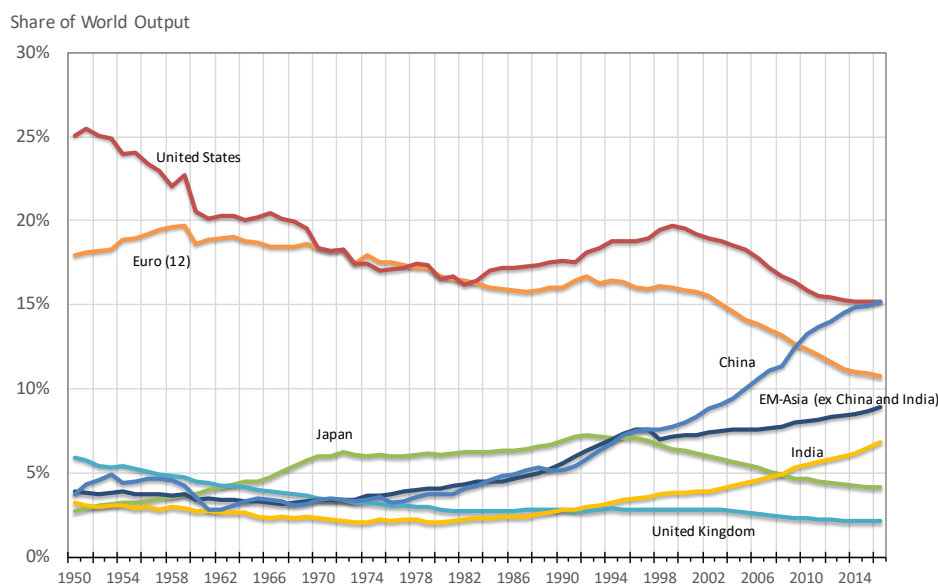


Figure 2: World Output Shares. Source: Maddison Project Database, version 2018, [Bolt et al. \(2018\)](#). Output is measured in constant 2011 US\$. EM-Asia ex China and India consists of Bangladesh, Cambodia, Hong-Kong, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Thailand and Vietnam. Euro12 consists of: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

choice of anchor currency of Asian countries. [Table 1](#) reports the start date of the most recent episode of dollar anchoring for various Asian countries, according to the detailed country narratives compiled by [Ilzetzi et al. \(2019\)](#). China, Hong-Kong, Indonesia, Pakistan, Singapore anchored their currency to the US dollar during or in the immediate aftermath of the Bretton Woods collapse, between 1969 and 1974. Malaysia, India, Cambodia and Vietnam followed between 1975 and 1994.³

A number of interesting observation arises from this table: in the case of Hong-Kong, India, Malaysia, Pakistan and Singapore, the dollar anchor replaced a sterling anchor. The latter naturally reflected the strong historical and colonial ties each of these countries had with the United Kingdom. They maintained a sterling anchor long after the U.K. had lost most of its luster: by 1970, its economy accounted for only 3.5% of world

³Only three Asian countries were anchoring to the dollar prior to 1969, all with close historical and military ties to the U.S.: the Philippines (since 1945), Japan (since 1947) and Korea (since 1953). See [Eichengreen, Mehl and Chitu \(2017\)](#) for an analysis of the geopolitics of international currency choice.

Table 1: Asian Economies and the Dollar Anchor

Country	Start of the dollar anchor
Philippines	1945
Japan	July 1947
Korea	February 1953
Indonesia	April 1969
Pakistan	January 1971
Singapore	June 1972
Hong Kong	July 1972
China (Mainland)	January 1974
Malaysia	September 1975
India	August 1979
Vietnam	January 1992
Cambodia	January 1994

Source: [Ilzetzi, Reinhart and Rogoff \(2017\)](#). The table reports the date at which dollar anchoring begins, according to [Ilzetzi et al. \(2019\)](#).

output, down from 5.9% in 1950 (see [Fig. 1](#)). Such path-dependence could be the consequence of strong network effects and strategic complementarities.

Another interpretation is that anchoring to the sterling may have been largely illusory. During the Bretton Woods era, most currencies, including the sterling, were fixed against the dollar. Very few changes in par values of the major currencies occurred between 1955 and 1969: France devalued three times, in 1957, 1958 and 1969, Britain devalued in 1967, Germany revalued in 1961 and 1969. It follows that anchoring to the dollar, to the sterling or to any other currency pegged to the former must have been economically roughly equivalent, and quasi impossible to detect empirically. In other words, it is quite plausible that emerging Asian economies were already shadow anchoring to the dollar, and that the collapse of the Bretton Woods system only brought to light what had been an economic reality for some time. This last observation is especially relevant as we look ahead and consider possible paths for the internationalization of the renminbi. As long as the dollar-yuan exchange rate remains stable, a similar form of shadow renminbi anchoring may be

at work, masquerading as a dollar anchoring. If, and when, the global economy is ready for a competing renminbi standard, the latter may unveil itself suddenly and precisely at a time of monetary instability between the U.S. and China.

The concept of ‘shadow anchoring’ also helps us understand how the dollar could prove so resilient to the collapse of the Bretton Woods system. The traditional interpretation emphasizes the lack of an alternative. For instance, Mundell writes:

“[T]he 1971 float of the dollar led to a brief period of confusion that exaggerated the weakness of the dollar. [...] By December 1971, however, when the Smithsonian agreement was signed, there was a tacit (and reluctant) acceptance of a dollar standard. That the dollar could survive the crisis of 1971 as it did proved its growing secular strength despite its short-term weakness.[...] [W]hen the United States suspended convertibility, the dollar was still the world unit of account. That is why the system did not collapse in 1971 or, to be more exact, why countries went back to the dollar. There was no alternative ready.” [Mundell \(1973, p390\)](#)

Yet this interpretation does not explain why the role of the dollar expanded as dramatically as it did in subsequent years. After all, between December 1971 and February 1973 when the Smithsonian agreement collapsed, the dollar depreciated by 14% against the DM, 17% against the Yen and 22% against the Swiss franc (see [Fig. 1](#)). There is little doubt that the transition to floating rates initially weakened the dollar as an international currency. But deeper forces were at play. In particular, one must consider the key role that the center country plays in providing safe stores of value to the rest of the world. This global provision of safe assets is one of the central aspects underpinning the architecture of the international monetary and financial system. What defines the center country is precisely that it is a net producer of safe assets, i.e. assets that deliver supe-

rior returns during global downturns.⁴ The provision of safe assets is intimately tied to the level of development of financial markets, the fiscal capacity of the sovereign, as well as the stability of its macroeconomic policies. A key insight from my work with H  l  ne Rey, Ricardo Caballero and Emmanuel Farhi is that regardless of the formal ‘rules of the game’ or formal exchange rate arrangements, the international monetary system naturally evolves in an asymmetrical way, with large net global safe asset producers at its center (see [Gourinchas 2017](#), [Gourinchas et al. 2019](#) and [Caballero, Farhi and Gourinchas 2017b](#)).

The architects of Bretton Woods system attempted to deal with this fundamental asymmetry in two ways, one that proved fatal and one that helped albeit only temporarily. First, by fixing the value of the dollar in terms of gold at \$35/oz, the Bretton Woods architects aimed to restore some symmetry in the system. The explicit aim was to introduce an external constraint on U.S. policymakers, just as foreign policymakers faced the external constraint of maintaining the par value of their currency against the dollar. As Robert Triffin brilliantly observed in [1961](#) in what came to be known as the ‘Triffin dilemma,’ the U.S. would ultimately be unable to simultaneously increase the supply of dollars needed to meet the demand of a growing global economy, and maintain the dollar price of gold.

Second, for most of its existence the Bretton Woods system of fixed parities operated with severely limited capital mobility. Limited capital mobility helped curtail direct demand for US safe assets originating with private foreign investors. Fixed parities meant that a local alternative, almost as good as dollars, existed in the form of domestic central bank liabilities and their substitutes such as local short-term government debt. As long as the fixed parities remained credible and capital was not allowed to flow freely between the center and the periphery, this allowed an elastic supply of local ‘quasi-safe’ assets by

⁴Note that this definition is relative: all assets returns may decline in a global downturn. Safe assets are those providing the strongest level of protection.

foreign central banks, partly backed by dollar reserve holdings. In other words, while local financial institutions had little choice but to hold local assets instead of true US dollar safe assets, the two were largely equivalent: local safe assets ‘shadowed’ dollar safe assets.

As long as dollars were scarce -acutely so in the immediate postwar period- this allowed the global economy to ‘economize’ on dollar safe assets, alleviating their underlying scarcity and letting the financial system operate smoothly. By the late 1960s, however, the world economy faced instead a dollar glut, largely as a consequence of years of loose US monetary policy. Under a fixed exchange rate system, this required foreign central banks to accumulate dollar reserves, which propagated the glut to their local financial system. This state of affairs was in some ways an inverted mirror image of the environment preceding the Global Financial Crisis (GFC) of 2008. In the 2000s, a global scarcity of safe assets triggered the endogenous creation of public and private sector alternatives: ‘quasi-safe’ assets that helped prop up the global economy in the years 2000-2007 ([Bernanke, Bertaut, DeMarco and Kamin 2011](#), [Caballero, Farhi and Gourinchas 2008](#)). The vulnerability was the lack of a proper backstop for quasi-safe assets: these would ultimately buckle under stress and be vulnerable to runs, as their holders quickly tried to convert them into true dollar safe assets ([Gorton and Metrick 2012](#)). In the late 1960s and early 1970s instead, an excessive supply of dollar assets was forced onto the global economy via the fixed exchange rate system. The initial depreciation of the dollar between 1968 and 1973 was a corrective mechanism that reduced the market value of dollar safe assets and equilibrated the market.

Interpreted in this light, the collapse of Bretton Woods first severed the link between dollar and gold in 1969, resolving the original Triffin dilemma. The failure of the Smithsonian agreement in 1973 then officially severed the link between the dollar and other currencies, in an environment marked by increasingly porous capital controls and the

emergence of offshore dollar markets. Ultimately, Triffin correctly analyzed the first contradiction built into the Bretton Woods system, but did not address the second one. From 1973 onwards, the demand for safe assets relocated narrowly on dollar assets since the US remained the sole provider of global safe assets. Increased capital mobility, currency volatility and growth in the rest of the world -especially in emerging Asia which embarked on an astonishingly rapid path of industrialization, further increased the demand for dollar safe assets in subsequent years.⁵

3 The Dollar Hegemon Today

What is the current status of the dollar as an international currency? The short answer is that we live in a dollar world! [Fig. 3](#), compiled by [Eichengreen and Xia \(2019\)](#), updating data from [European Central Bank \(2018\)](#)'s annual report on the international role of the Euro, documents the dominance of the dollar in all domains of the international financial system: international debt issuance, cross border loans, FX turnover or reserve accumulation. All other international currencies are far behind.

To go further, we briefly review the empirical evidence on the main functions of the dollar as an international currency, building from the useful typology introduced by [Kenen \(1983\)](#) and reproduced in [Table 2](#).⁶ It separates the traditional roles of the international currency as a medium of exchange, a store of value and a unit of account for the private and official sectors.

⁵Coincidentally, the first oil price shock of October 1973 also contributed to stabilize the demand for dollar-denominated stores of value. The offset of the large current account surpluses of OPEC countries, the so-called 'petrodollars', was a surge in direct foreign holdings of US Treasuries as well as offshore bank deposits and short term instruments.

⁶This section borrows heavily from [Gourinchas et al. \(2019\)](#).

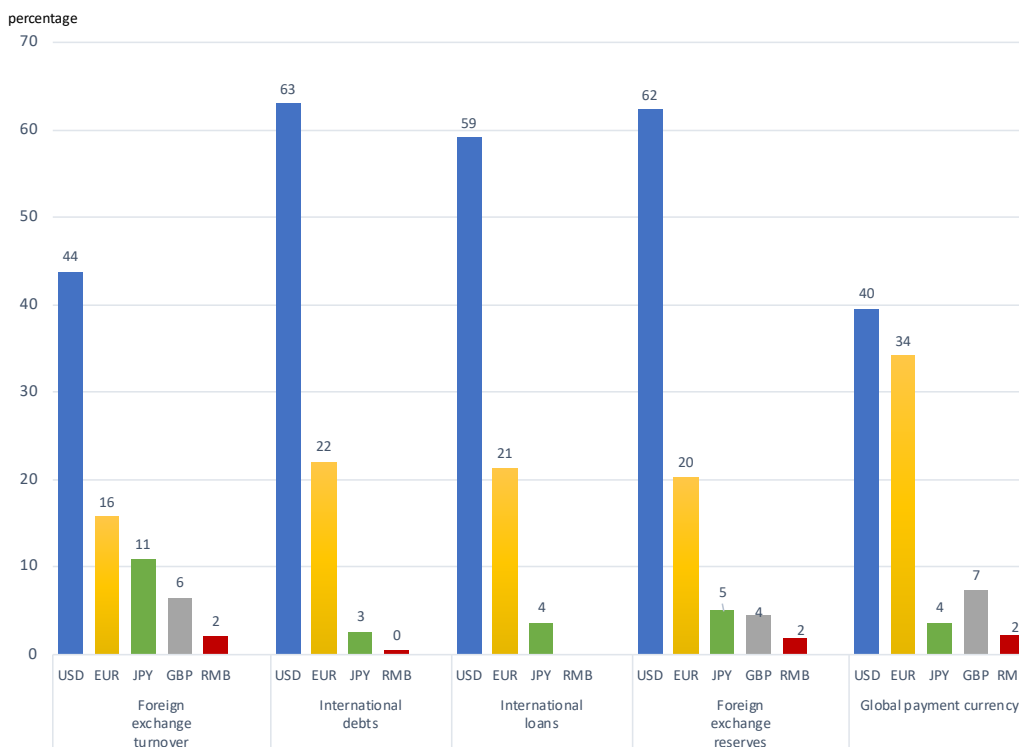


Figure 3: The Dominance of the dollar. Source: [Eichengreen and Xia \(2019\)](#).

3.1 The Dollar as a Unit of Account

We begin with the dollar's role as a unit of account. Thanks to the work of [Goldberg and Tille \(2009\)](#) and [Gopinath \(2016\)](#), we have ample evidence on the extensive use of the dollar for trade invoicing.⁷ [Gopinath \(2016\)](#) reports that the dollar's share as an invoicing currency is approximately 4.7 times the share of the U.S. in goods in worlds imports and 3.1 times its share in world exports. [Fig. 4](#) reports the combined share of exports and imports invoiced in US dollars, as a share of total exports and imports respectively. A sum equal to 2 means that all exports and imports are invoiced in dollars. The figure also singles out the Asian economies in the sample.⁸ The average across Asian economies, at

⁷see also [Kamps \(2006\)](#) and [Ito and Chinn \(2015\)](#).

⁸An important omission from [Fig. 4](#) is China. [Lai and Yu \(2015\)](#) report that, while the share of China's cross border trade settled in Renminbi increased rapidly from 0 in 2009 to 16.6% in 2013, the share invoiced in the Chinese currency remains minimal. For our purpose, what matters is the currency of invoicing, not that of settlement. The empirical evidence strongly suggests that prices are sticky in the currency of invoicing. We conjecture that China's cross border trade is similar to other Asian economies and predominantly invoiced in dollars.

Table 2: International currency

	Roles		
	Medium of exchange	Store of value	Unit of account
Private sector	Vehicle currency Liquid & safe asset markets	Nominal securities issuance Banking, cash hoarding	Denomination of securities Trade invoicing
Official sector	Intervention currency Lender of last resort	Reserves	Exchange rate pegs Anchor currency

Note: Adapted from [Kenen \(1983\)](#).

1.61 is very high (the average across all countries is 0.94), placing Asian economies only slightly behind Latin America (1.71).

From a theoretical perspective, the dominance of dollar invoicing arises naturally the stronger the strategic complementarities between exporters, the more open the economy is and the lower volatility of the dollar ([Gopinath, Boz, Casas, Diez, Gourinchas and Plagborg-Møller 2018](#), [Mukhin 2017](#)).

Turning to the official sector, [Fig. 5](#) based on the important work of [Ilzetzki et al. \(2019\)](#), documents the dramatic rise of the dollar zone between 1950 and 2015. According to these authors, until 1970, about 30 percent of countries was anchored to the dollar, with the rest split between UK pound, the French franc and the Soviet ruble. By 2015, the dollar zone has expanded considerably, including not only the former Soviet bloc, but also communist China, large parts of Asia, Africa and all of Latin America.

The dominant role of the dollar anchor reflects its importance both on the real and financial side. On the real side, the dominance of dollar invoicing generates asymmetric international spillovers that make it desirable to stabilize the dollar exchange rate ([Egorov](#)

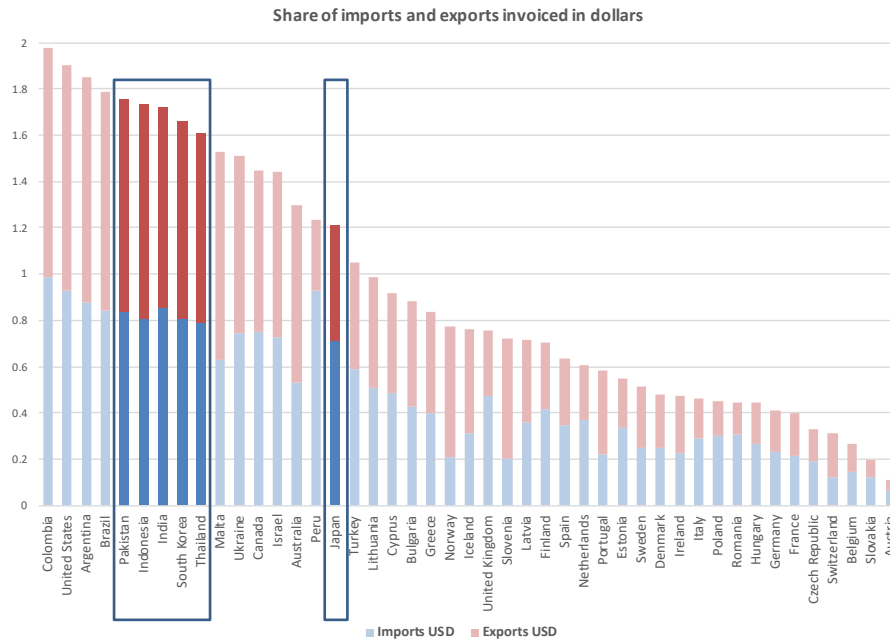
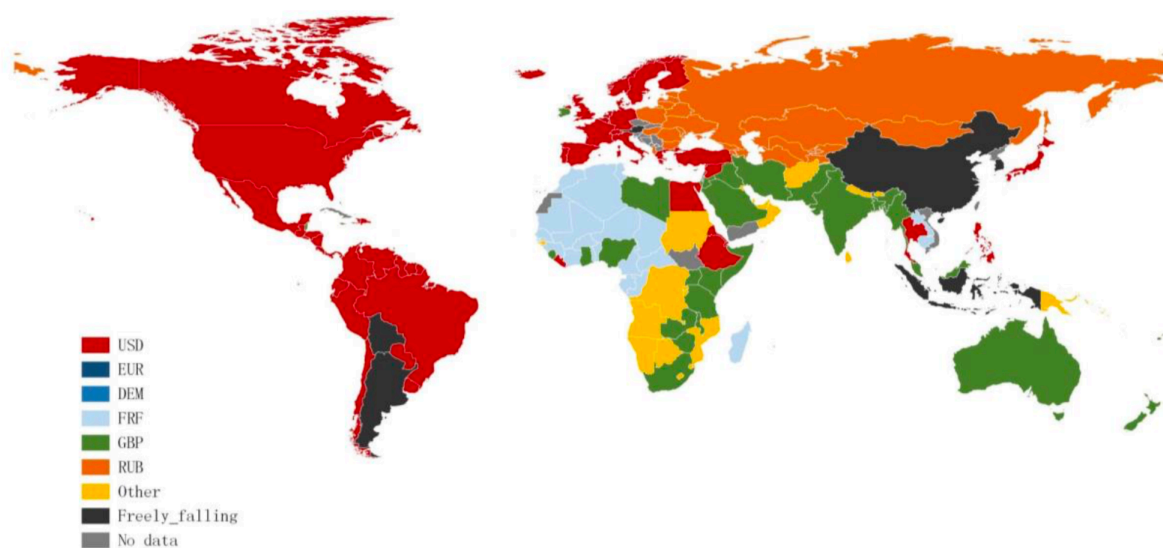


Figure 4: Share of invoice of imports and exports in US dollars. We keep all the countries for which data on exports and imports are both available. Source: [Gopinath \(2016\)](#).

[and Mukhin 2019](#)). The intuition for this result is quite straightforward: In a world with dollar pricing, domestic monetary policy cannot affect the demand for exports (whose price in dollars is independent from the exchange rate). Instead, the monetary authority will aim to stabilize the price of domestic goods. With imported intermediate inputs also invoiced in dollars, this requires ‘leaning against the wind’ and stabilizing the dollar exchange rate. On the financial side, another strand of the literature emphasizes the spillovers of US monetary policy via asset markets. Dollar dominance in banking and the dollarization of cross border claims imply that US monetary policy impulses get transmitted beyond US borders in international financial markets, contributing to a global financial cycle ([Avdjiev, N. and Shin 2015](#), [Avdjiev, Du, Koch and Shin 2016](#), [Miranda-Agrippino and Rey 2018](#), [Rey 2013](#)).

1950



2015

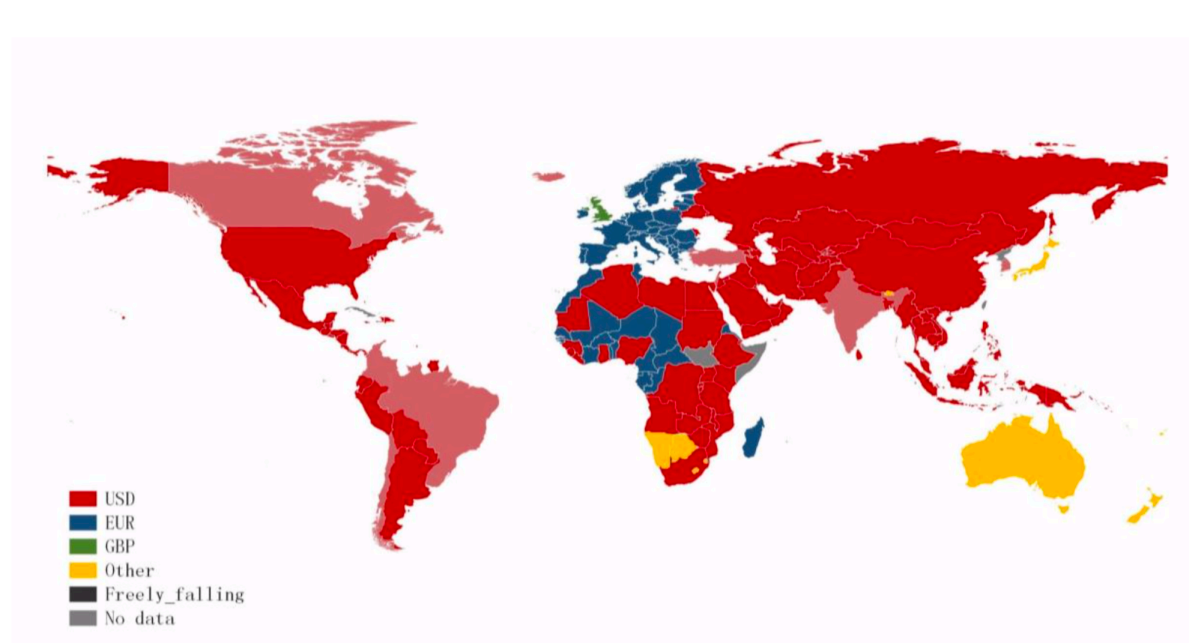


Figure 5: The Geography of Anchor Currencies, 1950 and 2015. Source: [Ilzetzi et al. \(2019\)](#). The figure reports the geographic distribution of anchor currencies.

3.2 The Dollar as a Means of Payment

Due to network externalities, few currencies emerge as vehicle currencies, that is, as international means of payments. This vehicle currency role is closely tied to the liquidity properties of the currency. Private investors around the world use dollars for their transactions because they value the ability to conduct large transactions with minimum adverse price impact. The depth and development of the dollar markets -not necessarily located in the U.S. since most of the foreign exchange transactions are conducted in London- is unparalleled. They are also more likely to use dollars if this is the currency in which transactions are invoiced in the first place: currency of settlement and currency of invoicing are often closely tied. As [Fig. 3](#) documents, the dollar serves as the undisputed vehicle currency.

Naturally, since the vehicle currency is used by most market participants, and is the currency they need to obtain for emergency funding, it tends to be the intervention currency, i.e. the currency used by central banks for their official interventions.

3.3 The Dollar as a Store of Value

International currencies also serve as store of value. Safety is a key attribute and the demand for safe assets undergirds large parts of the international financial system. Private investors use dollars for their short term investment needs as they are considered among the safest instruments.

It follows that the currency of issuance of international assets is a key determinant of the private sector's portfolios. This was demonstrated recently by [Maggiori, Neiman and Schreger \(2018\)](#). Using finely disaggregated data on international mutual fund positions, these authors demonstrates that investor's holdings are strongly biased towards instruments issued in their own currency, with the exception of securities issued in US dollar. [Fig. 6](#) illustrates this point. Consider the case of Canada (second from top). While

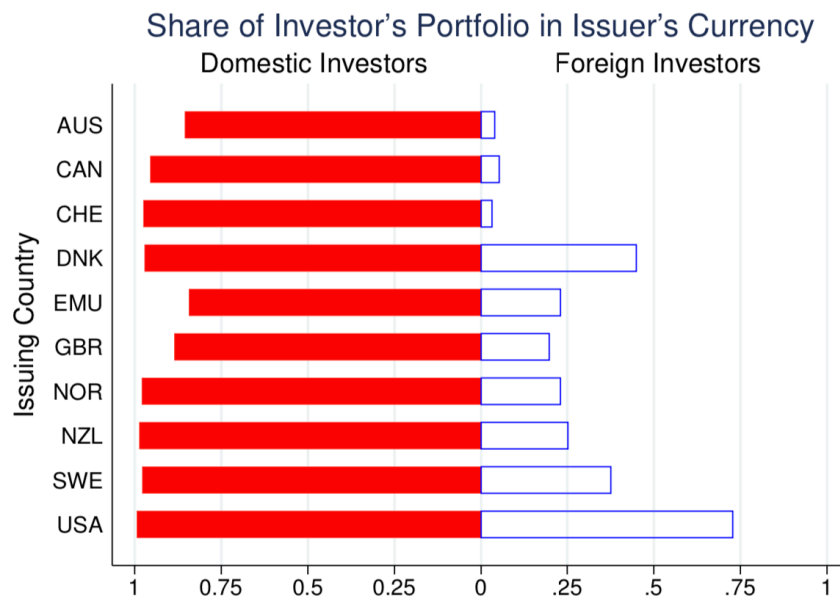


Figure 6: Share of Corporate Bond Investment Denominated in the Issuer's Local Currency. Source: [Maggiore et al. \(2018\)](#). The red bar reports for each issuing country, the share of bonds denominated in the issuer's local currency out of all domestic investment in its corporate bonds. The hollow blue bars show, for each issuing country, the share of bonds denominated in the issuer's local currency out of all foreign investment in its corporate bonds.

Canadian investors' holding of Canadian bonds are mostly in Canadian dollars, foreign investors holdings of Canadian bonds are mostly in foreign currency, i.e. in dollars.

Recent years have also witnessed a sharp increase in the amount of non-US resident dollar borrowing. [Fig. 7](#) reports bank loans and international debt securities issued by non-residents for the US dollar, the Euro and the Japanese Yen, as a share of global output. As the figure shows, in recent years, the bulk of the increase reflects the growing issuance of dollar debt by non-US residents. As of 2018, dollar credit to non-US residents represented close to 14% of global output.

Lastly, the currency of intervention, and the anchor currency naturally determine the reserve currency, i.e. the currency in which most official reserves are held. [Fig. 8](#) reports the distribution of Central Bank reserves by currency and its evolution over time. US dollar reserves vastly outweigh the Euro or other currencies.

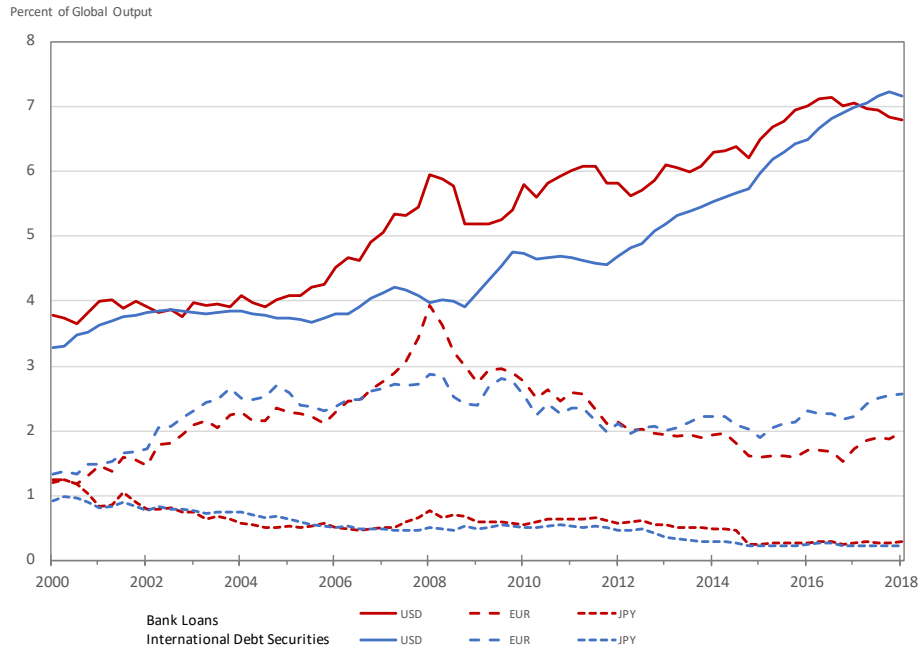


Figure 7: International Credit to Non-Resident by Currency and Instrument, percent of global GDP. Source: BIS Global Liquidity Indicators.

These are important complementarities between the different roles of an international currency. For instance, more dollar invoicing, or longer supply chains involving dollar-invoiced imported intermediates, are likely to increase the demand for dollar safe assets. As analyzed by [Gopinath and Stein \(2018a\)](#), financial institutions are then likely to intermediate these dollar assets into local dollar liabilities. In turn, more dollar debt issuance by the non-financial corporate sector, or more dollar funding for local banks make it more likely that the domestic central bank will monitor carefully the dollar exchange rate, intervene on currency markets, or accumulate more dollar reserves ([Gopinath and Stein 2018b](#)). Conversely, a more stable dollar exchange rate, or a larger stock of dollar reserve can make it more appealing to invoice in dollars, to borrow in foreign currency for banks or nonbanks, or to lengthen the global supply chain by relying more on dollar-invoiced foreign imported inputs.

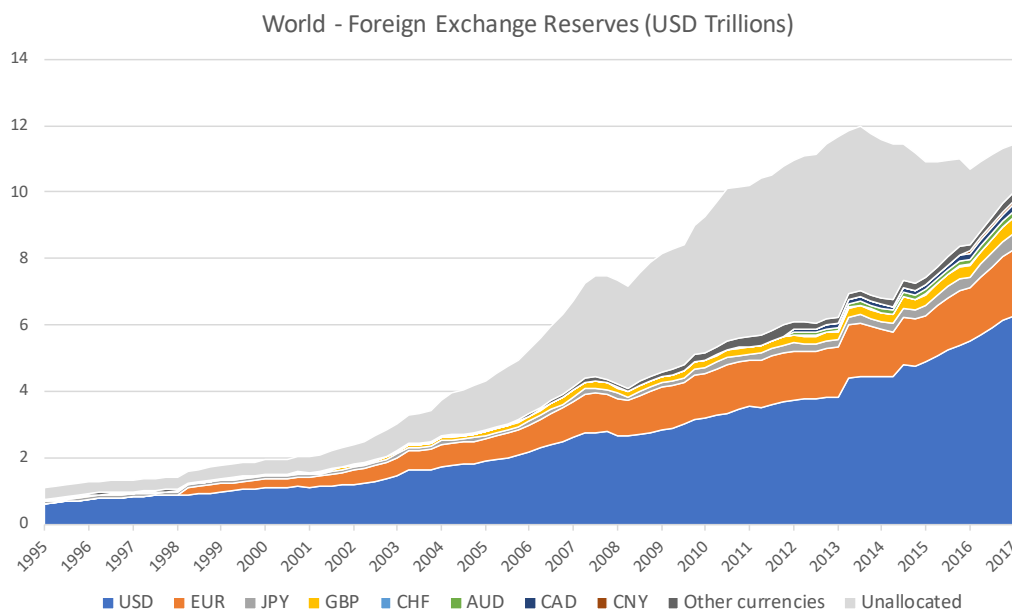


Figure 8: Currency composition of Foreign Exchange Reserves for the World, in trillions of US dollars. Source: IMF COFER as compiled by [Gourinchas et al. \(2019\)](#). The date indicates the last quarter of each year.

4 Implications for Policymakers

This section explores the implications of the dollar dominance for policymakers. We begin by discussing how dollar invoicing matters for the pass-through of exchange rates to local prices and terms of trade. We then discuss how monetary policy transmission is affected and how the value of the dollar affects global trade.⁹ Next, we consider how fluctuations in the dollar may affect domestic financial frictions and the transmission of local and US monetary policy. In this context, we revisit [Rey \(2013\)](#)’s argument that countries face a dilemma, not a trilemma. Lastly, we consider the global implications of the dollar standard for the scarcity of safe assets and the global stability of the international financial system.

⁹This discussion builds on [Gopinath et al. \(2018\)](#).

4.1 Exchange Rate Pass-Through, Expenditure Switching and the Effectiveness of Flexible Exchange Rates

The combination of dollar invoicing, strategic complementarities in pricing and imported intermediate inputs gives rise to a Dominant Currency Paradigm (DCP), explored in detail empirically and theoretically in [Gopinath et al. \(2018\)](#). This paradigm forces us to rethink a number of key predictions arising from standard models. For instance, in the traditional New Keynesian framework prices are assumed to be set -and sticky- in the producer’s currency (producer currency pricing or PCP). Under that assumption, a depreciation of the local currency raises the price of imports relative to exports, a depreciation of the terms of trade that shifts demand towards domestic produced goods and away from foreign produced ones. This ‘expenditure switching effect’ of exchange rate movements is a key argument in favor of flexible exchange rates. If all prices were set in the producer’s currency, a 1% depreciation of the nominal exchange rate would depreciate the terms of trade -defined as the ratio of the price of imports to the price of exports- by 1% in the short term. Instead, under DCP, both imports and export prices are set in dollar and a depreciation of the bilateral exchange rate has no effect on the terms of trade.

Empirically, [Gopinath et al. \(2018\)](#) put together aggregate data on harmonized annual bilateral import and export unit values for a large number of countries pairs that covers 91% of world trade. They confirm that non-commodities terms of trade are largely uncorrelated with bilateral exchange rate movements ([Table 3](#)).

A second key implication of DCP is that the dollar exchange rate dominates bilateral exchange rates in price pass-through and trade elasticity regressions. The first two columns of [Table 4](#) shows that the explanatory power of the the bilateral exchange rate for import prices disappears once we control for the dollar exchange rate. The last two columns of [Table 4](#) show a similar result for trade volumes. [Gopinath et al. \(2018\)](#) also

Table 3: Terms of Trade and Exchange Rates

	(1)	(2)
	$\Delta tot_{ij,t}$	$\Delta tot_{ij,t}$
$\Delta e_{ij,t}$	-0.00938 (0.0130)	0.0218 (0.0317)
trade-weighted	no	yes
R-squared	0.011	0.042
Observations	19,847	19,847
Dyads	1,200	1,200

Source: [Gopinath et al. \(2018\)](#). The table reports regressions of the change in the (log) bilateral terms of trade between countries i and j , Δtot_{ij} , on the change in the (log) bilateral nominal exchange rate between i and j , Δe_{ij} . All regressions include two lags of ΔER , ΔPPI and time fixed effects. S.e. clustered by dyad. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Exchange rate price pass-through and trade elasticity.

	import prices		import quantities	
	(1)	(2)	(3)	(4)
	$\Delta p_{ij,t}$	$\Delta p_{ij,t}$	$\Delta y_{ij,t}$	$\Delta y_{ij,t}$
$\Delta e_{ij,t}$	0.757*** (0.0132)	0.164*** (0.0126)	-0.119*** (0.0139)	-0.0310* (0.0160)
$\Delta e_{\$j,t}$		0.781*** (0.0143)		-0.186*** (0.0250)
R-squared	0.356	0.398	0.069	0.071
Observations	46,820	46,820	52,272	52,272
Dyads	2,647	2,647	2,807	2,807

Source: [Gopinath et al. \(2018\)](#). The first (resp., last) two columns use import prices (resp. import quantities). All regressions are unweighted, include two ΔER lags, lags 0–2 of exporter ΔPPI (resp. ΔGDP), and time FE. S.e. clustered by dyad. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

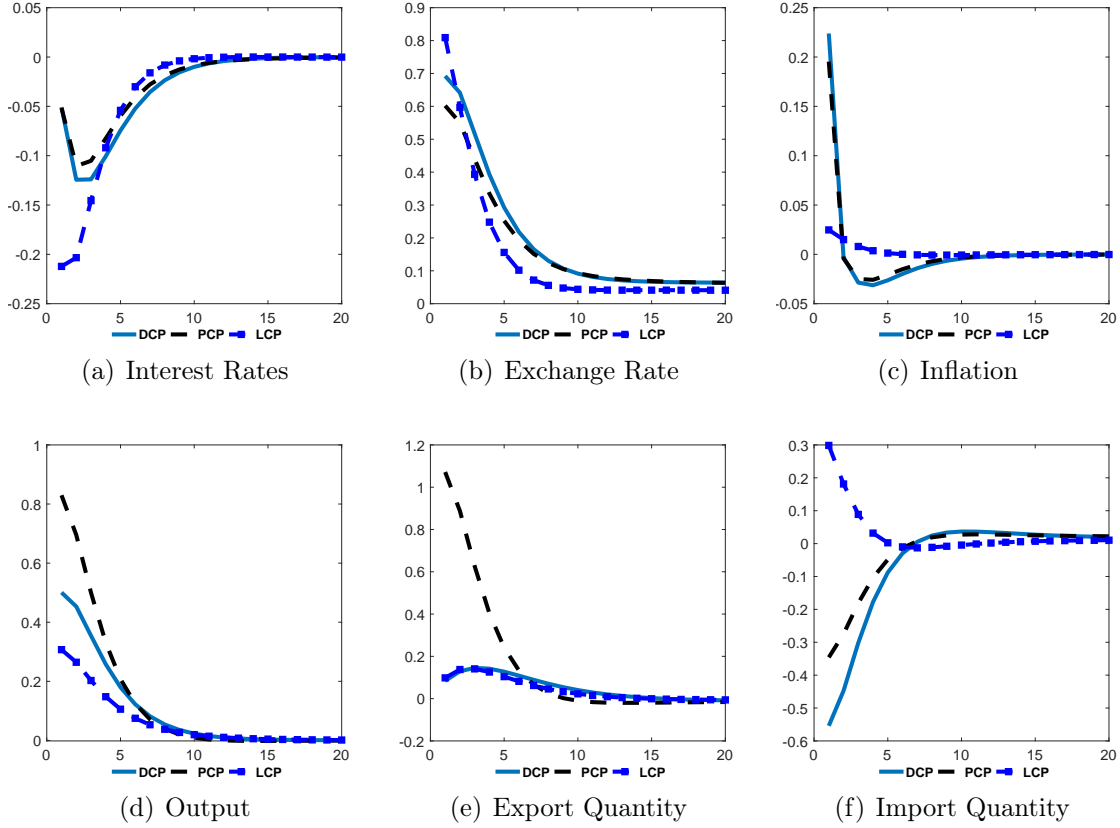


Figure 9: Impulse response to a 25bps domestic monetary policy easing in a Small Open Economy under different invoicing regimes: Producer Currency Pricing (PCP, dashed-black), Local Currency Pricing (LCP, dashed blue) and Dominant Currency Pricing (DCP, solid). Source: [Gopinath et al. \(2018\)](#).

document similar results using finely disaggregated product-firm level prices and quantities for Colombian exports and imports. This result indicates that some expenditure switching still operates, but only in response to the dollar exchange rate, and only on the import margin.¹⁰

These findings suggest that flexible exchange rates will be less effective under DCP than in standard New Keynesian models. Everything else equal, a unilateral depreciation of the domestic currency against all currencies (including the dollar) will quickly pass-through into the price of imported goods, but have a very limited impact on exports,

¹⁰Exports will respond to movements in the destination country dollar exchange rate.

improving the trade balance mostly via a reduction in imports. It follows that local monetary authorities will face a more adverse inflation-output trade-off.

[Fig. 9](#) illustrates this finding. It reports the theoretical responses of local interest rates, the nominal exchange rate, consumer price inflation, output, export and import quantities to a 25bps surprise reduction in the domestic policy rate, in a New Keynesian model calibrated under three different pricing regimes: Producer Currency Pricing (PCP), Local Currency Pricing (LCP) where the prices are invoiced and sticky in the destination currency, and dollar pricing (DCP). This monetary impulse translates into roughly similar depreciation under the three pricing regimes (panel (b)). However, the implications for inflation (panel (c)) and output (panel (d)) dynamics are vastly different. Under PCP and DCP, the depreciation increases the price of imports, increasing consumer price inflation. However, the depreciation does not stimulate exports under DCP (panel (e)), hence the increase in output remains more limited.¹¹

To summarize, in a world of dollar invoicing, the gains to exchange flexibility are more limited. As discussed by [Egorov and Mukhin \(2019\)](#) this also makes it more desirable to stabilize the dollar exchange rate.

4.2 Dollar Factor and Global Trade

The converse is also true: when most trade is invoiced in dollars, U.S. monetary policy has a global reach. To illustrate this point, [Fig. 10](#) reports the simulated impact of a 25bps U.S. monetary policy contraction in a stylized three-country version of a [Gali and Monacelli \(2005\)](#) model with dollar pricing. As expected, a monetary tightening in the U.S. appreciates the dollar (panel (b)), reduces US output (panel (d)) and lowers US in-

¹¹The model assumes a Taylor type rule for monetary policy, responding to consumer price inflation and the output gap. This is why the behavior of policy rates in panel (a) is different under the three different pricing regimes.

flation (panel (c)). However, under dollar pricing, US monetary policy has a very different impact on the rest of the world than under standard models. First, under dollar pricing, the appreciation of the dollar has only limited effects on US inflation: dollar pricing insulates US inflation from movements in the dollar. Instead, the appreciation of the dollar raises foreign import prices (and consumer price inflation) (panel (c)). Foreign central banks aiming to stabilize inflation are then forced to raise their own policy rate (panel (a)). Hence, a contractionary monetary impulse in the US triggers a contractionary move globally. As a result, the appreciation of the dollar -which is typically expected to expand output abroad via expenditure switching effects- fails to stimulate foreign output (panel (d)). Instead, the dollar appreciation reduces exports for all countries, decreasing world trade (panel (e)).

It follows that under dollar pricing, US monetary policy turns the dollar into an important driver for global trade: as the dollar appreciates, trade volumes between non-dollarized economies declines. [Gopinath et al. \(2018\)](#) explore this implication. [Fig. 11](#) shows that a 1% appreciation of the dollar leads, *ceteris paribus*, to a 0.6% contraction in trade volume in the rest of the world.

4.3 Financial Frictions, the Dollar and the Trilemma

While dollar pricing creates a link between global trade and the dollar, it is not the only channel. Other factors could also explain why a dollar appreciation might cause global trade to decline. One such factor is the currency of debt issuance. A dollar appreciation mechanically increases the real debt burden of dollar borrowers. This could cause foreign banks reliant on dollar funding to curtail domestic lending, or force non-financial dollar borrowers to raise prices. A dollar appreciation tightens local financial conditions, curtailing economic growth, and trade.

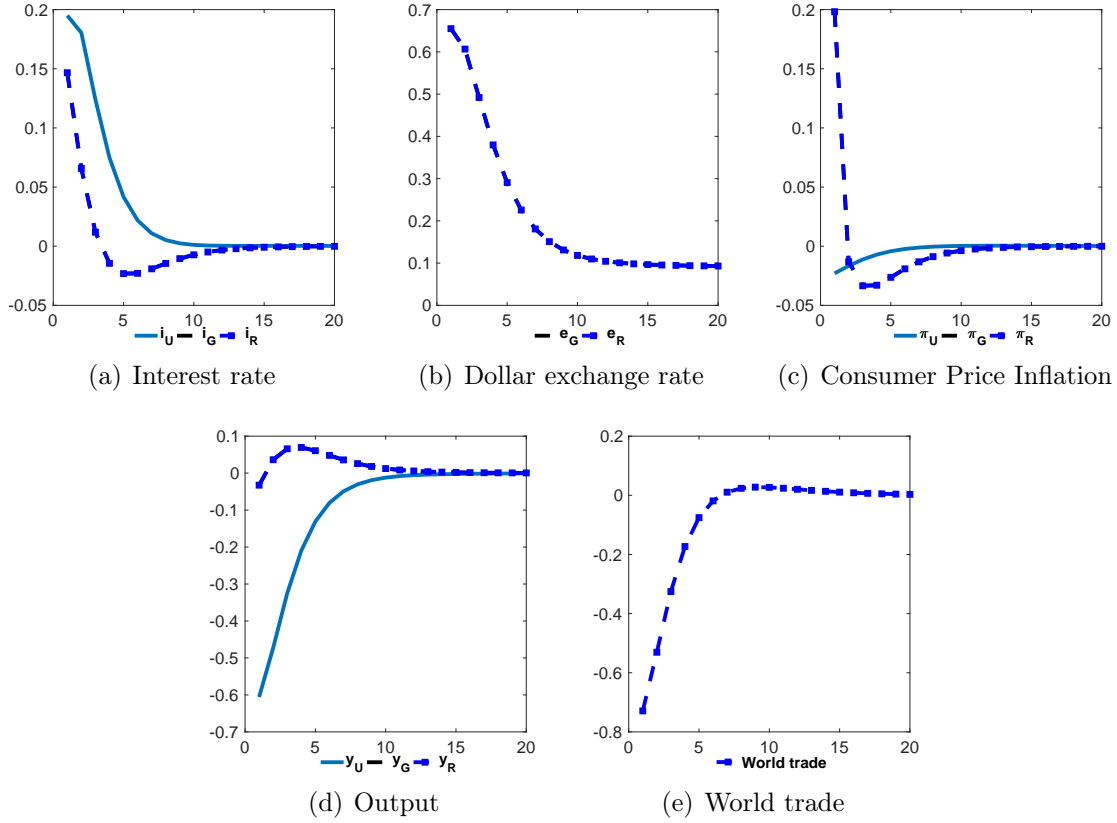


Figure 10: Impulse response to a 25bps monetary tightening in the U.S. (U) in the three-country version of the model under dollar pricing. The three countries are labeled U , G and R . G and R are symmetric in this simulation so their responses are identical. World trade is defined as the sum of export quantities from all countries. Source: [Gopinath et al. \(2018\)](#).

An important question attracting substantial attention, is that of the optimality of dollar borrowing for foreign non-financial corporates. It shares many similarities and interacts with the question of the optimality of dollar invoicing: dollar borrowing is optimal if it reduces the variability of profits, given the currency of invoicing, just like dollar invoicing is optimal if it reduces the variability of profits, given the currency composition of debt. Not surprisingly, the two decisions feed on each other: dollar borrowing makes dollar invoicing more desirable, and vice versa.

While there is a long and distinguished literature on the ‘original sin’, i.e. the extent

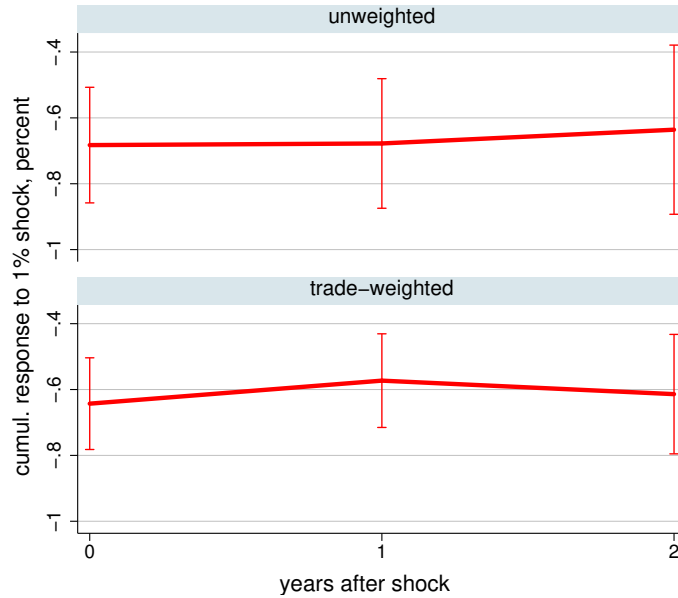


Figure 11: Response of rest-of-world aggregate trade to USD appreciation, 2002–2015. Source: [Gopinath et al. \(2018\)](#). Impulse responses of rest-of-world aggregate trade volume to a 1% U.S. dollar appreciation against all other currencies, holding constant all other exchange rates and the global business cycle. Top row: unweighted regression, bottom row: trade-weighted. Error bars: 95% confidence intervals, clustering by dyad.

to which sovereigns borrow in foreign currency ([Eichengreen and Hausmann 1999](#)), there has been comparatively less work on the currency of borrowing of the private sector. In recent years many EM sovereigns switched from foreign currency to local currency debt. Yet over the same period, private sector dollar borrowing ballooned. [Salomao and Varela \(2018\)](#), using data from Hungarian firms, emphasize that in an environment with financial frictions, firms with higher growth prospects are more likely to resort to euro borrowing. [Eren and Malamud \(2018\)](#) argue that firms may prefer to borrow in dollars if the U.S. pursues expansionary monetary policy that lowers the real burden of debt in times of global stress. Whether this is the case empirically is not clearly established. [Stavrakeva and Tang \(2018\)](#) show convincingly that in times of global stress, US monetary easing leads to an appreciation of the dollar, not a depreciation, thus generating the pattern of valuation losses as documented in [Gourinchas, Rey and Govillot \(2017\)](#). Undoubtedly, these questions will attract further empirical and theoretical research.

More broadly, dollar dominance in banking and the dollarization of cross-border claims also imply that US monetary policy impulses get transmitted to the broader economy. In a celebrated contribution, [Rey \(2013\)](#) argued that the induced global financial cycle reduced the desirability of flexible exchange rates, turning the classic Trilemma into a Dilemma. Yet, in [Gourinchas \(2018\)](#), I argued that in an environment with financial spillovers, flexible exchange rates may become more, not less, desirable (see also [Akinci and Queralto 2018](#)).

To see why this might be the case, suppose that it is indeed the case that a U.S. monetary policy tightening is contractionary abroad, for instance because the incipient appreciation of the dollar tightens local financial conditions for dollar borrowers. How local monetary authorities should respond depends, in turn, on how local monetary policy transmits to their own economy. It is a simple matter of logic to observe that, if a local monetary policy easing is expansionary, as is usually assumed, then the optimal response to the contractionary impulse originating from the center remains a local monetary easing. It follows immediately that the local currency must be allowed to depreciate against the dollar.

Stabilizing the exchange rate would be desirable if local monetary policy tightenings were ‘perversely’ expansionary locally, instead of contractionary. Many EM policymakers seem to think this is indeed the case. The resulting monetary policy dilemma is sometimes called the ‘Tošovský dilemma’, in reference to Josef Tošovský, governor of the Czech National Bank in the mid 1990s when capital inflows to Eastern European countries surged (see [Na 2019](#)). Similar arguments have been made more recently by the central banks of Iceland and Turkey (see [Gudmundsson 2017](#) and [Başçı, Özel and Sarıkaya 2008](#)): a local monetary tightening can become expansionary if the higher yields attract a massive

amount of foreign capital, and the appreciation of the local currency relaxes collateral constraints in the local economy. In that case, the contractionary impulse from the US should be countered by tightening domestic monetary conditions, leaving the exchange rate more or less unchanged. Obviously, this requires that financial spillovers are sufficiently strong: the direct expansionary effects of an appreciation become so large that they overwhelm the other and more usual contractionary channels of transmission of monetary policy.

To illustrate this possibility, [Fig. 12](#) reports the impulse response of EM output for a US monetary policy tightening, in a New Keynesian model calibrated to Chile, with dominant currency pricing and financial spillovers from the exchange rate.¹² For low levels of financial spillovers (panel (a)), the model operates as a standard Mundell-Fleming or [Gali and Monacelli \(2005\)](#) model: a monetary policy tightening in the US is expansionary abroad, thanks to the depreciation of the local currency against the dollar. As we increase the degree of financial spillovers, the depreciation tightens the financial constraints, hurting the local economy. For moderate or high levels of financial spillovers, a US tightening contracts the local economy (panels (b) and (c)). [Fig. 13](#) reports the calibrated impulse responses to a domestic monetary policy tightening. The case of low financial spillovers, as before, corresponds to the Mundell-Fleming case where a monetary tightening is contractionary (panel (a)). For moderate levels of spillovers, a domestic tightening remains contractionary, but less so: the appreciation of the local currency against the dollar relaxes borrowing constraints (panel (b)). Overall, though even if local monetary policy has become less effective, the optimal response to a US tightening -which contracts the EM economy- is to ease monetary policy. Finally, panel (c) considers the case of high financial spillovers. In that case, the balance sheet effects of an appreciating currency are so strong that the economy expands when the domestic policy rate is increased. A tightening of domestic monetary policy becomes desirable precisely because it is expansionary.

¹²The financial spillovers are modeled simply by assuming that some households are borrowing constrained and that their borrowing limit increases as the currency appreciates.

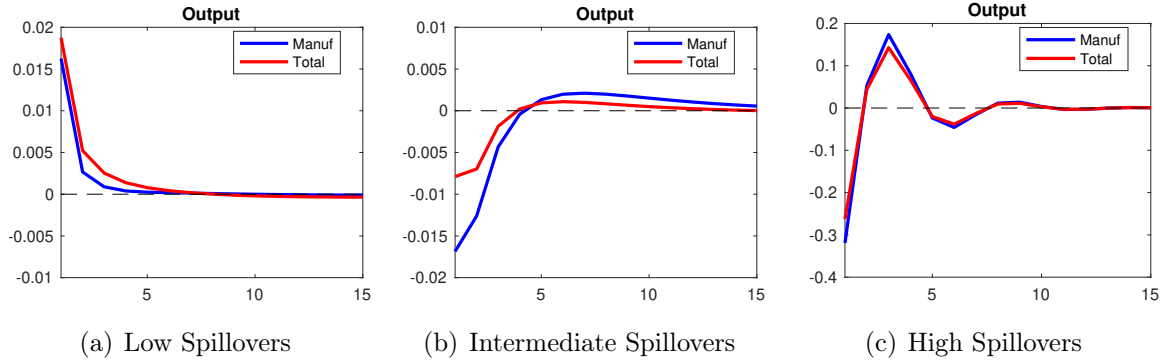


Figure 12: Impulse Response of EME output to a US Monetary Policy Tightening for various degrees of financial spillovers. Source: [Gourinchas \(2018\)](#). The figure reports the effect of a US monetary tightening on EM's output with various degrees of financial spillovers.

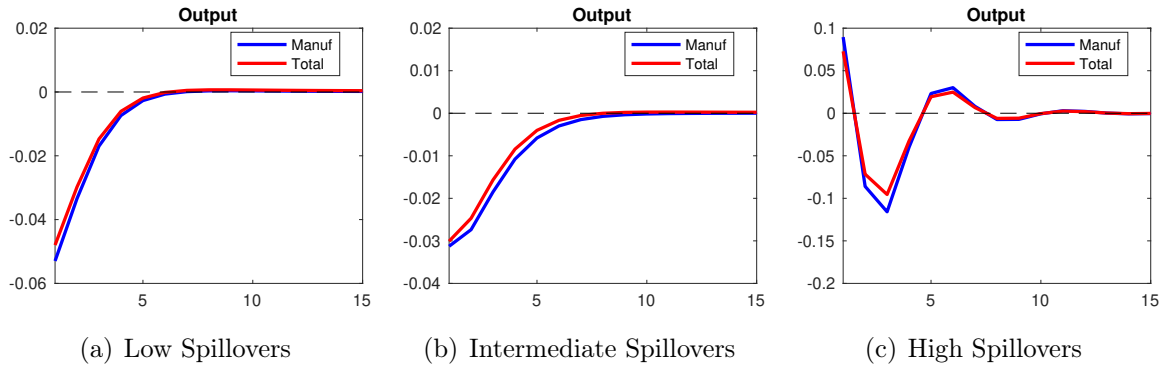


Figure 13: Impulse Response of EME output to an EME Monetary Policy Tightening for various degrees of financial spillovers. Source: [Gourinchas \(2018\)](#). The figure reports the effect of a domestic monetary tightening on domestic output for various degrees of financial spillovers.

The upshot is that, while financial spillovers and dollar invoicing reduce the effectiveness of flexible exchange rates, they do not necessarily make flexible exchange rate less desirable for emerging market economies. In other words, the Trilemma may be reinforced, not weakened, by the global financial cycle. Whether this is the case or not depends, crucially, on the strength of financial spillovers from the exchange rate, and on the transmission of US and local monetary policy. These are empirical questions of the first importance to which we have, so far, few definitive answers.

4.4 Safe Asset Scarcity, Safety Traps and Currency Wars

The transition to a dollar standard limited the supply of global safe assets to dollar safe assets. While dollars safe assets may have initially been in abundant supply, increases in capital mobility, rapid economic growth in emerging markets ahead of their level of financial development, and new regulations in the wake of the global financial crisis have created and perpetuated a global scarcity of safe assets (Caballero et al. 2017b). This scarcity is one of the defining characteristics of our economic environment. It is consistent with the secular decline in global real interest rates since the early 1980s. It is also consistent with the observed divergence between the average real return to physical capital and the risk free real rate.¹³

Caballero, Farhi and Gourinchas (2016) argue that the scarcity of safe assets mutates once the economy reaches the Effective Lower Bound (ELB) on the policy rate. Above the ELB, the scarcity is benign: countries with a scarcity of safe assets run a current account surplus vis-à-vis safe asset providers, and these surpluses pushes the global safe real rate downwards. At the ELB, the scarcity becomes malign: since the equilibrium real rate cannot fall sufficiently to equilibrate the market for safe assets, aggregate demand falls short of potential output and the global economy experiences a recession. In that environment, countries face a strong incentive to reflate their economy at the expense of their neighbor, for instance by depreciating their currency. In other words, there is a potential for currency wars. More generally, there are strong gains from coordinating macroeconomic policies. In the extreme, policies that seem to be appropriate locally, such as increasing price flexibility, or building safety nets by accumulating reserves, or implementing stricter liquidity requirement on the banking sector as envisioned under Basle

¹³The increased spread between the economic return to productive capital and the risk free rate is also consistent with increased rents in the economy. Caballero, Farhi and Gourinchas (2017a) proposes a macro decomposition that allows for increased rents as well as increased risk premia or factor-augmenting technological progress. It finds that increased rents or technological progress cannot alone explain the decline in the labor share and observed trends in returns. See also Farhi and Gourio (2019).

III, may be self-defeating globally: by accentuating the scarcity of safe assets, they may push the global economy further into a recession (Fornaro and Romei 2018).

5 Where Do We Go from There? New Triffin Dilemma and Shadow RMB Anchor.

In conclusion, I would like to offer a few prospective remarks. First, Fig. 14 extends Fig. 2, using World Economic Outlook data. It reports output shares between 1980 and 2024 as predicted by the International Monetary Fund, for the same countries and regions.¹⁴ The message is very clear: the share of US output in world output is expected to decline further, from 15.5% in 2016 to 13.7% in 2024. Much of the growth is expected to come from India (7.3% to 9.8%) and China (17.6% to 21.4%). This secular decline in the relative size of the U.S. raises important questions for the continued primacy of the dollar.

To begin with, in the near future, the US is bound to remain the primary issuer of global safe assets. All other candidate international currencies lag far behind the dollar along almost all dimensions (see Fig. 3). The immediate implication is that, unless the supply of dollar safe assets rises in line with global demand, the global scarcity of safe assets is bound to increase, pushing global real safe rates uncomfortably close to the ELB. The macroeconomic risks of such an environment are quite easy to grasp: at the ELB, the global economy tips over into a recession. The increasing scarcity of safe assets keeps the economy in the danger zone. Furthermore, as I've argued above, self-oriented policies such as fiscal austerity, reserve accumulation or stricter liquidity requirement in the banking sector, that may look appropriate at the country level, could well be self-defeating globally as they further increase global demand for safe assets or reduce its supply.

¹⁴There are small but non negligible differences between Fig. 2 and Fig. 14. These are not important for our purpose and I will ignore them.

Other dangers lurk in the corners. Low safe real rates, below the growth rate of the economy, send a strong market signal that debt sustainability is not an issue. This is the case whether the issuers have sufficient borrowing capacity or not. For the former, more debt issuance increases the supply of safe assets and helps move the global economy away from safety traps (Caballero et al. 2016, 2017b). For the latter, whether private or public, a key question is whether markets have the ability to correctly price credit risk. The experience of the latest global financial crisis is not encouraging. Caballero et al. (2008) argued that environments with a scarcity of safe assets are prone to bubbles. One way to think about these bubbles is that they increase the supply of ‘quasi-safe’ assets. While this may temporarily alleviate the problem, it also makes the global economy more risky since these are not truly safe assets: bubble are rarely safe. The danger, then, is that efforts to make some parts of the financial system safer only help to push vulnerabilities to other corners.¹⁵ As argued by Shin (2014), a second phase of global liquidity started around 2010, with a substantial increase in dollar debt issuance substituting for cross-border dollar loans, since the latter were subject to a stricter regulatory environment (see Fig. 7). In turn, continued or even increased private sector reliance on dollar funding makes local authorities reluctant to let their currency depreciate against the dollar, and potentially increases sovereign default risk, even on local currency debt (Du and Schreger 2016). Increased reliance on dollar funding also increases the desirability of holding dollar reserves (Gopinath and Stein 2018b).

Core safe asset providers such as the US face a problem of a different nature: a modern version of the old Triffin dilemma. Expanding public debt in line with a growing global

¹⁵Carstens and Shin (2019) make a similar argument in relation to the original sin debate: the development of local currency bond markets for sovereign debt may look like it is insulating sovereigns from fluctuations in the dollar exchange rate. Yet it simply pushes the currency risk onto the marginal (and foreign) lender. In the end, local currency bond markets may simply substitute currency risk for default risk without substantially improving risk sharing.

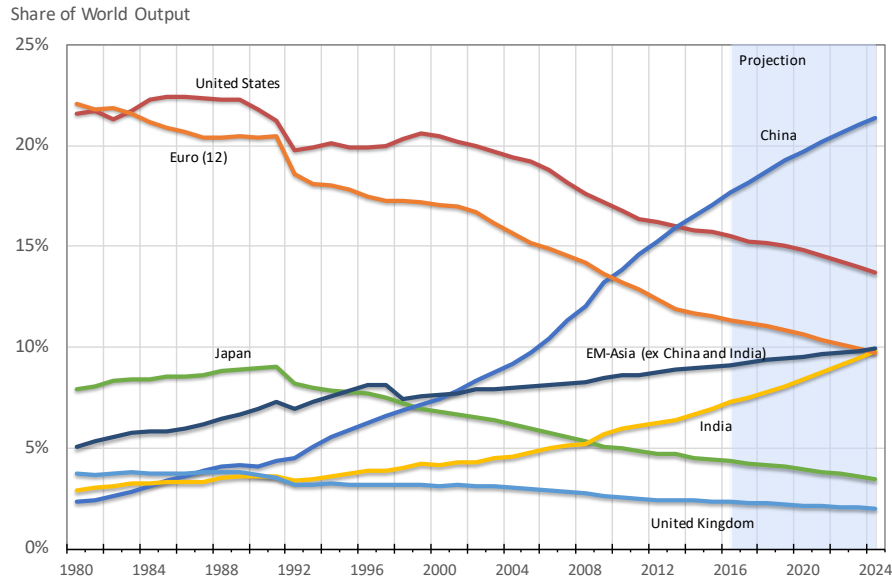


Figure 14: World Output Shares - 2. Source: World Economic Outlook, April 2019. Output shares based on PPP. EM-Asia ex China and India consists of Bangladesh, Cambodia, Hong-Kong, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Thailand and Vietnam. Euro12 consists of: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain.

demand is tempting: yields remain low, so that debt sustainability does not appear to be an issue. Furthermore, to the extent that the global economy is close to the effective lower bound, fiscal policy is likely to be quite stimulative. The alternative, with an unchanged supply of safe assets and real rates at the ELB, is a secular appreciation of the dollar which restores equilibrium on the market for safe assets by reducing foreign demand (in dollars) (Caballero et al. 2017b). However, since the share of the US economy will continue to decline, expanding US public debt in line with the growth of the world economy must eventually exhaust the fiscal capacity of the US, and before that, runs the risk of coordination failure type run on its debt (Farhi and Maggiori 2018).

To put it differently, while the dollar hegemon is locally stable, it is not sustainable. The global economy will have to transition, at some point in the future, either to another single anchor, or to a multipolar environment. The former scenario is much less likely than the latter since no-one anticipates a full displacement of the dollar. The most likely

path is one where the dollar co-exists with one or two other global international currencies: the renminbi and possibly the euro.

While that transition will not be completed anytime soon, it is already partially under way. First, renminbi internationalization has started, both by design, and as a consequence of the increased size of the Chinese economy and the explosion in the volume of trade between China and the rest of the world. The use of renminbi for trade invoicing, trade settlement, cross-border financial transactions, or official use, has soared in the last ten years, in part due to a number of policy initiatives implemented by the Chinese authorities, including trade settlement programs, RMB offshore clearing banks, off-shore RMB denominated bond market in Hong Kong (so called ‘dim sum’ bonds), and a network of central bank RMB swap lines.¹⁶ These initial efforts culminated in October 2016 with the addition of the renminbi to the basket making up the International Monetary Fund’s Special Drawing Rights. More recently, China introduced an RMB denominated oil future contract (‘petroyuan’) and allowed the inclusion of Chinese local bonds in Bloomberg global bond index. As in the case of the dollar, we ought to expect that the use of the renminbi for trade invoicing and settlement will increase the private sector demand for renminbi funding, and vice versa; that increased renminbi invoicing and borrowing will increase the desirability of anchoring one’s currency to the RMB, and to hold RMB reserves; and conversely that stability in the RMB-local exchange rate and abundant RMB reserves will make it more desirable to invoice and borrow in RMB.

These complementarities also suggest that the transition could gather speed once it gets seriously under way. Consider, for instance, the question of RMB anchoring. No country is currently anchoring to the RMB. In part this is because, while the currency is technically deemed ‘freely usable,’ it still faces significant restrictions.¹⁷ Another reason

¹⁶See [Eichengreen and Kawai \(2015\)](#) for a detailed description of each policy initiative.

¹⁷The IMF criterion for a ‘freely usable’ currency does not require that all capital controls be dismantled.

is that, as long as the dollar-RMB exchange rate remains reasonably stable, anchoring to the dollar indirectly also anchors to the RMB. The argument is similar to that of sterling anchoring during the Bretton Woods era and described above: for all intents and purposes, sterling anchors were shadow dollar anchors. Once currencies started floating, countries -especially in Asia- had to choose whether to remain anchored to the sterling or the dollar. All of them chose the dollar. Similarly, for some countries, a dollar anchor may already be a 'shadow RMB anchor.' A switch to RMB anchoring would occur, should significant monetary instability between the two countries arise. This could force a rapid realignment with the emergence of a RMB zone.

References

- Akinci, Ozge and Albert Queralto, “Balance sheets, exchange rates, and international monetary spillovers,” June 2018. FRB of New York Staff Report No. 849.
- Aliber, Robert Z, National Preferences and the scope for International monetary reform number 101, International Finance Section, Princeton University, 1973.
- Avdjiev, Stefan, McCauley Robert N., and Hyun Song Shin, “Breaking free of the triple coincidence in international finance,” 2015. Working Paper 524, Bank Int. Settl., Basel, Switz.
- , Wenxin Du, Catherine Koch, and Hyun Song Shin, “Exchange rates, currency hedging and the cross-currency basis,” 2016. Working Paper 592, Bank Int. Settl., Basel, Switz.
- Başçı, Erdem, Özgür Özel, and Çağrı Sarıkaya, “The monetary transmission mechanism in Turkey: new developments,” 2008. Paper No 35, Bank Int. Settl., Basel, Switz.
- Bernanke, Ben S., Carol Bertaut, Laurie Pounder DeMarco, and Steven Kamin, “International capital flows and the returns to safe assets in the United States, 2003-2007,” International Finance Discussion Papers 1014, Board of Governors of the Federal Reserve System 2011.
- Bolt, Jutta, Robert Inklaar, Herman de Jong, and Jan Luiten van Zanden, “Rebasing ‘Maddison’: new income comparisons and the shape of long-run economic development,” GGDC Research Memorandum, 2018, 174.
- Bruno, Valentina and Hyun Song Shin, “Capital flows and the risk-taking channel of monetary policy,” *Journal of Monetary Economics*, 2015, 71, 119–132.
- , Se-Jik Kim, and Hyun Song Shin, “Exchange Rates and the Working Capital Channel of Trade Fluctuations,” *AEA Papers and Proceedings*, 2018, 108, 531–36.
- Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas, “Financial Crash, Commodity Prices and Global Imbalances,” *Brookings Papers on Economic Activity*, 2008, 2, 1–55.
- , —, and —, “Global Imbalances and Currency Wars at the ZLB,” March 2016. NBER Working Paper No. 21670.
- , —, and —, “Rents, technical change, and risk premia accounting for secular trends in interest rates, returns on capital, earning yields, and factor shares,” *American Economic Review*, 2017, 107 (5), 614–20.
- , —, and —, “The Safe Assets Shortage Conundrum,” *Journal of Economic Perspectives*, 2017, 31 (3), 29–46.
- Calvo, Guillermo A. and Carmen M. Reinhart, “Fear of Floating,” *The Quarterly Journal of Economics*, May 2002, 117 (2), 379–408.

- Carstens, Agustín and Hyun Song Shin, “Emerging Markets Aren’t Out of the Woods Yet,” *Foreign Affairs*, 2019.
- Coeuré, Benoit, “Asserting Europe’s leadership,” Panel remarks, *Les rencontres économiques d’Aix-en-Provence*, July 2018.
- Cooper, Richard N, “The Future of the Dollar,” *Foreign Policy*, 1973, (11), 3–32.
- Du, Wenxin and Jesse Schreger, “Sovereign Risk, Currency Risk, and Corporate Balance Sheets,” *Harvard Business School Working Papers 17-024*, Harvard Business School 2016.
- Egorov, Konstantin and Dmitry Mukhin, “Optimal Monetary Policy under Dollar Pricing,” March 2019. mimeo Yale University.
- Eichengreen, Barry and Guangtao Xia, “China and the SDR: Financial Liberalization through the Back Door,” *Quarterly Journal of Finance*, 2019.
- and Masahiro Kawai, *Renminbi internationalization: Achievements, prospects, and challenges*, Brookings Institution Press, 2015.
- and Ricardo Hausmann, “Exchange Rates and Financial Fragility,” *Federal Reserve Bank of Kansas City Economic Policy Symposium*, 1999.
- , Arnaud J Mehl, and Livia Chitu, “Mars or Mercury? The Geopolitics of International Currency Choice,” *Working Paper 24145*, National Bureau of Economic Research December 2017.
- Eren, Egemen and Semyon Malamud, “Dominant currency debt,” November 2018. CEPR Discussion Paper No. DP13391.
- European Central Bank, “The international role of the euro,” *Interim report*, June 2018.
- Farhi, Emmanuel and François Gourio, “Accounting for macro-finance trends: Market power, intangibles, and risk premia,” February 2019. NBER Working Paper No. 2582.
- and Matteo Maggiori, “A Model of the International Monetary System,” *Quarterly Journal of Economics*, 2018, 133 (1), 295–355.
- , Pierre Olivier Gourinchas, and Hélène Rey, *Reforming the International Monetary System*, CEPR eBook, 2011.
- Fornaro, Luca and Federica Romei, “The paradox of global thrift,” December 2018. Banco de Espana Working Paper No. 1845.
- Gali, Jordi and Tommaso Monacelli, “Monetary policy and exchange rate volatility in a small open economy,” *The Review of Economic Studies*, 2005, 72 (3), 707–734.
- Goldberg, Linda and Cédric Tille, “Macroeconomic interdependence and the international role of the dollar,” *Journal of Monetary Economics*, 2009, 56 (7), 990–1003.

- Gopinath, Gita, The International Price System, Jackson Hole Symposium Proceedings, 2016.
- and Jeremy C. Stein, “Banking, Trade, and the Making of a Dominant Currency,” Technical Report, National Bureau of Economic Research April 2018. NBER Working Paper, No. w24485.
 - and —, “Trade Invoicing, Bank Funding, and Central Bank Reserve Holdings,” AEA Papers and Proceedings, 2018, 108, 542–46.
 - , Emine Boz, Camila Casas, Federico Diez, Pierre-Olivier Gourinchas, and Mikkel Plagborg-Møller, “Dominant Currency Paradigm,” Dec 2018. NBER Working Paper No. 22943.
- Gorton, Gary and Andrew Metrick, “Securitized banking and the run on repo,” *Journal of Financial economics*, 2012, 104 (3), 425–451.
- Gourinchas, Pierre-Olivier, The Fundamental Structure of the International Monetary System, hoover press ed., *Rules for International Monetary Stability: Past, Present and Future*, 2017.
- , “Monetary Policy Transmission in Emerging Markets: An Application to Chile,” in E. Pastén E. Mendoza and D. Saravia, eds., *Monetary Policy and Global Spillovers: Mechanisms, Effects and Policy Measures*, Vol. 25, Santiago: Banco Central de Chile, 2018, chapter 8, pp. 279–324.
 - , Hélène Rey, and Maxime Sauzet, “The International Monetary and Financial System,” *Annual Review of Economics*, Forthcoming 2019.
 - , Hélène Rey, and Nicolas Govillot, “Exorbitant Privilege and Exorbitant Duty,” 2017. Mimeo UC Berkeley.
- Gudmundsson, Már, “Global financial integration and central bank policies in small, open economies,” *The Singapore Economic Review*, 2017, 62 (01), 135–146.
- Ilzetzki, Ethan, Carmen M Reinhart, and Kenneth S Rogoff, “The Country Chronologies to Exchange Rate Arrangements into the 21st Century: will the anchor currency hold?,” Technical Report 23135, National Bureau of Economic Research February 2017.
- , Carmen Reinhart, and Kenneth Rogoff, “Exchange Arrangements Entering the 21st Century: Which Anchor Will Hold?,” *Quarterly Journal of Economics*, 2019, 134 (2), 599–646.
- Ito, Hiro and Menzie D. Chinn, “The rise of the ‘redback’ and the people’s republic of china’s capital account liberalization: An empirical analysis of the determinants of invoicing currencies,” in B. Eichengreen and M. Kawai, eds., *Renminbi Internationalization: Achievements, Prospects, and Challenges*, April 2015.
- Kalemli-Özcan, Şebnem, Se-Jik Kim, Hyun Song Shin, Bent E Sørensen, and Sevcin Yesiltas, “Financial shocks in production chains,” 2014. mimeo, University of Maryland.

- Kamps, Annette, "The Euro as invoicing currency in international trade," ECB Working Paper Series August 2006.
- Kenen, Peter B., "The Role of the Dollar as an International Currency," Occasional Paper, 1983, 13.
- Keohane, Robert O., The theory of hegemonic stability and changes in international economic regimes, 1967-1977, Center for International and Strategic Affairs, University of California, 1980.
- Kindleberger, Charles P, The world in depression, 1929-1939, Univ of California Press, 1973.
- , "Dominance and leadership in the international economy: Exploitation, public goods, and free rides," *International studies quarterly*, 1981, 25 (2), 242–254.
- Lai, Edwin L-C and Xiangrong Yu, "Invoicing currency in international trade: An empirical investigation and some implications for the renminbi," *The world economy*, 2015, 38 (1), 193–229.
- Maggiore, Matteo, Brent Neiman, and Jesse Schreger, "International Currencies and Capital Allocation," 2018. Working Paper, Harvard University.
- McKinnon, Ronald, A new tripartite monetary agreement or a limping dollar standard? number 106, International Finance Section, Princeton University, 1974.
- , *Money in International Exchange: The Convertible Currency System*, Oxford: Oxford University Press., 1979.
- Miranda-Agrippino, Silvia and Hélène Rey, "US Monetary Policy and the Global Financial Cycle," Technical Report, NBER Working Paper No. 21722, Issued in November 2015, Revised in February 2018 2018.
- Mukhin, Dmitry, "An equilibrium model of the International Price System," 2017. mimeo Princeton University.
- Mundell, Robert A, "The monetary consequences of Jacques Rueff," *Journal of Business*, July 1973, 46 (3), 384–395.
- Na, Seunghoon, "The Monetary Policy Dilemma of Emerging Economies," April 2019. mimeo Purdue University.
- Rey, Hélène, "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence," Federal Reserve Bank of Kansas City Economic Policy Symposium, 2013, 2013.
- Rueff, Jacques, *Le péché monétaire de l'Occident*, Paris: Plon, 1971.
- Salomao, Juliana and Liliana Varela, "Exchange Rate Exposure and Firm Dynamics," January 2018. C.E.P.R. Discussion Papers No 12654.

- Shin, Hyun Song, “The second phase of global liquidity and its impact on emerging economies,” in “Volatile capital flows in Korea,” Springer, 2014, pp. 247–257.
- Stavrakeva, Vania and Jenny Tang, “The dollar during the global recession: US monetary policy and the exorbitant duty,” 2018.
- Triffin, Robert, Gold and the Dollar Crisis; the future of convertibility, New Haven, Connecticut: Yale University Press, 1961.
- Whitman, Marina VN, “The current and future role of the dollar: How much symmetry?,” Brookings Papers on Economic Activity, 1974, 3, 539–591.