
“Dollar Rivals”: Can the Dollar-Based System Be Improved or Replaced?

JEFFREY FRANKEL

The question of the international currency status of the dollar versus its potential rivals is not new, but it has been accorded an unusual amount of attention in the past few years, among scholars and non-scholars alike. With more data available than ever before, it is a good time to take stock. This chapter examines possible alternatives to a unipolar dollar-based system. It examines measures of international currency use, potential challenges to the dollar, whether a multipolar currency system is consistent with the existence of network externalities, and gold and digital currencies as alternatives to national currencies.

Measures of International Currency Use

An international currency like the dollar serves many functions (table 25.1). It is a currency in which central banks and sovereign wealth funds hold international reserves, an anchor currency to which smaller countries' currencies can peg, a currency to use in denominating or invoicing trade, and a vehicle currency for foreign exchange trading.¹

1. A standard analogy illustrates its role (Kindleberger 1967). If Brazilians want to communicate with Filipinos, they are likely to find it more convenient to do so via some third language, such as English or Spanish, because the chances that either group speaks the other's language is slim. Similarly, if someone in the Philippines wishes to conduct business with someone from Brazil, they will find it more convenient to transact via some

Table 25.1

Roles of an international currency

Function of money	Governments	Private actors
Store of value	International reserves held by central banks	Currency substitution (private dollarization)
Medium of exchange	Vehicle currency for foreign exchange intervention	Vehicle currency for private foreign exchange trades
Unit of account	Anchor for pegging smaller currencies	Invoicing trade and financial transactions

Sources: Cohen (1971), as revised by Kenen (1983) and Frankel (1992).

Data are most complete for the first criterion, from central banks' reported reserve holdings. The dollar's share of foreign exchange reserves has been declining gradually since the turn of the 20th century. In 1999, when the newborn euro took the place of the French franc and German mark, the dollar constituted 71 percent of allocated holdings (that is, reserve holdings of which the currency composition is known).² By mid-2023, its share had declined to 59 percent, a rate of decline of about half a percentage point a year, according to the Currency Composition of Official Foreign Exchange Reserves (COFER) site of the International Monetary Fund (IMF).³

The dollar still remains far ahead of the next-most important international currency, the euro, which represents 20 percent of allocated holdings, a share that is not growing. If the dollar's share were to continue to decline by half a percentage point per year, it would take another 70 years for it to fall to the euro's share.⁴

third currency, such as dollars or euros, than to try to find someone who wants to take the other side of a *peso-real* trade.

2. Eichengreen and Mathieson (2001) characterize the currency composition of reserves as stable in the 1980s and 1990s. In fact, the dollar share declined after 1977, in tandem with the value of the dollar, recovering only in the late 1990s.

3. Prasad (2019) notes that the unallocated proportion of global reserves has become less of a limitation of the COFER statistics since China began to share the currency breakdown of its reserves with the IMF, a policy that it phased in over the period 2014–18.

4. This calculation assumes that the euro's share remains unchanged. If central banks switched out of dollars into euros, the catch-up date would be sooner.

The euro is well ahead of the yen, which ranks third. The yen is followed by the pound sterling in fourth place. The much-ballyhooed renminbi moved into fifth place only relatively recently, having passed the Canadian dollar and the Australian dollar.

Use of a currency internationally for one purpose is highly correlated with its use for others, both causally and statistically (Aiyar et al. 2023). Causally, Gopinath and Stein (2018, 2021) show that the international use of a currency with which to invoice trade (unit of account) is bi-directionally related to the use of the currency financially (store of value, particularly in the case of a currency with safe-haven properties, like the dollar and yen).

The correlation is also evident statistically. The dollar remains number one not only by the criterion of reserve holdings but also by the criteria of denominating and invoicing trade (Engel 2006; Goldberg and Tille 2008; Gopinath 2015; Boz et al. 2020), denominating international debt and loans, foreign exchange turnover (BIS 2022), and global payments.⁵ According to an overall measure of international currency use computed at the Federal Reserve, the dollar remains three times as important as the euro and far more important than the yen, pound, or renminbi (Bertaut, von Beschwitz, and Curcuru 2021).

Only in the case of global SWIFT payments does the euro come close to the dollar's share (SWIFT 2023). In 2023, 32.6 percent of payments were in euros, and 41.7 percent were in US dollars. The renminbi was in fifth place, at 2.3 percent.⁶

The Challengers

When the Bretton Woods system came undone 50 years ago, the dollar seemed to lose its special status. Initially, some expected that the IMF's Special Drawing Rights (SDRs) could fill the gap (Grubel 1963; Solomon 1976; Kenen 1987; Williamson 2009). The SDR had been proposed and created as a means of repairing the Bretton Woods system by offering an alternative to dollar reserves. But the synthetic unit never caught on as an international currency (Eichengreen and Frankel 1996; Obstfeld 2011). By 1979, 12 countries (16 percent of all peggers), many of them in Africa or

5. As of April 2022, the dollar was used in almost three times as many foreign exchange transactions as the euro, its nearest competitor, whether by simple spot trades or derivatives. Following the dollar and euro in the ranking come the yen, pound, renminbi, Australian dollar, Canadian dollar, and Swiss franc, in that order.

6. Recent growth in the renminbi would show up more strongly if data on the Cross-Border Interbank Payment System, which China launched in 2015, or other non-SWIFT alternative payments systems, could be included.

the Middle East, had pegged their currencies to the SDR. That figure rose to 16 (23 percent) by 1982, but it was all downhill from there. By 1995, the number had declined to just three (Libya, Myanmar, and Seychelles). The SDR largely fell out of use, except as an international reserve asset for central banks.⁷

The SDR lacks the advantage of a base where it is the indigenous national currency. In the linguistic analogy, if the dollar is akin to the English language as the world's lingua franca, then the SDR is akin to Esperanto. Both the SDR and Esperanto were deliberately designed for maximum practicality but remain little used in practice, precisely because they were created artificially rather than growing organically out of a substantial home base.

Excitement over rival currencies tends to come in waves of pessimism regarding the role of the dollar.⁸ In the last 40 years, a procession of other currencies has been characterized as potentially challenging the dollar as premier international currency. The deutsche mark in 1973–90 (Tavlas 1993); the yen in 1984–91 (Frankel 1984; Tavlas and Ozeki 1992; Hale 1995; and Takagi 2011); and the euro in the 2000s (Alogoskoufis and Portes 1992; Bergsten 1997; Portes and Rey 1998; Frieden 2000; Chinn and Frankel 2007; Posen 2008; Goldberg 2010) each had its turn. Since around 2009, it has been the turn of the renminbi (Dobson and Masson 2009; Ito 2010; Park and Song 2010; Eichengreen 2011b; Subramanian 2011a, 2011b; Prasad and Ye 2012; Frankel 2012; and Zhang 2022).

Predictions that the renminbi might challenge the dollar for the number one spot by 2020 were obviously premature. China's currency has two of the three necessary conditions to be a leading international currency—economic size and the ability to keep its value. It lacks the third—deep, liquid, open financial markets—however. Much as the Chinese government craves the global stature of a major international currency, it has not been willing to give up capital controls and allow free convertibility. It halted its efforts to internationalize Chinese financial markets after 2014, when 10 years of net capital inflows gave way to 10 years of net capital outflows. China also lacks a democratic form of government, a free media, and an independent central bank, which most international currencies have.

7. The IMF occasionally still issues new batches of SDRs, as it did in August 2009 in response to the global financial crisis (Truman 2022).

8. One wave of declarations that the dollar was on its way out came in 1995, at the nadir of a 10-year decline in its foreign exchange value against the mark and yen (not that there need be any connection between international use of a currency and its exchange rate). See, for example, Kindleberger (1995), Kunz (1995), and Frankel (1995).

In 2023, the BRICS (Brazil, Russia, India, China, and South Africa) began talking about establishing a new currency as an alternative to the dollar.⁹ Details are scarce. Because of its size, China would dominate a BRICS currency, however, and it is hard to imagine that five such disparate countries could live with a common currency, whether or not it would be China's. Russia has proposed that the BRICS currency might be a new basket of the five national currencies. If such a new synthetic currency is envisioned alongside the five existing currencies, it would fail for lack of a home base, like the SDR but more so.

The gradual move of global central bank reserve holdings out of dollars is not primarily into any of the aforementioned challengers but rather into new, relatively small reserve currencies, such as the Canadian dollar, Australian dollar, South Korean won, Swedish krona, and Norwegian krone (Arslanalp, Eichengreen, and Chima Simpson-Bell 2022). Some other relatively small currencies, such as the Singapore dollar, the South African rand, and the New Zealand dollar, are held as reserves or considered as anchor currencies by a few countries that are still smaller, located in their respective regions. One might add these small units to the list of international currencies, though obviously not as candidates for the number one slot.

Is a Multicurrency System Consistent with Network Externalities?

The traditional view of international currencies accords a very strong role to network externalities (Kindleberger 1981; Krugman 1984; Matsuyama, Kiyotaki, and Matsui 1993; Rey (2001), and Gopinath and Stein 2018, 2021). Like the English language, people find the dollar convenient to use, given that everyone else is using it. Like a language, there are good reasons to have a single currency dominate at any given time. It is more efficient to use one currency internationally for the same reasons that it is more efficient to have a single currency *within* a country.

One implication of network externalities is inertia in the world's "choice" of the top international currency ("choice" is in scare quotes because these models tend to have multiple equilibria and thus path dependence). There may be long lags between the time that one currency's fundamental advantages, especially the size of the home economy, surpass those of another currency, and the time that the system reaches the tipping point, when the challenger currency overtakes the incumbent in international use.

9. Paul McNamara, "Why a BRICS Currency Is a Flawed Idea," *Financial Times*, February 10, 2023.

Statistical studies of reserve holdings find a lot of inertia (Lindert 1969; Krugman 1984; Chinn and Frankel 2007; Iancu et al. 2020; and others). The traditional view is that inertia explains why the dollar did not fully supplant the pound as the premier international currency until 1950 or so. The fundamental determinants had come to favor the dollar over the pound by around 1920. The United States passed the United Kingdom in economic size in 1872 and had acquired a central bank in 1913; Britain had lost the strength that goes with being a large international creditor as a result of borrowing during World War I. But inertia delayed the overturning of the old order (Schenk 2010).

A new view posits that network externalities are not as large as previously believed and that multiple leading international currencies can exist simultaneously (Eichengreen 2010, 2011a, 2011b). Eichengreen and Flandreau (2009, 2012) and Chitu, Eichengreen, and Mehl (2014) argue that the dollar surpassed the pound by 1925. A reasonable verdict is that international use of the dollar attained approximately the same level as the pound in the 1920s and 1930s; the dollar pulled decisively ahead of the pound only after World War II.

The global monetary system can be usefully viewed as a tradeoff between the advantage of a single currency (network externalities) and the disadvantage (the fact that the issuing country may abuse its exorbitant privilege, provoking countries to look for alternatives) (Farhi and Maggiori 2018). Abusing the exorbitant privilege used to mean excessive budget deficits, money growth, current account deficits, inflation, and depreciation.¹⁰ Econometric estimation of the determination of international currency shares included the ability of a country's currency to hold its value. (Two other standard determinants are country size and the openness and liquidity of the country's financial markets. See Dooley, Lizondo, and Mathieson 1989; Mathieson and Eichengreen 2000; Chinn and Frankel 2007; Ito and McCauley 2020; Aizenman, Cheung, and Qian 2020; Lusinyan et al. 2020; Arslanalp, Eichengreen, and Simpson-Bell 2022; and Chinn, Ito, and McCauley 2022.)

Lately, overuse of exorbitant privilege has taken on an additional meaning. It has been increasingly evident that frequent use of sanctions by the United States can provoke some countries to move away from reliance on dollars.

10. The 1973 collapse of the monetary system was not simply the culmination of the Triffin Dilemma (Triffin 1960); it was accelerated by the fiscal and monetary expansion of the Vietnam War era, under Presidents Lyndon B. Johnson and Richard M. Nixon. Since 1973, the United States has accumulated another \$31 trillion in national debt, in 2020 attaining the highest ratio of debt to GDP since World War II.

Most international sanctions are thought to have accomplished relatively little, historically, when applied without multilateral support (Bapat and Morgan, 2009). Most experts view them as a way for a country to register a clear protest, one of the few options between armed intervention and doing nothing. But sanctions have been used more often in recent years, particularly financial sanctions.

The US government's exploitation of the dollar's global dominance in order to extend the extraterritorial reach of US law and policy has been called "weaponization of the dollar."¹¹ An attempt to shut Iran out of the international banking system was among the economic sanctions applied in response to its threatened development of nuclear weapons. Initially, in 2005, the United States had multilateral support. Europeans occasionally grumbled about US extraterritoriality, suspecting that the United States might be quicker to impose large penalties on European banks than on their American peers for violating sanctions, but they went along. Sanctions were lifted when Iran agreed to halt its nuclear weapons program under the 2015 Iran nuclear deal (the Joint Comprehensive Plan of Action).

The sanctions garnered little multilateral support when President Donald J. Trump reinstated them in September 2020. In 2018, he had pulled the United States out of the 2015 agreement. In the eyes of the international community, Iran's compliance with the terms of that agreement made it difficult to justify sanctions in the name of a global public good and easier to characterize them as an abuse of the United States' exorbitant privilege.¹² Not just China but Europe as well looked for channels to pay for purchases of Iranian oil outside the US-controlled banking system. The episode added to concerns that the dollar might lose its long-standing primacy.

When Russia seized Crimea and invaded the eastern provinces of Ukraine, in 2014, the US, EU, and other allies applied financial and other sanctions. Their effects turned out to be limited. Worse, they motivated the Russian government to spend the next seven years building up its financial defenses. With the aid of substantial current account surpluses, its central bank by early 2022 accumulated \$643 billion worth of international reserves, equal to an impressive 40 percent of GDP. Further, the

11. Jeffrey Frankel, "How a Weaponized Dollar Could Backfire," *The Guardian*, October 23, 2019. Available at <https://www.project-syndicate.org/commentary/donald-trump-weaponized-dollar-could-backfire-by-jeffrey-frankel-2019-10>.

12. Quint Forgy, "Trump Administration Unveils New Sanctions on Iran Despite Foreign Resistance," *Politico*, September 21, 2020. Available at <https://www.politico.com/news/2020/09/21/trump-administration-sanctions-iran-419408>.

Bank of Russia, almost alone among the world's central banks, deliberately shifted most of the composition of its international reserves out of dollars and into renminbi, other nondollar currencies, and gold.

Before the 2022 invasion of Ukraine, cutting off Russian banks from the global financial system, via the SWIFT system or otherwise, seemed an ambitious goal. In the event, the United States and its allies were able to achieve it and much more. The US Treasury, together with the European Union, Japan, other G-7 countries, Switzerland, South Korea, and Singapore, jointly took almost unprecedentedly strong action on February 28, 2022. They denied the Russian authorities (the central bank and the sovereign wealth fund) access to their foreign exchange reserves and other assets held overseas, thereby disarming Russia's carefully prepared financial defenses. As a result, the ruble plummeted 30 percent, on top of earlier declines, bringing it below \$0.01 in value. The ruble soon recovered its value. But it fell sharply once again in 2023, standing in November at 20 percent below the pre-invasion level.

By late 2023, the results of the sanctions seems to have been less than expected. The expansion of alternative payment mechanisms, in renminbi and other non-dollar currencies, has facilitated evasion of sanctions.

A few recent studies examine whether the countries that are geopolitically the least aligned with the United States—and thus the most exposed to the threat of sanctions—are generally the ones that have been shifting their reserve holdings out of dollars. Eichengreen, Mehl, and Chitu (2017) use a dummy variable reflecting whether a country has a defense pact with the United States. Mosler and Potrafke (2020) and Perez-Salz, Zhang and Iyer (2023) use the frequency with which the country votes in agreement with the United States in United Nations General Assembly resolutions. Arslanalp, Eichengreen, and Simpson-Bell (2022), use both variables. The case of Russia notwithstanding, the general finding in these studies is little significant positive effect of these measures of geopolitical proximity on dollar holdings.¹³

Alternatives to National Currencies

National currencies are not necessarily the only sort of international reserves or international unit of account or means of payment. Other options include gold—until recently considered by most economists a relic of the barbarous past—and cryptocurrency (a sign of a barbarous future?).

13. Eichengreen et al. (2019), do find effects of bilateral military alliances on currency composition of reserves in the period before World War I.

Economists long believed that central bank holdings of gold were an anachronism. Monetary authorities in many countries still held some gold, but they did not treat it as an active part of their international reserves; that is, they did not buy or sell it. In recent years, central banks, especially in Asia, have been actively buying (and selling) gold (Arslanalp, Eichengreen, and Simpson-Bell 2023). Ferranti (2023) finds that from 2016 to 2021, countries that faced a higher risk of US sanctions increased the share of gold in their international reserves more than countries facing a lower risk of US sanctions.

Ferranti (2023) explores whether it is sensible for a country that faces a modest risk of sanctions to diversify some of its central bank's portfolio out of US Treasuries and into cryptocurrency, specifically bitcoin (see also Smales 2019 and Aysan et al. 2019).¹⁴ Somewhat surprisingly, he concludes that the answer is yes. Given that bitcoin is the asset that is hardest for US authorities to block, the threat of sanctions gives bitcoin a place in some portfolios and a fundamental long-run value.

Conclusion

The US currency has withstood repeated blows over the last five decades, most of them self-inflicted. An alarming example is the danger that repeated standoffs over the debt ceiling between the two political parties will eventually force the US Treasury to default at least partially on its obligations, which are a main component of dollar foreign exchange reserves.

So far, there is still little sign of the dollar losing its position as the leading international currency. Various measures show that it is still comfortably in the number one position. For example, the latest IMF data on the composition of foreign exchange reserves, covering the first half of 2023, show the dollar's share in allocated global reserves rising slightly. Tellingly, when a global shock raises perceptions of risk on the part of financial markets, investors still rush to the US dollar as the safe haven currency—even when the shock originates in the United States, as was the case with the 2007–09 global financial crisis.

14. The cryptocurrency question is distinct from the question of whether countries will issue central bank digital currencies (CBDCs) that are used internationally. If successful, CBDCs would be merely another technological step akin to—but probably less important than—the laying of the first successful trans-Atlantic cable in 1865, which allowed the real-time trading of dollars for pounds (giving this bilateral trade the name “cable”). CBDCs would not eliminate the need for an international vehicle currency, a role now played by the dollar (Eichengreen 2021).

The dollar retains its primacy because of the lack of a good alternative. The euro remains wounded from the 2010 crisis among its periphery members, and too few highly rated government bonds are issued in euros. The economies of Japan, the United Kingdom, and Switzerland are not big enough to sustain the number one role. China is big enough, but it lacks financial markets that are sufficiently deep, open, and liquid. With respect to the store-of-value function of an international reserve asset, the recent resuscitation of gold could make it more important. Even bitcoin could conceivably join the roster. But neither asset can fulfill the functions of a unit of account or a means of payment, at least not as well as the dollar.

It is normal for an important economy like the euro zone or China to conduct some of its trade in its own currency rather than entirely in dollars. It is even normal for such a currency to be used in some transactions between other pairs of countries in its region. This kind of use does not make a currency a plausible candidate to supplant the dollar as the number one international currency, however.

Perhaps the need to balance network externalities against the danger of abuse of the exorbitant privilege can give rise to an equilibrium in which multiple currencies of equal size would serve as the top international currencies. There may be an *a priori* logic supporting three global currencies (the dollar, the euro, and the renminbi). If there is only one premier international currency in the system, its government has a strong incentive to run deficits and profit from the resulting international seigniorage; it can finance its deficits more easily than other currencies, because there is an extra demand for its debt. Having three international currencies would put a check on the single currency's seigniorage. Every time that two of them are tempted to collusively abuse the exorbitant privilege, the third government could keep them honest by exercising greater monetary and fiscal discipline, thereby offering a higher rate of return on its currency and attracting holders away from the first two.

A better equilibrium would be one in which the dollar has a substantially greater role than the euro, the euro has a substantially greater role than the third-place currency, and so on, as in Zipf's Law (Chau, Ilzetzki, and Rogoff 2022). If the dollar was able to withstand the inflation of the Vietnam War era and its aftermath, the Nixon shocks of 1971–73, the 2007–08 subprime mortgage crisis, the 2017–20 American loss of interest in global leadership, and the blowback from the 2022 sanctions imposed on Russia, perhaps it can also withstand the partisan politics that threaten a downgrading of US government debt.

References

- Aiyar, Shekhar, Jiaqian Chen, Christian H. Ebeke, Roberto Garcia-Saltos, Tryggvi Gudmundsson, Anna Ilyina, Alvar Kangur, Tansaya Kunaratskul, Sergio L. Rodriguez, Michele Ruta, Tatjana Schulze, Gabriel, Soderber, and Juan P. Trevino. 2023. *Geo-Economic Fragmentation and the Future of Multilateralism*. Staff Discussion Note 001. Washington: International Monetary Fund. Available at <https://www.elibrary.imf.org/view/journals/006/2023/001/article-A001-en.xml>.
- Aizenman, Joshua, Yin-Wong Cheung, and Xingwang Qian. 2020. The Currency Composition of International Reserves, Demand for International Reserves, and Global Safe Assets. *Journal of International Money and Finance*, 102, 102–120.
- Alogoskoufis, George, and Richard Portes. 1992. European Monetary Union and International Currencies in a Tripolar World. In *Establishing a Central Bank: Issues in Europe and Lessons from the US*, ed. Matthew Canzoneri, Vittorio Grilli, and Paul Masson, 273–302. Cambridge: Cambridge University Press.
- Arslanalp, Serkan, Barry Eichengreen, and Chima Simpson-Bell. 2022. The Stealth Erosion of Dollar Dominance and the Rise of Nontraditional Reserve Currencies. *Journal of International Economics* 138. Available at <https://www.sciencedirect.com/science/article/abs/pii/S0022199622000885>.
- Arslanalp, Serkan, Barry Eichengreen, and Chima Simpson-Bell. 2023. *Gold as International Reserves: A Barbarous Relic No More?* Working Paper WP/23/14. Washington: International Monetary Fund.
- Aysan, Ahmet Faruk, Ender Demir, Giray Gozgor, and Chi Keung Marco Lau. 2019. Effects of the Geopolitical Risks on Bitcoin Returns and Volatility. *Research in International Business and Finance* 47: 511–18.
- Bapat, Navin A., and T. Clifton Morgan. 2009. “Multilateral Versus Unilateral Sanctions Reconsidered: A Test Using New Data.” *International Studies Quarterly* 53, no.4: 1075–1094.
- Bergsten, C. Fred. 1997. The Dollar and the Euro. *Foreign Affairs* (July/August): 83–95.
- Bertaut, Carol, Bastian von Beschwitz, and Stephanie Curcuru. 2021. *The International Role of the US Dollar*. *Fednotes*, October 6. Washington: Federal Reserve System. Available at <https://www.federalreserve.gov/econres/notes/feds-notes/the-international-role-of-the-u-s-dollar-20211006.html>.
- BIS (Bank for International Settlements). 2022. *Triennial Central Bank Survey of Foreign Exchange*. December. Basel. Available at <http://www.bis.org/statistics/rpfx22.htm>.
- Boz, Emine, Camila Casas, Georgios Georgiadis, Gita Gopinath, Helena Le Mezo, Arnaud Mehl, and Tra Nguyen. 2020. *Patterns in Invoicing Currency in Global Trade*. Washington: International Monetary Fund.
- Chau, Vu, Ethan Iletzki, and Kenneth Rogoff. 2022. *Zipf's Law for International Currencies*. March. Cambridge, MA: Harvard University.
- Chinn, Menzie, and Jeffrey Frankel. 2007. Will the Euro Eventually Surpass the Dollar as Leading International Reserve Currency? In *G7 Current Account Imbalances: Sustainability and Adjustment*, ed. Richard Clarida, p. 339–76. Chicago: University of Chicago Press. Available at <https://www.nber.org/books-and-chapters/g7-current-account-imbances-sustainability-and-adjustment/will-euro-eventually-surpass-dollar-leading-international-reserve-currency>.

- Chinn, Menzie D., Hiro Ito, and Robert N. McCauley. 2022. Do Central Banks Rebalance Their Currency Shares? *Journal of International Money and Finance* 122.
- Chitu, Livia, Barry Eichengreen, and Arnaud Mehl. 2014. *When Did the Dollar Overtake Sterling as the Leading International Currency? Evidence from the Bond Markets*. Working Paper 1433. Frankfurt: European Central Bank. Available at <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1433.pdf>.
- Cohen, Benjamin J. 1971. *The Future of Sterling as an International Currency*. London: Macmillan.
- Dobson, Wendy, and Paul Masson. 2009. Will the Renminbi Become a World Currency? *China Economic Review* 20, no. 1: 124–35.
- Dooley, Michael, J. Saul Lizondo, and Donald Mathieson. 1989. *The Currency Composition of Foreign Exchange Reserves*. IMF Staff Papers 36: 385–434. Washington: International Monetary Fund.
- Eichengreen, Barry. 2010. Managing a Multiple Reserve Currency World. In *The Future Global Reserve System: An Asian Perspective* A Project of the Asian Development Bank, Manila, ed. Jeffrey Sachs, Masahiro Kawai, Jong-Wha Lee, and Wing Thyee Woo: Chapter 4. {The project is at <https://aric.adb.org/grs/about.php>}
- Eichengreen, Barry. 2011a. *Exorbitant Privilege: The Rise and Fall of the Dollar and the Future of the International Monetary System*. Oxford: Oxford University Press.
- Eichengreen, Barry. 2011b. The Renminbi as an International Currency. *Journal of Policy Modeling* 33, no. 5: 723–30.
- Eichengreen, Barry. 2021. Will Central Bank Digital Currencies Doom Dollar Dominance? *Project Syndicate*, August 9.
- Eichengreen, Barry, and Marc Flandreau. 2009. The Rise and Fall of the Dollar (or When Did the Dollar Replace Sterling as the Leading Reserve Currency)? *European Review of Economic History* 13, no. 3: 377–411.
- Eichengreen, Barry, and Marc Flandreau. 2012. The Federal Reserve, the Bank of England and the Rise of the Dollar as an International Currency, 1914–39. *Open Economies Review* 23, no. 1: 57–87.
- Eichengreen, Barry, and Jeffrey Frankel. 1996. The SDR, Reserve Currencies, and the Future of the International Monetary System. In *The Future of the SDR in Light of Changes in the International Financial System*, ed. Michael Mussa, James Boughton, and Peter Isard. Washington: International Monetary Fund: 337–378.
- Eichengreen, Barry, and Donald Mathieson. 2001. The Currency Composition of Foreign Exchange Reserves: Retrospect and Prospect. In *The Impact of EMU on Europe and the Developing Countries*, ed. Charles Wyplosz: 269–293. Oxford: Oxford University Press.
- Eichengreen, Barry, Arnaud Mehl, and Livia Chitu. 2017. *How Global Currencies Work*. Princeton, NJ: Princeton University Press.
- Eichengreen, B., Mehl, A. and Chtițu, L. 2019. Mars or Mercury? The geopolitics of international currency choice. *Economic Policy*, 34 (98), pp.315–363.
- Engel, Charlers. 2006. “Equivalence results for optimal pass-through, optimal indexing to exchange rates, and optimal choice of currency for export pricing.” *Journal of the European Economic Association* 4.6: 1249–1260.

- Farhi, Emmanuel, and Matteo Maggiori. 2018. A Model of the International Monetary System. *Quarterly Journal of Economics* 133, no. 1: 295–355.
- Ferranti, Matthew. 2023. Hedging Sanctions Risk: Cryptocurrency in Central Bank Reserves. Chapter 2 of PhD thesis, Department of Economics, Harvard University, Cambridge, MA.
- Frankel, Jeffrey. 1984. *The Yen/Dollar Agreement: Liberalizing Japanese Capital Markets*. Policy Analyses in International Economics 9. Washington: Institute for International Economics.
- Frankel, Jeffrey. 1992. On the Dollar. In *The New Palgrave Dictionary of Money and Finance*. London: Macmillan Press Reference Books.
- Frankel, Jeffrey. 1995. Still the Lingua Franca: The Exaggerated Death of the Dollar. *Foreign Affairs* 74, no. 4: 9–16.
- Frankel, Jeffrey. 2012. Internationalization of the RMB and Historical Precedents. *Journal of Economic Integration* 27, no. 3: 329–65.
- Frieden, Jeffrey. 2000. The Political Economy of the Euro as an International Currency. In *The Euro as a Stabilizer in the International Economic System*, ed. Robert Mundell and Armand Clesse. Boston: Kluwer Academic Publishers: 203–213.
- Goldberg, Linda. 2010. Is the International Role of the Dollar Changing? *Current Issues in Economics and Finance* 16, no. 1.
- Goldberg, Linda S., and Cédric Tille. 2008. Vehicle Currency Use in International Trade. *Journal of International Economics* 76, no. 2: 177–92.
- Gopinath, Gita. 2015. *The International Price System*. Jackson Hole Symposium, vol. 27. Federal Reserve Bank of Kansas City.
- Gopinath, Gita, and Jeremy C. Stein. 2018. Trade Invoicing, Bank Funding, and Central Bank Reserve Holdings. *American Economic Review Papers and Proceedings* 108: 542–46.
- Gopinath, Gita, and Jeremy C. Stein. 2021. Banking, Trade, and the Making of a Dominant Currency. *Quarterly Journal of Economics* 136, no. 2: 783–830.
- Grubel, Herbert G. 1963. *World Monetary Reform: Plans and Issues*. Stanford, CA: Stanford University Press.
- Hale, David. 1995. A Yen for Change: Why the Yen as a Reserve Currency Is Not Far-Fetchd. *The International Economy*, May/June.
- Iancu, Alina, Lucine Lusinyan, Yiqun Wu, Andrea Gamba, Sakai Ando, Gareth Anderson, Neil Meads, Ethan Boswell, and Shushanik Hakobyan. 2022. Reserve Currencies in an Evolving International Monetary System. *Open Economies Review*, 33(5), 879–915.
- Ito, Takatoshi. 2010. China as Number One: How about the Renminbi? *Asian Economic Policy Review* 5, no. 2: 249–76.
- Ito, Hiro, and Robert N. McCauley. 2020. Currency Composition of Foreign Exchange Reserves. *Journal of International Money and Finance* 102: 102104.
- Kenen, Peter. 1983. *The Role of the Dollar as an International Currency*. Occasional Paper No. 13. New York: Group of Thirty.

- Kenen, Peter. 1987. Changing Views about the Role of the SDR and Implications for Its Attributes. In *The International Monetary System and Its Reform, Part II*, ed. Sidney Dell, 373–85. Amsterdam: North Holland.
- Kindleberger, Charles. 1967. *The Politics of International Money and World Language*. Essays in International Finance, No. 61. Princeton, NJ: Princeton University Press.
- Kindleberger, Charles. 1981. *International Money*. London: George Allen & Unwin.
- Kindleberger, Charles. 1995. Is the Dollar Going the Way of Sterling, the Guilder, the Ducat, and the Bezan? *The International Economy*, no. 3: 609–11. Reprinted in Kindleberger. 1999. *Essays in History: Financial, Economic, Personal*. Ann Arbor: University of Michigan Press.
- Krugman, Paul. 1984. The International Role of the Dollar: Theory and Prospect. In *Exchange Rate Theory and Practice*, ed. John Bilson and Richard Marston, 261–78. Chicago: University of Chicago Press.
- Kunz, Diane. 1995. The Fall of the Dollar Order. *Foreign Affairs* 74: 22–27.
- Lindert, Peter. 1969. Key Currencies and Gold: 1900–1913. *Princeton Studies in International Finance* 24: 16–22.
- Matsuyama, Kiminori, Nobuhiro Kiyotaki, and Akihiko Matsui. 1993. Toward a Theory of International Currency. *Review of Economic Studies* 60 (April): 283–07.
- Mosler, Martin, and Niklas Potrafke. 2020. International Political Alignment During the Trump Presidency: Voting at the UN General Assembly. *International Interactions* 46, no. 3: 481–97.
- Obstfeld, Maurice. 2011. *The SDR as an International Reserve Asset: What Future?* International Growth Centre Working Paper, March. London: London School of Economics.
- Obstfeld, Maurice, and Haonan Zhou. 2022. *The Global Dollar Cycle*. *Brookings Papers on Economic Activity* (Fall). Washington: Brookings Institution.
- Park, Yung Chul, and Chi-Young Song. 2010. RMB Internationalization: Prospects and Implications for Economic Integration in East Asia. *Asian Economic Papers* 10, no. 3.
- Perez Saiz, Hector, Longmei Zhang and Roshan Iyer. 2023. Currency Usage for Cross Border Payments. IMF Working Paper No. 2023/072. Washington: International Monetary Fund.
- Portes, Richard, and Hélène Rey. 1998. The Emergence of the Euro as an International Currency. *Economic Policy* 13, no. 26: 306–43.
- Posen, Adam S. 2008. Why the Euro Will Not Rival the Dollar. *International Finance* 11, no. 1: 75–100.
- Prasad, Eswar. 2019. *Has the Dollar Lost Ground as the Dominant International Currency?* Washington: Brookings Institution. Available at https://www.brookings.edu/wp-content/uploads/2019/09/DollarInGlobalFinance.final_9.20.pdf.
- Prasad, Eswar, and Lei (Sandy) Ye. 2012. *The Renminbi's Role in the Global Monetary System*. Washington: Brookings Institution. Available at https://www.brookings.edu/wp-content/uploads/2016/06/02_renminbi_monetary_system_prasad.pdf.
- Rey, Hélène. 2001. International Trade and Currency Exchange. *Review of Economic Studies* 68, no. 2: 443–64.

- Schenk, Catherine. 2010. *The Decline of Sterling: Managing the Retreat of An International Currency*. Cambridge: Cambridge University Press.
- Smale, L. A. 2019. Bitcoin as a Safe Haven: Is It Even Worth Considering? *Finance Research Letters* 30: 385–93.
- Solomon, Robert. 1976. *The International Monetary System. 1945–1976: An Insider's View*. New York: Harper and Row.
- Subramanian, Arvind. 2011a. *Eclipse: Living in the Shadow of China's Economic Dominance* Washington: Peterson Institute for International Economics. Available at <https://www.piie.com/bookstore/eclipse-living-shadow-chinas-economic-dominance>.
- Subramanian, Arvind. 2011b. *Renminbi Rules: The Conditional Imminence of the Reserve Currency Transition*. Working Paper Series 11-14. Washington: Peterson Institute for International Economics. Available at <https://www.piie.com/publications/working-papers/renminbi-rules-conditional-imminence-reserve-currency-transition>.
- SWIFT. 2023. *RMB Tracker: Monthly Reporting and Statistics on Renminbi (RMB) Progress towards Becoming an International Currency*. Available at <http://www.swift.com/our-solutions/compliance-and-shared-services/business-intelligence/renminbi/rmb-tracker/rmb-tracker-document-centre> (accessed April 2023).
- Takagi, Shinji. 2011. Internationalizing the Yen, 1984–2003: Unfinished Agenda or Mission Impossible? In *Asia and China in the Global Economy*, ed. Y.W. Cheung and G. Ma, 219–244. Singapore: World Scientific Publishing.
- Tavlas, George. 1993. The Deutsche Mark as an International Currency. In *International Finance: Contemporary Issues*, ed. Dilip Das, 566–79. London: Routledge.
- Tavlas, George, and Yuzuru Ozeki. 1992. *The Internationalization of Currencies: An Appraisal of the Japanese Yen*. IMF Occasional Paper 90. Washington: International Monetary Fund.
- Triffin, Robert. 1960. *Gold and the Dollar Crisis*. New Haven, CT: Yale University Press.
- Truman, Edwin M. 2022. *The IMF Should Enhance the Role of SDR to Strengthen the International Monetary System*. PIIE Working Paper 22-20. Washington: Peterson Institute for International Economics. Available at <https://www.piie.com/publications/working-papers/imf-should-enhance-role-sdrs-strengthen-international-monetary-system>.
- Williamson, John. 2009. *Why SDRs Could Rival the Dollar*. PIIE Policy Brief 09-20. Washington: Peterson Institute for International Economics. Available at <https://www.piie.com/publications/policy-briefs/why-sdrs-could-rival-dollar>.
- Zhang, Longmei. 2023. *Capital Account Liberalization and China's Financial Integration*. M-RCBG Associate Working Paper Series. Cambridge, MA: Harvard University.

