Managing a Multiple Reserve Currency World

Barry Eichengreen
University of California, Berkeley

April 2010

Reforming the international monetary system is a game that any number can play. The second half of the 19th century saw a series of international monetary conferences designed to place the leading European countries on a common monetary standard. The 1920s saw the Brussels and Genoa Conferences. 1944 saw Bretton Woods. 1967 saw the creation of Special Drawing Rights, which U.S. Treasury Secretary Henry Fowler hailed as "the most ambitious and significant effort in the area of international monetary affairs since Bretton Woods." 1968 saw the creation of the two-tier gold market, which President Johnson welcomed as "the most significant reforms of the international monetary system since Bretton Woods." 1971 saw the Smithsonian Agreement, which President Nixon lauded as "the most significant monetary achievement in the history of the world."

The point being, of course, that none of these international agreements fundamentally changed the trajectory of the international system. The most striking feature of the international monetary system from an historical perspective is continuity rather than change. Over this period the international system evolved from a gold standard to a gold exchange standard, to a gold-dollar standard, and then to a dollar standard. It is evolving now into a multiple reserve currency system. International monetary conferences and official initiatives can influence the system at the margin, both for better or for worse, but the "actually existing system" (to invoke language derived from a very different context) reflects a powerful underlying market logic.

It is the thesis of this paper that a multiple reserve currency system is coming. The system for which we need to prepare is one in which the dollar, the euro and the renminbi will all be consequential international and reserve currencies. The international monetary system is growing more multipolar because the world economy is growing more multipolar. After World War II, when the United States accounted for the majority of the industrial production of the non-Soviet world, it made sense that the dollar was the principal unit in which exporters and importers invoiced and settled their trade, in which international loans were extended, and in which central banks held their reserves. But this situation makes less sense today when the U.S. accounts for only some 20 per cent of the combined output of countries engaged in international transactions. Because habits die hard, the dollar continues to play a disproportionately important role. But simply because this is true today does not mean that it will be true tomorrow. Countries that trade with and borrow from the euro area will increasingly seek to hold euros as reserves. Countries that trade with and borrow from China will similarly seek to hold renminbi, if not today then in the not-too-distant future.

* * * * *

It is widely argued that because international finance is characterized by network externalities, there is room for only consequential international currency.[1] Since it pays to use the same unit that everyone else uses, there are strongly increasing returns to using a national currency in international transactions. For importers and exporters, quoting prices in the same currency as other importers and exporters avoids confusing one's customers. For central banks, holding reserves in the same currency in which other central banks hold reserves means holding the most liquid asset. With everyone else buying, selling and holding dollars, it pays to similarly buy, sell and hold dollars, since markets in dollar-denominated assets will be the most liquid. While it is always possible that there could come a tipping point where everyone migrates from one international currency to another, this network-externality characteristic of the international monetary system means that there is room for only true international unit. Or so it is said.

Were this argument correct, there would be reason to doubt that we are in fact heading toward a multiple international currency system. But the premise is wrong. It is wrong for three reasons. First, the notion that importers, exporters and bond underwriters all will want to use the same unit as other importers, exporters and bond underwriters in order to avoid confusing their customers holds less weight in a world where everyone carries in his or her pocket a cell phone that can be used to compare currency values in real time. Once upon a time, comparing prices in dollars and euros may have been beyond the capacity of all but the most sophisticated traders and investors. But this notion is not longer valid in an age when "Currency Converter" is one of the top ten most downloaded wigits at Apple.com. Switching costs are lower than before. The natural monopoly argument for why there is room in the market for only one electricity provider or telephone company has been weakened by technical change. So too the argument that international currency services are a natural monopoly.

Second, the sheer size of today's global economy means that there is now room for deep and liquid markets in more than one international currency. Once upon a time it may have been plausible that only one treasury market could achieve the scale required to drive big-ask spreads to low levels and allow central banks and other investors to undertake a substantial volume of transactions without moving prices. But with the growth of the global economy, the requirements of minimum efficient scale no longer imply that only one currency can support such a market.

Third, a careful reading of history is at odds with the notion that there can exist just one international currency at any point in time. Before 1914 there were three, the British pound, the French franc and the German mark. While the pound was the most important, the other two played decidedly nonnegligible roles. The dollar and the pound similarly shared the international stage in the 1920s and 1930s. And the fact that currencies other than the dollar today account for nearly 40 per cent of identified international reserves is again inconsistent with the presumption that there is room for only one true international and reserve currency.[2]

To be sure, the pre-1914 and interwar reserve systems both had prominent regional dimensions. Before 1914, sterling was disproportionately used by the members of Britain's Commonwealth and Empire. The French franc was held by Russia and a number of Northern

[1] An influential theoretical model is Krugman (1984). The empirical case is made by Chinn and Frankel (2005).
[2] See Lindert (1969).

European countries, the reichmark by Southeast European countries. It similarly makes sense that in the 21st century the renminbi will be used to settle international transactions and held as reserves by countries that trade heavily with China – which will mean, in the first instance, other Asian countries. The euro will be most attractive to countries that undertake extensive transactions with the euro area, such as Russia (Europe's main supplier of natural gas), Turkey and other countries bordering the Mediterranean.[3] The dollar will dominate in the Western Hemisphere and in other places with close economic links to the United States. Central banks, like other investors, appreciate the advantages of diversification, but their reserve proportions will also vary with their trade and financial flows.

Looking out 10 or 20 years, the dollar, the euro and the renminbi will be the leading international currencies because the United States, the euro area and China will be the three largest economies.[4] Note however that the same arguments suggesting that there is room for three international currencies imply that there may be room for more than three. India and Brazil are countries with the scale and favorable demographic prospects consistent with growing international roles for their currencies. Like China, they have lots of reform to complete before their markets are sufficiently liquid and their currencies become attractive to the conservative investors that are central banks. But, in thinking about the future of the international reserve system, it is important to be aware of their prospective roles.

* * * * *

A multiple reserve currency system will be an improvement over a system in which countries seeking to accumulate reserves find themselves having to accumulate dollars. No one country will monopolize the seigniorage gains. Spreading the seigniorage across three, four or five countries is not socially optimal, but it is an improvement over a situation where one country enjoys the exorbitant privilege of issuing the reserve currency.

In this world, moreover, no one reserve currency country will have the capacity to finance its current account deficit as freely as the United States in the years leading up to the crisis. The priority that should be attached to the international monetary system in explaining the crisis is disputed. Many of us would in fact attach greater weight to lax supervision and regulation, the perverse incentives associated with flawed compensation practices in the financial services industry, conflicts of interest in the rating-agency industry, and the unusually accommodating monetary policies of the Federal Reserve in the key period 2003-4. That said, a confounding role was certainly played by an international system in which countries accumulating reserves as insurance against capital-flow volatility and as a byproduct of policies of export-led growth found themselves disproportionately accumulating dollars.

As a result of these purchases of U.S. treasury and agency securities, U.S. interest rates were lower than otherwise. The literature suggests that 10-year treasury yields were on the order of 50 to 100 basis points lower than would have been the case in the absence of foreign central

---

[3] The euro's emergence as a regional reserve currency is documented by European Central Bank (2009).
[4] I disregard the yen and Russian ruble as possible reserve currencies because of Japan and Russia's gloomy demographic prospects.

bank and government purchases.[5] These lower rates encouraged money managers to stretch for yield. They fueled the asset and housing bubbles. They reduced the cost of adjustable-rate mortgages and made it easier for mortgage lenders to offer teaser rates. They made it cheaper for investment banks and broker dealers to fund themselves on the interbank market, encouraging excessive leverage. All this allowed the bubble to grow, causing more serious disruptions when it burst.

Countries when they sought to accumulate reserves accumulated dollars partly because this was their habit. Partly they did because of the practice, on the part of Asian countries in particular, of pegging their exchange rates to the dollar. In the multiple-currency world toward which we are heading, they will have alternatives. As their trade becomes more multilateral, they will increasingly operate managed floats against a basket of major currencies and not just the dollar. As a result they will find it more attractive to accumulate a diversified portfolio of reserves. If they see a reserve-currency country behaving irresponsibly, in the manner of the United States in 2005-7, then they can curtail the rate at which they add its liabilities to their reserves. The discipline on each reserve-currency country will be greater. The danger that the international monetary system will contribute to another crisis like that of 2007-8 will be correspondingly less.

* * * * *

The most compelling objection to the argument that we are now moving toward a multiple-reserve-currency system in which the dollar, the euro and the renminbi all play consequential roles is that one or more of these currencies is an implausible candidate for international-currency status. The problem, of course, is that, depending on who you ask, any and indeed all of them could potentially be ruled out.

At the time of writing, pessimism is most pervasive about the euro.[6] The euro area is growing more slowly than the United States. European firms undertook less extensive restructuring during the crisis than their American competitors during the crisis; as a result, their labor productivity is growing more slowly. The euro area has made less progress in restructuring and recapitalizing its banks. A number of euro area countries now have very large deficits and heavy debts, raising questions about the sustainability of their public finances.

Then there is the crisis in Greece, which has raised questions in the minds of some about the very survival of the euro. A Greek default, they warn, could undermine investor confidence in Spain, Portugal, Ireland and Italy. Instability could spread contagiously. Greece might be forced or choose to abandon the euro. Other Club Med countries might follow. A Germany that has found itself backed into providing emergency assistance for Greece and, prospectively, for other countries might opt to abandon the euro itself. This climate of uncertainty and anxiety about the prospects for the single currency does not make it attractive as a form of central bank reserves.

---

[5] See Warnock and Warnock (2009) and Craine and Martin (2009).

[6] No doubt the currency about which investors are most pessimistic will have changed again by the time this paper appears.

All this doom and gloom is overdone. A Greek default can't be ruled out, but neither can a default by the city of Los Angeles. But a Greek default will not mean the break-up of the euro area, any more than a default by Los Angeles would mean the end of the dollar. Moreover, Greece would almost certainly make its problems worse by attempting to reintroduce the drachma.[7] Germany, for its part, has too much invested in the European project to turn its back on that now – which is what abandoning the single currency would entail.

The real problem the euro area has as an international currency is the absence of a government bond market with the scale and liquidity of the U.S. treasury market. Europe's government bond markets are a heterogeneous collection of national markets, not all of which are attractive to central banks and governments contemplating what to hold as reserves. The market in German bunds is less than a quarter the size of the U.S. treasury market. Moreover, many bunds are held to maturity by insurance companies and pension funds, as a result of which the market in them lacks liquidity.

The Greek crisis has shown that this status quo is untenable. The decision in the 1990s not to create an emergency financing mechanism for illiquid governments or an orderly resolution mechanism for insolvent governments but nonetheless to plow ahead with a single currency leaves Europe in an impossible position. Ultimately it will be compelled to create that emergency mechanism and fund it with subscriptions, using taxpayer dollars, like the subscriptions with which it funds the European Central Bank. This will be the first step in the direction of creating a market in euro area bonds backed by the full faith and credit of euro area governments as a group. It will be the first step toward creating a market in a euro bond market with the depth and liquidity to rival the market in U.S. treasury bonds.

In the longer run, there may be more grounds for worrying about the dollar. Dysfunctional politics continue to undermine efforts to bring the America's chronic budget deficits under control. By the time this paper appears, the ratio of federal government debt to GDP will approach 75 per cent. For a federal government that mobilizes only 19 per cent of GDP in taxes in good times, this is a considerable burden. A quarter of the tax take will go to debt service once interest rates return to normal levels. And the fiscal situation only darkens after that. After 2015, when the baby boomers start to retire, health care and pension costs rise explosively. The Congressional Budget Office estimates that federal spending on Medicare and Medicaid will rise from 5 per cent of GDP today to 10 per cent in 2035. This reflects how the share of individuals aged 65 or older will grow from 13 per cent today to 20 per cent in 2035. Between now and 2035, an ageing population explains two thirds of the growth in Medicare, Medicaid and Social Security; health care costs that increase faster than inflation explain the remaining third. Ageing explains all the Social Security cost increase, and about half of the growth in health care spending. Under current law, federal spending rises to 40 per cent of GDP between 2015 and 2040, which is just a way of saying that current law cannot remain unchanged.

The question is whether the U.S. will come to grips with these problems before things get out of hand or, failing that, whether it will resort to the inflation tax to fill the fiscal gap. The fact that foreigners now own a majority of U.S. treasury securities will make the second alternative more tempting. But foreigners are perfectly capable of the same calculation. If they

[7] As explained in Eichengreen (2010).

see the United States as unable to solve its fiscal problem, they will dump their dollars in favor of alternatives.

To be clear, this is not my baseline scenario. The U.S. has shown itself capable of dealing with significant challenges before. More likely than not, it will do so again. But if it doesn't, this would spell the end of the dollar's role as an international currency.

Finally there are the challenges that China must to surmount in order to internationalize the renminbi. It will have to build deep and liquid financial markets and make them accessible to foreign investors. It will have to remove many of the financial restrictions that are integral to its development model. This is not something that will be completed overnight.

But Chinese officials are serious about transforming Shanghai into a first-class international financial center by 2020. They have negotiated renminbi swap arrangements with other Asian countries. They have actively encouraged use of the renminbi in bilateral trade transactions. They have authorized the issuance of renminbi-denominated bonds in Hong Kong and done a sovereign RMB issue there themselves. The next major step will be when they permit foreign banks and firms to freely issue, purchase and sell renminbi-denominated bonds in Shanghai.

As China continues to develop, it will exhibit a better balance between consumption and investment. The availability of plain-vanilla financial instruments that allow households to more effectively insure themselves against shocks to the cost of housing, health care and education – that is, to reduce their precautionary saving in favor of consumption – will be part of this process. It will also be part of what makes Shanghai a more prominent financial center and, therefore, the renminbi a more prominent international currency.

To be sure, this financial development, deepening and opening will erode the capacity of the Chinese authorities to channel finance to favored firms and sectors. It will thereby undermine one of the traditional pillars of China's development model. If we know one thing about Chinese officials, it is that they are not inclined toward radical changes in policy. The move away from the traditional model will be gradual. So too, therefore, will be Shanghai's emergence as an international financial center and the development of the renminbi's international currency role.

That said, observers may be underestimating how quickly the renminbi will be adopted as a currency in which to invoice and settle trade, denominate international financial transactions, and hold central bank reserves. The United States completed the transition from a starting point where the dollar had no international role to one where it was the leading international currency in less than ten years. In 1914, approximately zero per cent of global reserves were in the form of dollars.[8] Zero per cent of global trade was financed and settled in dollars. Even U.S. exporters and importers went to London to obtain trade credit in sterling. But only ten years later, in 1924, the dollar was the leading reserve. More trade finance was obtained in New York than London and accounted for by the dollar than the pound.[9] The history of the United States

[8] Only Nicaragua and the Philippines, where the United States was the de facto colonial power, held dollar reserves.
[9] The data are in Eichengreen and Flandreau (2009).

suggests that the transition can occur more quickly than conventionally supposed. Note also how these facts are again inconsistent with the notion that network externalities giving rise to lock-in strongly privilege the incumbent international currency over all others.

The dollar, the euro and the renminbi all have their problems. But, as when thinking about exchange rates, it is important to recall that their international attractiveness depends, in part, on the severity of those problems relative to those of the alternative. The very fact that there are doubts about all three currencies is a reason to think that there will be a demand for all of them.

* * * * *

This is a long way into a paper on the international reserve system without mention of Special Drawing Rights. In fact the delay is appropriate. For the SDR will remain at best a bit player in the international monetary system over the horizon relevant to practical policy making (that is to say, the next 20 odd years). Countries may agree to some modest additional issuance of SDRs. This would be a desirable alternative to allowing a handful of reserve currency countries monopolize the seigniorage. It would further reduce the ability of countries like the United States to run larger current account deficits and allocate foreign funds in riskier ways than would be the case otherwise. It would be a way of advancing other social goals, especially if agreement could be reached on allocating SDRs mainly or entirely to poor countries with the greatest need. But the idea that SDRs may modestly supplement national currencies is different from the view that it can replace them or that ten years from now the SDR will rival the dollar, the euro and the renminbi as a form of international reserves.

History offers two lessons relevant to the SDR debate. First, central banks do not find it attractive to hold reserves in a unit that is not also widely used in international transactions. Only if a unit is privately used is it also convenient for official intervention in private markets. The SDR is not easily used for foreign exchange market intervention. It is not an obvious unit in which to provide emergency liquidity assistance to banks and firms with dollar-, euro-, or renminbi-denominated liabilities. It is not attractive therefore as a form in which to hold reserves for central banks in a position of actually having to use them.

Second, creating private markets in SDR-denominated claims will not be easy. The IMF simplified the SDR basket in 1981 with the goal of doing just that, but the effort was unsuccessful. While some investors may prefer a basket over a single currency because of its diversification and stability characteristics, nothing prevents them from creating their own basket out of existing currencies. Markets in those currencies are already more liquid than markets in SDRs. Countries can construct their own bespoke baskets that fit their needs more closely than the international community's one-size-fits all SDR basket. It is not surprising from this point of view that efforts at creating private markets in SDRs failed in the past. Succeeding would be a seriously uphill battle now.

The first step in doing so would be for countries to peg to or shadow the SDR basket. Portfolio theory suggests that countries will want to hold a substantial fraction of their reserves in the currency or currencies to which they peg, since those currencies will be relatively stable in terms of domestic purchasing power.[10] The second step would then be for countries to issue SDR-denominated sovereign bonds that would trade on private markets. China has purchased SDR-denominated claims from the IMF; a much more significant step would be for it to issue SDR-denominated bonds which private investors could buy and sell.

Some will object that this emphasis on private markets is misplaced. It would be enough, they argue, for governments to commit to accepting SDRs in settlements among themselves and with the IMF and to stand ready to convert SDRs into national currencies without limit on demand. But this is precisely why SDRs will not play more than a limited role in the international monetary system going forward. For SDRs to play a substantial role, countries like the United States would have to accept substantial quantities of SDRs, and pay out dollars in return, on demand without conditions. This would be equivalent to the international swap lines in which the Fed provided $30 billion of dollar-denominated credit to four central banks in response to the dollar stringency that arose in the autumn of 2008. The difference in an SDR-based system is that the U.S. liability would be an order of magnitude larger. The U.S. might be prepared to provide larger currency swaps, but only subject to conditions. But then the system would not be characterized by the large, unconditional credit lines that the proponents of an SDR-based system presumably have in mind.

Alternatively, swaps could be provided by the quasi-global central bank responsible for issuing the SDR. This might be the International Monetary Fund or, in the case of a reformulated SDR, a global central bank operating under United Nations auspices.[11] A global central bank that was independent and autonomous and held a pool of national currencies could freely swap them for SDRs, without conditions on demand. But painting the picture this way makes clear why this is not going to happen. If we know one thing about central bank swaps and IMF programs, it is that they can be either unlimited or unconditional, but not both.[12]

The shareholders in a global central bank will be willing to provide large, effectively unlimited, swaps only subject to conditions. The United States will provide it with the dollars its needs to swap them for the SDRs in an emergency only if it approves the conditions governing the swap. The United States will allow the IMF or the global bank to borrow or buy dollars on the market in the quantities needed to them to be swapped for SDRs only if it approves the conditions governing the swap. A consequential role for the SDR in the international system presupposes the existence of an independent global central bank with autonomy to make decisions concerning its own funding and lending. Putting the point this way shows why the role of the SDR will remain limited. The day when there is international support for a global central bank remains very far away.

---

[10] On the underlying portfolio-allocation logic see Papaioannou, Portes and Siourounis (2006).
[11] As proposed in United Nations (2009).
[12] This is the lesson of experience under the European Monetary System, when the Bundesbank insisted on an opt out from unlimited intervention obligations, the so-called Emminger letter (Eichengreen and Wyplosz 1993). This is the lesson of the euro area, when the European Central Bank is willing to provide credit to the Greek government against what it regards as acceptable collateral. This is the lesson of Asian experience with the Chiang Mai Initiative Multilateralization, where credit lines are limited and, after the first 20 per cent, conditioned on prior negotiation of an IMF program.

Will there be an expanded role for the SDR? Yes. Will that expansion be significant in the sense that the SDR shows rivals and supplants national currencies in the international system? No, not in our lifetimes. There is nothing wrong with efforts to reform the IMF to enhance its legitimacy and make it more independent – to start it down the road to where it can ultimately act more in the manner of global central bank. But that road is long and winding.

* * * * *

For all these reasons, a global monetary and financial system organized around two or three international currencies (two in the short run, three in the longer run) is coming. The question is whether we should worry.

Some warn that a multiple-international-currency system will be dangerously unstable. With dollars, euros and (eventually) renminbi, all trading in deep and liquid markets and being substitutes for one another, their exchange rates will become dangerously volatile. Substitutability will create the temptation to shift erratically between them. Even a limited loss of confidence in the policies of one of the reserve-currency countries could cause central banks to rush out of its currency, aggravating financial difficulties in the problem country. The consequences for other reserve-issuing countries, which will see their currencies appreciate sharply, will be equally undesirable. A multiple-reserve-currency system, it is argued, would be an engine of instability.[13]

This view is based on a mischaracterization of the behavior of central bank reserve managers.[14] Reserve managers do not seek to maximize the return on their reserve portfolios in the manner of hedge-fund managers. They have social responsibilities, and know it. They do not have the high-powered financial incentives of hedge fund managers – reserve managers are not compensated on a 2+20 scheme. They have less incentive to run with the herd – to sell a currency because everyone else is selling. They can adopt a longer horizon because, unlike private fund managers, they do not have to satisfy impatient investors. They do not have to exceed their previous high-water mark in order to draw a paycheck. The People's Bank of China has been subject to criticism for investing so heavily in U.S. treasury and agency securities and taking accounting losses with the dollar's depreciation. But that criticism and its consequences are modest compared to the implications for a hedge-fund manager who is consistently late in placing appropriate currency bets.

Private investors can find it hard to act as contrarians. Even if they think the price of an asset has been beaten down excessively, they find it hard to take a long position without an expectation that the price will recover within a reasonable period of time. They have to fund the position, which is expensive. They face impatient investors who will see the funding cost but not the return. Central bank reserve managers, with their longer horizons and guaranteed funding, are in a better position to act as stabilizing speculators, buying an asset whose price has been beaten down in a fire sale instead of following the herd.

[13] This view has a long history (see e.g. Witteveen 1980). But that doesn't make it right.

[14] There is a shortage of careful scholarship on this subject. But see Bakker and van Herpt (2007).

This view is supported by the limited data available on central bank asset allocation. Truman and Wong (2006) use IMF data to compare the shares of central bank reserves held in different currencies valued at current and constant exchange rates. The comparison shows that when a currency depreciates, central banks tend to purchase it to reconstitute the share of that currency in their portfolios, and vice versa. In other words, reserve managers tend to be contrarians, or stabilizing speculators, rather than running with the herd.

What can be done, in terms of policy, to stabilize a multiple international currency system? Sound and stable policies on the part of the reserve-issuing countries would be the most important contribution. Chronic budget deficits, lax supervision and regulation of financial markets and institutions, and bubble-denying monetary policies could set the system up for a painful fall. An International Monetary Fund that refuses to pull its punches and exercises firm surveillance of large-country policies would help to prevent this.

What would not help would be futile efforts to stabilize exchange rates between the reserve currencies. Economic conditions and therefore appropriate monetary policies will continue to differ. The idea that the U.S., the euro area and China are prepared to subordinate domestic policy objectives to the defense of target zones between their currencies is unrealistic. Any attempt to put such zones in place would quickly come undone.

Indeed, there is reason to think that allowing exchange rates between the major currencies to float would help to stabilize the international system. It would allow policy authorities in the reserve-issuing countries to prevent internal and external imbalances from building up. And it would avoid creating one-way bets for currency speculators. The fact that exchange rates between the major currencies can move either way on a day-to-day basis discourages precisely the kind of stabilizing behavior feared by critics of the emerging multiple international currency system.

* * * * *

In thinking about feasible and desirable reforms of the international reserve system, it is useful to remind oneself of the kind of global economy that we can expect to see develop in coming years. The world economy will become even more multipolar; this is the fundamental reason to think that the reserve system will become more multipolar. On the other hand, the world economy will not become more supranational. National sovereignty remains a fact of 21st century life. International relations will continue to be organized on the basis of the interaction of sovereign states – within the framework, one hopes, provided by multilateral institutions.

This points to the continued development of a global reserve system in which several national currencies play consequential roles. In this paper I have suggested that this development is to be welcomed, not feared. But, in addition to welcoming it, policy makers need to think harder about how to manage it.

References

Bakker, Age and Ingmar van Herpt, eds, (2007), *Central Bank Reserve Management*, Cheltenham: Edward Elgar.

Chinn, Menzie and Jeffrey Frankel (2005), "Will the Euro Eventually Surpass the Dollar as the Leading International Currency?" NBER Working Paper no.11510 (August).

Craine, Roger and Vance Martin (2009), "Interest Rate Conundrum," *B.E. Journal of Macroeconomics* 9, pp.1-27.

Eichengreen, Barry (2010), "The Break-Up of the Euro Area," in Alberto Alesina and Francesco Giavazzi (eds), *Europe and the Euro*, Chicago: University of Chicago Press, pp.11-56.

Eichengreen, Barry and Marc Flandreau (2009), "The Rise and Fall of the Dollar, or When Did the Dollar Overtake Sterling as the Leading Reserve Currency?" *European Review of Economic History* 13, pp.377-411.

European Central Bank (2009), *The International Role of the Euro*, Frankfurt: ECB (July).

Eichengreen, Barry and Charles Wyplosz (1993), "The Unstable EMS," *Brookings Papers on Economic Activity* 1, pp.51-144.

Krugman, Paul (1984), "The International Role of the Dollar: Theory and Prospect," in John Bilson and Richard Marston (eds), *Exchange Rate Theory and Practice*, Chicago: University of Chicago Press, pp.261-278.

Lindert, Peter (1969), Key Currencies and Gold, 1900-13, *Princeton Studies in International Finance* no.24.

Papaioannou, Elias, Richard Portes and Gregorious Siourounis (2006), "Optimal Currency Shares in International Reserves: The Impact of the Euro and the Prospects for the Dollar," NBER Working Paper no.12333 (June).

Truman, Edwin and Anna Wong (2006), "The Case for an International Reserve Diversification Standard," Policy Brief 06-2, Washington, D.C.: Institute for International Economics (May).

United Nations (2009), *Preliminary Report of the Commission of Exports on Reforms of the International Monetary and Financial System*, New York: United Nations (May).

Warnock, Frank and Virginia Warnock (2009), "International Capital Flows and U.S. Interest Rates," *Journal of International Money and Finance* 28, pp.903-919.

Witteveen, Johnanes (1980), "Statement by H. Johannes Vitteveen," in Group of Thirty, *Towards a Less Unstable International Monetary System*," New York: Group of Thirty, pp.1-2.