

A Note on Reserve Currencies with Special Reference to the G-20 Countries

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Summary: It is most likely that the current reserve currencies will retain their status in the near future, given the persistence in the composition of reserve holdings. However, since we do not have complete data on the switchovers in lead reserve currencies, a great deal of uncertainty attends any forecasts. Hence, it is possible that new reserve currencies might appear with greater rapidity than anticipated. Of the candidates for new reserve currencies among the major emerging economies, the renminbi (RMB) is the most plausible. However, even under optimistic assumptions regarding economic growth and financial development, RMB status as a major reserve currency is some time off. A role for regional reserve currency status in the near future is much more likely. The advent of a multi-reserve currency world is unlikely to have negative consequences for global financial stability (and might be stability-enhancing). However, achieving the prerequisites for reserve currency status will force sacrifices in terms of policy autonomy. In addition, reserve currency status might reduce international competitiveness for individual countries, as higher currency demand appreciates their currencies.

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Executive Summary

I examine three key questions:

1. What is likely to happen to the relative importance of the existing reserve currencies
2. What are the prospects for the renminbi and other emerging market currencies to become reserve currencies
3. What are the implications for both developed and emerging market countries of these developments

The evolution of the relative importance of reserve currencies

In the post war era, the US dollar has held the role of dominant reserve currency. However, the rankings of the second and third currencies have changed; prior to the 1970's, the pound was the second key currency, until supplanted by the Deutsche mark.

The determinants of reserve currency holding include economic size, stability in the value of the currency (either measured against a basket of currencies or basket of goods), and the depth and liquidity of financial markets. Clearly, a simple linear relationship between these determinants and the share of currencies in reserve holdings is not likely, given the outsized importance of the dollar in reserve holdings. However, the nature of the nonlinearity, and the persistence of the shares of reserve holdings, are uncertain given the fact that we have little data on switchovers in key reserve currency roles.

Chinn and Frankel (2007, 2008) find that the key determinant of reserve holdings is the depth of the financial market, which they proxy using foreign exchange turnover in the financial center. In addition, they find a high degree of persistence in currency shares. Given these two findings, and the slow-moving nature of developed country financial development, there should be little change in developed country shares *as long as emerging market financial development is also slow*. The latter assumption is clearly an open issue.

Emerging market currencies as reserve currencies

The literature on developed country reserve currencies suggests that the increasing relative economic mass of key emerging market economies will lead to a greater role for their respective currencies. However, if previous empirical findings are relevant, GDP alone will not be the main determinant. Rather, financial market development will be the critical variable.

Financial development involves the creation of institutions that are able to funnel large amounts of capital from savers to borrowers in an efficient manner. Empirical work suggests that institutional development (e.g., rule of law, a low degree of corruption) as well as open capital markets are important (Chinn and Ito, 2006). To the extent that the largest emerging market countries with currencies that are candidates for reserve status have relatively closed and underdeveloped financial markets, the path forward is unclear.

As long as these countries restrict capital flows in a heavy-handed fashion and limit convertibility, use of their respective currencies in international transactions – including financial – is unlikely to increase rapidly. Financial repression would also limit the desirability of each currency in international transactions.

To make these points concrete, consider that many of the reserves are held in the form of government bonds. When it is difficult to purchase and sell government bonds across borders (and especially if there is no secondary market for those bonds), and agents worry about the default risk associated with those bonds, then the currency those government bonds are denominated in will not be a good candidate for a reserve currency.

The nature of policy preferences is key to determining the pace of developments. In particular, policy authorities will determine when (and how much) they are willing to surrender the policy autonomy associated with capital controls and repressed financial systems in favor a more internationalized currency.

Over the medium term (the next decade), it seems unlikely that any of the emerging market currencies will become key reserve currencies on the order of the British pound. Over the longer term, if the dollar's role is eroded (for instance, by China, as suggested by Prasad and Ye, 2012), then tighter constraints will be imposed on the US government's ability to finance budget deficits. Conventional wisdom holds that there can be only one dominant currency at a time, given network externalities. In contrast, Eichengreen (2005) asserts that historically, several currencies have shared a dominant role simultaneously.

Implications for emerging market countries

The prerequisites of achieving reserve currency status include financial development, which typically entails financial openness (including capital account liberalization). To the extent that this is accomplished, policy authorities will have to make more explicit trade-offs between monetary autonomy and exchange rate stability.

As emerging market currencies become reserve currencies, they should be able to obtain some seigniorage gains. However, these are likely to be small. Larger benefits that will accrue include the enhanced ability to borrow in home currency, at lower rates.

Moreover, if a more polycentric international monetary system, as envisioned by Eichengreen, comes to pass, this will decrease emerging market reliance on the dollar, lessening the susceptibility to policy uncertainty associated with the macroeconomic policy of the dominant reserve currency-issuing country.

One major concern is that reserve currency status might induce exchange rate appreciation, due to enhanced currency demand. This reduction in international competitiveness constitutes a tangible economic cost.

1. Introduction

This memo examines three questions:

1. What is likely to happen to the relative importance of the existing reserve currencies
2. What are the prospects for the renminbi and other emerging market currencies to become reserve currencies
3. What are the implications for both developed and emerging market countries of these developments

This survey is focused on developments regarding reserve currencies, and not on broader features of international currencies. The distinction is important in that reserve currency status pertains to the governmental/public sector uses of currencies. The international currency status encompasses that dimension, as well as private sector uses, as shown in Table 1.

Table 1

<i>Function of money:</i>	Governments	Private actors
<i>Store of value</i>	International reserve holdings	Currency substitution (private dollarization)
<i>Medium of exchange</i>	Vehicle currency for foreign exchange intervention	Invoicing trade and financial transactions
<i>Unit of account</i>	Anchor for pegging local currency	Denominating trade and financial transactions

Source: Kenen (1983).

2. The Evolution of the Relative Importance of Reserve Currencies

2.1 The Historical Record Interpreted

There are two competing narratives relating to the evolution of reserve currencies over the past 120 years. The conventional interpretation is that only in the aftermath of the Second World War did the dollar emerge as the leader among international currencies. In 1899 the share of the pound in known foreign exchange holdings of official institutions was more than twice the total of the next nearest competitors, the franc and the mark, and much greater than that of the dollar. By 1945, however, the position of the dollar and pound, as measured by this statistic, had precisely reversed (Aliber, 1966). This view holds that only one currency held the role as leading reserve currency at each instant, and the switchover was permanent.

The alternative narrative launches from recent work by Eichengreen (2005), and Eichengreen and Flandreau (2008). In the latter work, the authors conclude that the dollar first overtook the pound in the mid-1920s. The devaluation of the dollar in 1933 temporarily re-instituted the pound's lead. As war approached, reserves were shifted back into US dollars, since the US was a neutral country

for the first two years of the war.¹ Nonetheless, in both accounts, the US dollar was the pre-eminent reserve currency at the end of World War II.

The switch reflected trends that had been underway since the latter part of the 19th century; US GDP exceeded the UK GDP as early as 1872. Depending upon the interpretation of the interwar data, the overtaking occurred either some fifty or seventy years before the dollar's ascendancy occurred. That fact highlights the fact that other factors are potentially of greater importance than sheer economic mass. For instance, the US lacked a central bank until 1913. The sophistication of US financial markets also lagged. Hence, it is not until the mid-1920's (or 1940's) that the US dollar outstrips the pound.

In the post-War era, we have more definitive evidence of US dollar dominance. Reserve holdings, as reported to the IMF, are shown in Figure 1.

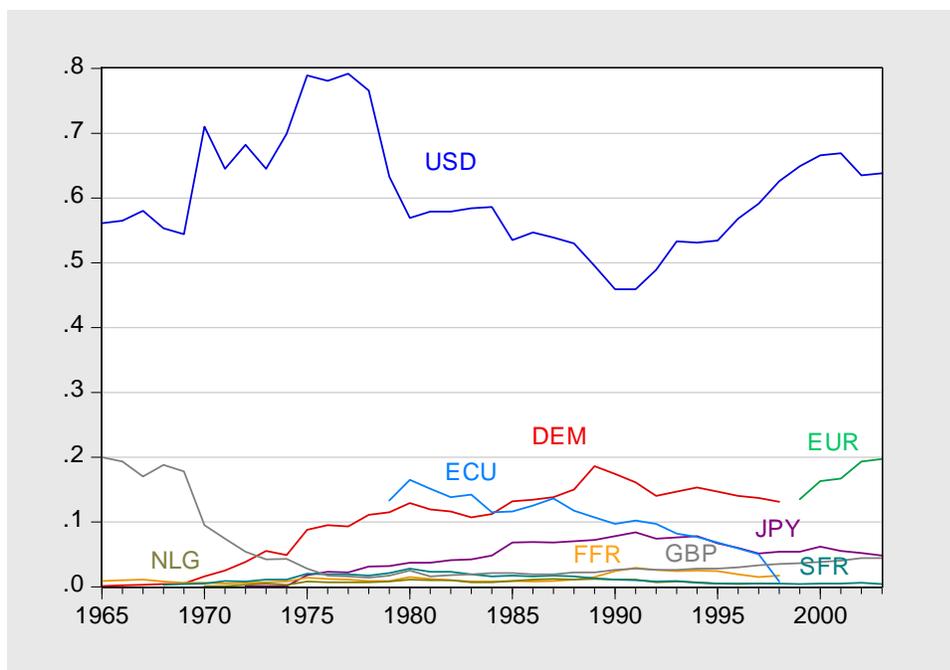


Figure 1: Estimated currency shares of reserves of all central banks, year end, 1965-2003. “Other currencies” omitted. Source: IMF, *Annual Reports*, Chinn and Frankel (2008).

The data series depicted in Figure 1 end in 2003, as the IMF has revised their reporting standards. Prior to December 2005, the IMF estimated the currency composition of holdings for central banks that did not report explicitly the currency shares. Since then, the IMF has foregone estimating the currency composition of holdings. It now reports as “unallocated” those shares that are not explicitly defined. For developing country and emerging market

¹ Eichengreen and Flandreau (2008) report that in 1929, central bank reserve holdings of dollars and sterling were approximately equal.

country central banks, the unallocated share is particularly large.³ Figure 2 extends Figure 1 making assumptions regarding the share of unallocated reserves.⁴

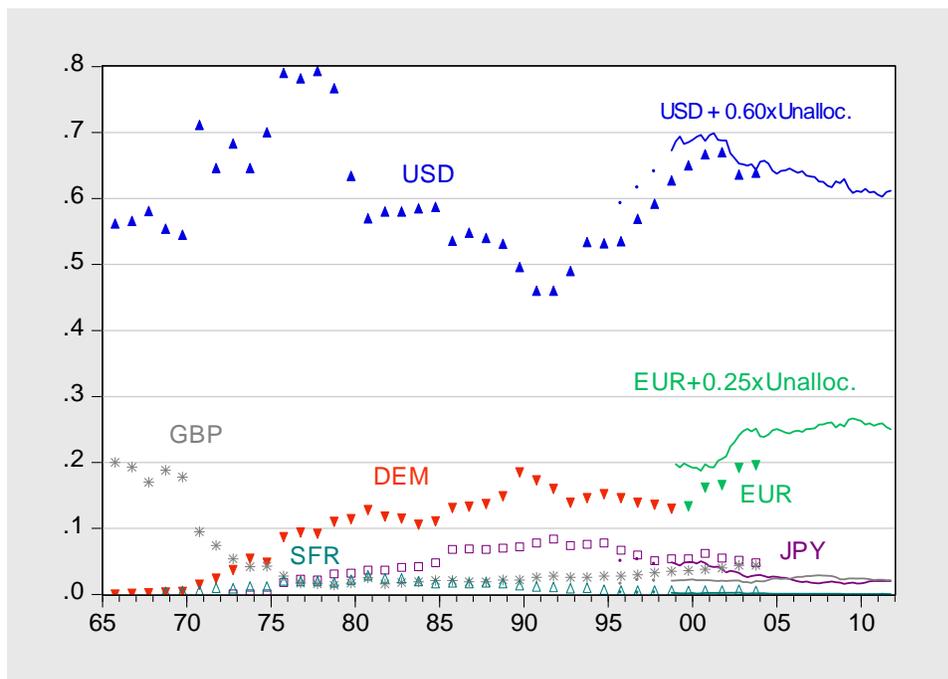


Figure 2: Estimated and reported currency shares of reserves of all central banks, quarterly, 1965Q1-2011Q4. “Other currencies” omitted. Source: IMF, *Annual Reports*, Chinn and Frankel (2008), and IMF, *Currency Composition of Official Exchange Reserves (COFER)*.

Despite the variation in the dollar’s share, the dollar has retained the lead role throughout the post-War era. Interestingly, the relative rankings of the second and third currencies *have* changed: Prior to the 1970’s, the pound was the second key currency, until supplanted by the Deutsche mark. This switchover is useful for thinking about switchovers that might occur in the near future.

2.2 Theory and the Empirical Literature

Chinn and Frankel (2007, 2008) address the issue of what determines reserve currency status. They estimate a nonlinear relationship between the reserve holdings and proxies for the variables of interest, using data over the 1973-98 period. Given the relative brevity of the sample, they impose some a priori information based upon the literature on international currencies. This literature has identified a number of critical factors.

- (1) The pattern of output and trade.
- (2) Financial markets
- (3) Confidence in the currency
- (4) Network externalities

³ Appendix Figures 1-3 report the currency breakdown for all, advanced, and emerging market/less developed country central banks. Note here, and elsewhere, shares are calculated using contemporaneous exchange rates.

⁴ In Figure 2, 60% of unallocated reserves are assumed to be denominated in USD, and 25% in euros.

(1) Patterns of output and trade. The currency of a country that has a large share in international output, trade and finance has immediate advantage over other contenders in terms of becoming a reserve currency, as well as an international currency. The U.S. economy remains the world's largest in terms of output and trade. By such measures, the euro zone should be a close (rather than far) number two. Furthermore, Japan barely registered as a reserve currency even before the advent of the euro, when it was the second largest economy.⁵

(2) The country's financial markets. To attain international currency status, capital and money markets in the home country must be not only open and free of controls, but also deep and well-developed. The large financial marketplaces of New York and London clearly benefit the dollar and pound relative to the euro and its predecessor the Deutsche mark, as Frankfurt is still less well-developed. Tokyo and Frankfurt financial markets have changed a lot over the last two decades. But they still lag far behind New York and London as financial centers. Meanwhile, Singapore and Hong Kong have gained.

It is surprisingly difficult to come up with a proxy for size, depth, or development that is available for all the financial centers. One measure is foreign exchange turnover in the respective financial centers: New York, London, Frankfurt, Tokyo, Zurich, etc. This measure differs from turnover of the currencies (dollar, pound, euro, etc.), a variable that would be much more simultaneously determined with the reserve currency status that we are trying to explain. It captures, for example, the pre-eminence of London, which continues despite the small role of the pound in reserves. This measure has the virtue of reflecting to some extent all kinds of international financial transactions (both long-term and short-term, banking and securities, bonds and equities).⁶

(3) Confidence in the value of the currency. Even if a key currency were used only as a unit of account, a necessary qualification would be that its value not fluctuate erratically. As it is, a key currency is also used as a form in which to hold assets (firms hold working balances of the currencies in which they invoice, investors hold bonds issued internationally, and central banks hold currency reserves). Here confidence that the value of the currency will be stable, and particularly that it will not be inflated away in the future, is critical. The monetary authorities in Japan, Germany and Switzerland, in the 1970s established a better track record of low inflation than did the United States, which helped their bids for international currency status. As recently as the 1980s, the mean and variance of the inflation rate in the United States were both higher than in those three hard-currency countries, though lower than in the United Kingdom, France, Italy, and many other countries.⁷

⁵ For some measures of *international* currency use – how often a vehicle currency is used in the invoicing and financing of international trade – other aspects of the pattern of trade may also be relevant. The fact that much of Japan's imports are oil and other raw materials and that much of its exports go to the Western Hemisphere, for example, helps explain why a disproportionately small share of trade is invoiced in yen as opposed to dollars. Raw materials still tend heavily to be priced in dollars.

⁶ Chinn and Frankel (2007) assessed an alternative proxy for the size of financial centers, namely the size of the countries' stock markets.

⁷ E.g., Tavlas and Ozeki (1992).

Given the relatively good U.S. inflation performance over the past two decades, this is no longer such a concern. A more important negative for the dollar is the fact that the United States is now a large-scale debtor country. Even if the Federal Reserve never succumbs to the temptations or pressures to inflate away the U.S. debt, the continuing U.S. current account deficit is always a possible source of downward pressure on the dollar. Such fears work to make dollars relatively less attractive.

(4) Network externalities. An international money, like domestic money, derives its value because others are using it. It is a classic instance of network externalities. In this sense, the intrinsic characteristics of a currency are of less importance than the path-dependent historical equilibrium. There is a strong inertial bias in favor of using whatever currency has been the international currency in the past.

Krugman (1984) showed how there can be multiple equilibria in use of an international currency, developing some informal ideas of earlier authors such as Kindleberger (1981), McKinnon (1979), and Swoboda (1969). Matsuyama, Kiyotaki and Matsui (1991) went to the next level of abstraction analyzing this problem with the theory of random matching games.

The implication is that small changes in the determinants will not produce corresponding changes in the reserve currency numbers, at least not in the short run. At a minimum, changes will show up only with a long lag. As noted, the pound remained an important international currency even after the United Kingdom lost its position as an economic superpower early in the century. In the present context, the inertial bias favors the continued central role of the dollar. Also, as already noted, economies of scale suggest that, even in the long run, measures of international currency use may not be linear in the determinants. There may be a tipping phenomenon when one currency passes another. Eichengreen and Flandreau's finding that dollar and pound exchanged leading roles during the interwar years suggests that the network effects and associated nonlinearities are not strong as implied by the conventional narrative.

Another aspect of the network externalities is economies of scope. An individual (exporter, importer, borrower, lender, or currency trader) is more likely to use a given currency in his or her transactions if everyone else is doing so. If a currency is widely used to invoice trade, it is more likely to be used to invoice financial transactions as well. If it is more widely used in financial transactions, it is more likely to be a vehicle currency in foreign exchange trading. If it is used as a vehicle currency, it is more likely to be used as a currency to which smaller countries peg. To this extent, motivations for international currency use will affect the likelihood of becoming a reserve currency, and vice versa.⁸

⁸ In Chinn and Frankel (2007), a measure of the popularity of the major currencies for smaller currencies to peg to was added to the regressions as a robustness check. An Asian country that is pegged to the dollar, for example, is likely to hold a larger share of its reserves in the form of the dollar. However, no significant effect of this nature was detected.

In their studies, Chinn and Frankel use GDP (in USD terms) as a measure of economic size.⁹ The stability of the currency's value is measured using either long term inflation, or long term depreciation against the SDR. The standard deviation of monthly exchange rate changes is also included as an indicator of currency stability. Finally, FX turnover (as a share of total FX turnover) proxies for relative financial development. Appendix 1 provides the variable details.

Table 2: Panel Regression for Determination of Currency Shares

Dependent variable: logit of currency shares in reserve holdings Pre-euro sample (1973-98)			
	[1]	[2]	[3]
Constant	-0.65 [0.15]	-0.49 [0.14]	-0.12 [0.06]
GDP ratio (γ)	2.77 [0.64]	2.22 [0.62]	1.04 [0.29]
Inflation differential (π)	-2.64 [1.16]		
Depreciation (Δs)		-1.08 [1.29]	-1.10 [0.59]
Exratevar (σ)	-0.98 [0.57]	-0.58 [0.58]	-1.25 [0.34]
FX Turnover ratio (t_o)	0.45 [0.29]	0.21 [0.30]	0.43 [0.14]
Lag: logit(share _{t-1})	0.85 [0.03]	0.88 [0.03]	0.96 [0.01]
N	182	182	156
Sample	1973-98	1973-98	1973-98
Adjusted R2	0.97	0.97	0.99

Notes: Dependent variable is logit(share) = log(share/(1-share)). All variables are in decimal form. Figures in bold face are significant at the 10% level. Column [3] omits Japanese yen, and uses cross-section weighted standard errors.

Estimates are obtained by use of panel regression on reserve currency holdings of central banks over the period 1973-1998. The functional form is assumed to be nonlinear, so that the predicted currency shares are bounded between 0 and 1; the dependent variable is a logit transformation of the shares variable. A lagged endogenous variable is included to allow for partial adjustment. The results confirm that economic size is important. The results differ somewhat depending upon whether the yen is omitted. In general, higher inflation, or higher depreciation, reduces the use of a reserve currency. In addition, higher exchange rate volatility has a depressing effect.

⁹ Chinn and Frankel focus on results using nominal GDP at market exchange rates, rather than PPP valuations.

On the other hand, they find that a key determinant is the depth of the financial market. Figure 3 shows foreign exchange turnover (as a share of total) in the countries corresponding to the key reserve currencies.

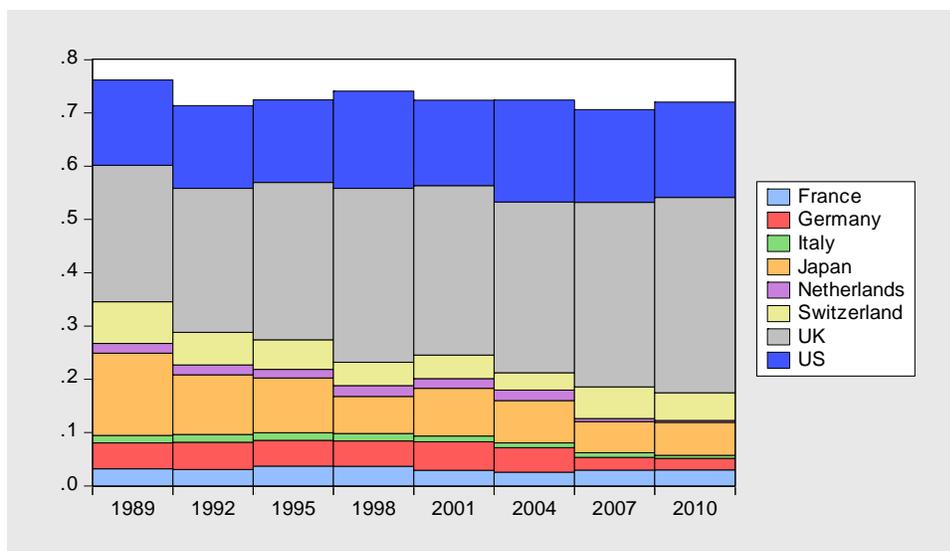


Figure 3: Foreign exchange turnover as a share of total turnover, in April of the indicated year. Source: BIS, *Triennial Central Bank Survey*, various issues.

Note that only data up to 1998 is used in the regressions. Chinn and Frankel also find a high degree of persistence in currency shares; the autoregressive coefficient ranges between 0.85 to 0.96. The implied half lives that correspond to these estimates are 4.3 to 17 years.

These findings imply that only under certain circumstances would a switchover occur for the lead currency role. For instance, even if the euro area's GDP were to expand as anticipated, London's financial heft would have to be associated with the euro area's financial market. And, in addition, the value of the dollar would have to be eroded considerably (in terms of depreciation against the SDR) in order for the switchover to occur.

Chinn and Frankel's analyses preceded the debt crisis which has undermined the perceived stability of the euro. To the extent that the euro's store of value function will be mitigated by the ongoing crisis, the likelihood of the US dollar losing the lead position to the euro has decreased.¹⁰

With respect to the non-lead reserve currencies, in the absence of marked changes in inflation and exchange rate depreciation, there should be little change in developed country shares *as*

¹⁰ The financial crisis of 2008-09 demonstrated that as long as so much international finance is undertaken in dollars, dollar reserves will be particularly important in times of financial stress. See Engel (2012: 22-23). This aspect of reserve determination is difficult to incorporate into the Chinn-Frankel specification.

long as emerging market financial development is also slow. The latter assumption is clearly an open issue, and is central to assessing the prospects for emerging market currencies.

3. Emerging Market Currencies as Reserve Currencies

3.1 Implications for New Reserve Currencies

What does the literature suggest for the prospects of emerging market currencies as reserve currencies? First, it is important to observe that the results in Chinn and Frankel must be taken with caution. Their data do not span a switch in the lead reserve currency. However, while we do not have historical data to evaluate the switch in the lead reserve currency, we do have information regarding the switch in second and third reserve currencies – namely the Pound and the mark during the mid-1970's.

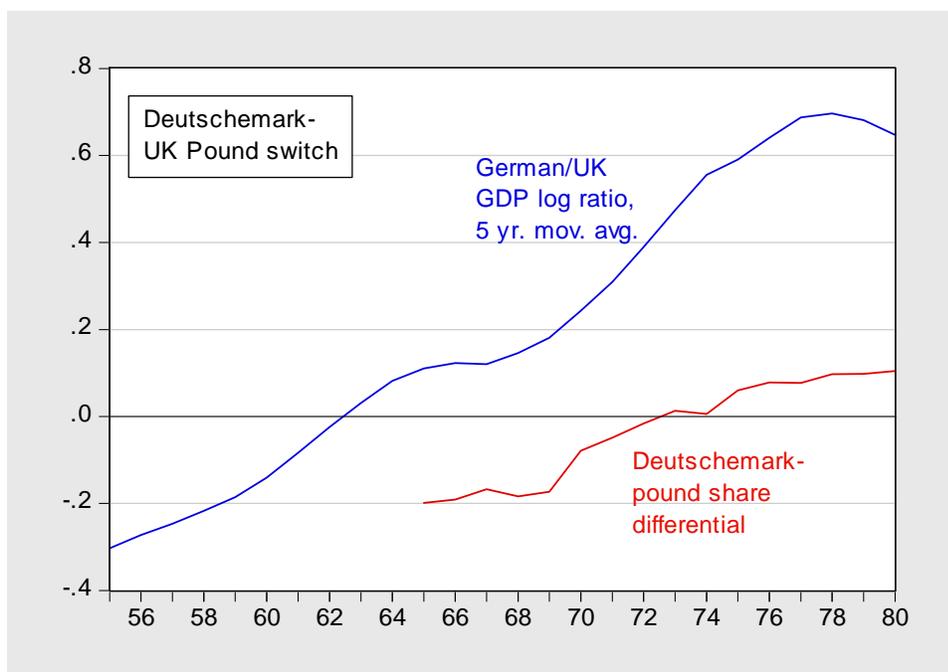


Figure 4: Five year moving average of log ratio of German to UK GDP (at current exchange rates), and differential estimated currency shares of reserves of all central banks, year-end, 1955-1980. Source: IMF, *International Financial Statistics*; IMF, *Annual Reports*, Chinn and Frankel (2008).

Figure 4 indicates that economic size does not directly determine reserve currency importance, although it does have an impact, with a lag.

Second, Chinn and Frankel's results indicate that in addition to income, the stability of the currency's value (against goods, and against other currencies) is also important. But perhaps most important is the level of financial development. Chinn and Frankel use foreign exchange turnover in respective financial centers as a *proxy* for financial development.

I now turn to evaluating the prospects for the currencies of several key emerging market economies: Brazil, Russia, India and China.¹¹ Figure 5 displays the IMF’s forecasted 2017 GDP levels for the four emerging market economies, and for reference the United States and the UK.

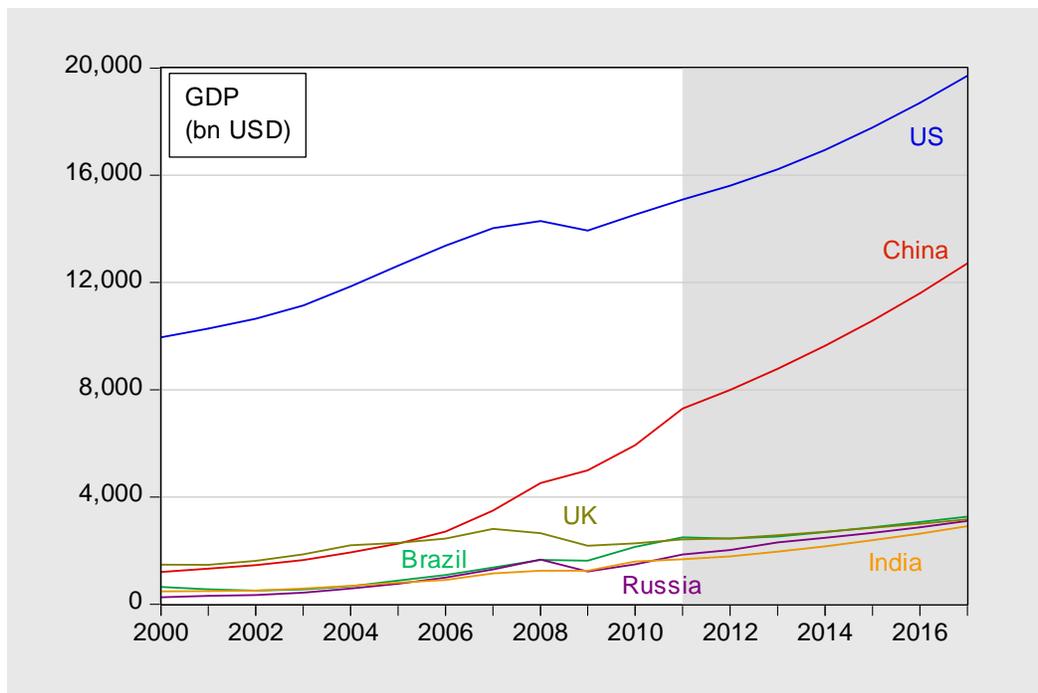


Figure 5: GDP (billions of USD) for US, UK, Brazil, Russia, India and China, evaluated at market exchange rates. Forecast data 2011 onward except for US and UK (2012 onward). Source: IMF, *World Economic Outlook* (April 2012) database.

While all four emerging market economies will not exceed US GDP (at market exchange rates) in the next five years, what is of interest is that Chinese GDP surpassed UK GDP in 2005, and Japanese GDP in 2009. Brazilian GDP is currently on par with that of the UK. By 2017, Russia and India are projected to have matched with the UK as well.

In terms of economic size alone, one would anticipate that with some lag, China would achieve reserve currency status. However, the comparison to the UK-German switch is not quite apt because the disparity in the level of financial development in that earlier switchover was not as great as that between China and the UK. Referring to the financial center proxy used in the Chinn-Frankel analyses, in 2010 Chinese daily foreign exchange turnover was only 20 billion USD (registering approximately 0% of total); the corresponding figure for the UK is 1854 billion USD. The turnover in the other countries is similarly low: 14, 42, and 27 billion USD (BIS, 2010).

¹¹ Some other candidate reserve currencies would include Australian and Canadian dollars. While both countries are relatively small in terms of GDP, by some metrics their currencies are closer to meeting the requirements. 4% of foreign exchange trading takes place in Australia, while turnover in the Australian dollar exceeds that of the Swiss franc (7.6% vs. 6.4% out of 200%). The Singapore dollar and Swedish and Norwegian currencies are also currently well represented in central bank reserve holdings, under the category of “Other currencies” (Szalay, 2012). As of December 2011, “Other currencies” represented 5% of allocated reserves, and 2.8% of total reserves (IMF, 2012).

For completeness, presented below are some conventional measures of financial development: liquid liabilities to GDP, and public and private bond capitalization to GDP.

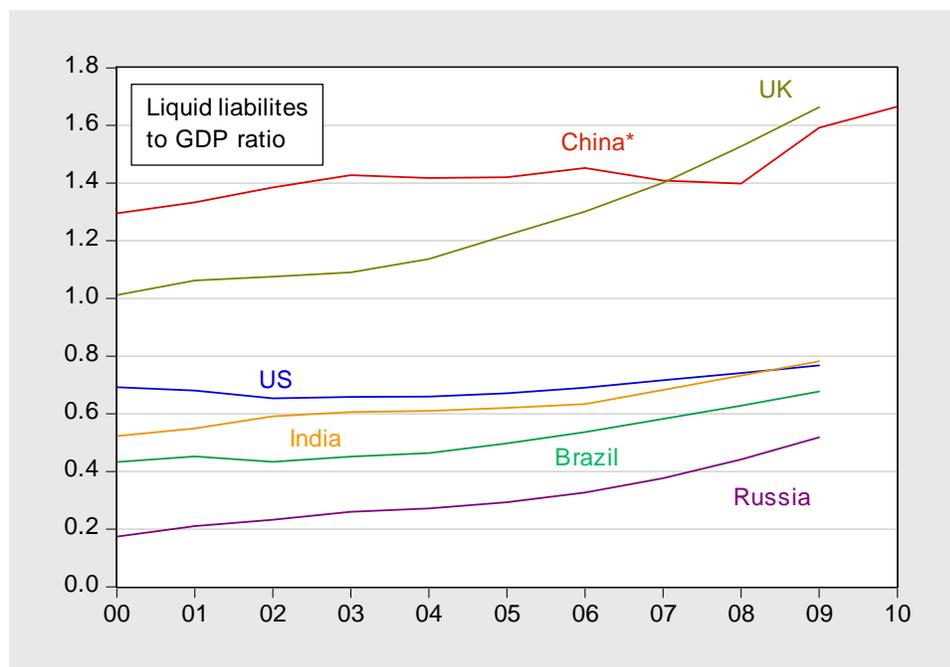


Figure 6: Ratio of liquid liabilities (M3) to GDP (M2 to GDP for China). Source: Beck and Demirgüç-Kunt (2009); and World Development Indicators, 2012 for China.

Clearly, the ratio of liquid liabilities or M2 to GDP is inadequate as a measure of financial development, as it indicates a small gap between the UK and China (and greater financial development than the US). In the case of China, such measures are very poor indicators of financial development, especially given the dominance of state owned banks.¹²

Other measures of market mediated finance, such as public and private bond market capitalization to GDP, are shown in Figures 7 and 8.

¹² See Chinn and Ito (2006) for a more extensive discussion of what exactly constitutes financial development. Ito and Chinn (2009) assess financial development using other financial indicators, including stock market and bond market value and turnover.

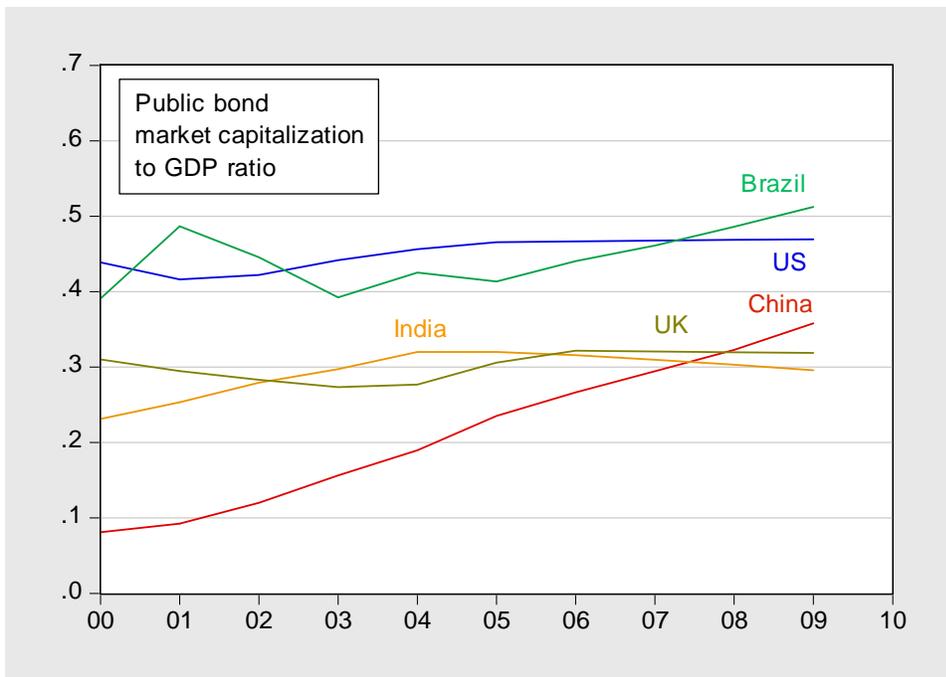


Figure 7: Ratio of public bond capitalization to GDP. Source: Beck and Demirgüç-Kunt (2009).

Since foreign exchange reserves are held in the form of government bonds, public bond markets are of important. When it is difficult to purchase and sell government bonds across borders (and especially if there is no secondary market for those bonds), and agents worry about the default risk associated with those bonds, then the currency those government bonds are denominated in will not be a good candidate for a reserve currency.

However, public bond market capitalization in itself does not indicate how well active the secondary markets are. Prasad and Ye (2012) report that the government bond turnover ratio is rising in China, but remains low in China and India (1.0 and 2.2, respectively, vs. 14.3 in the US in 2010).

To the extent that the ability of private firms to issue bonds indicates the depth and quality of financial markets, it is useful to contrast the extent of private bond capitalization across countries.

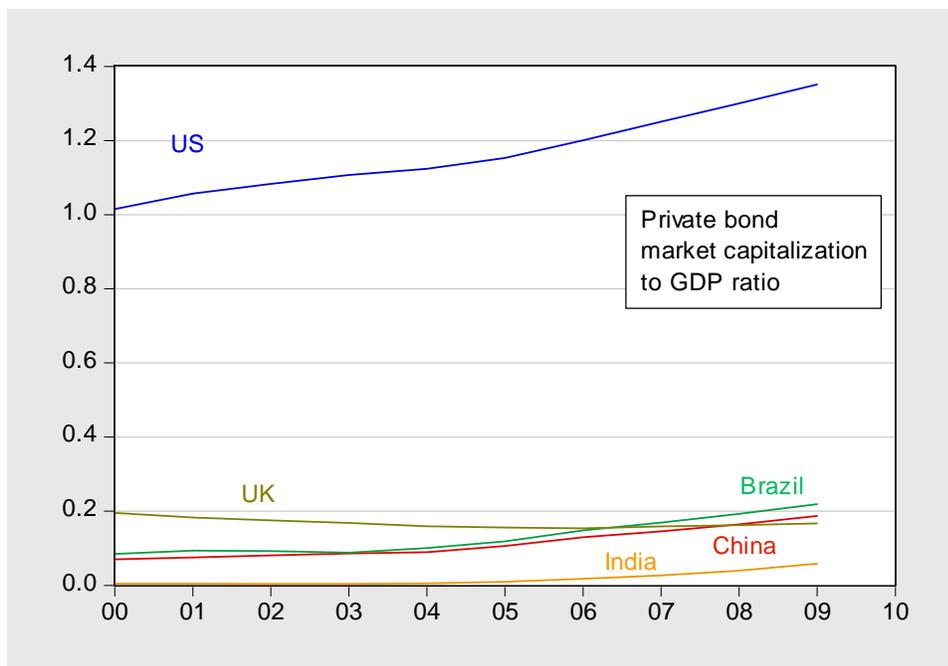


Figure 8: Ratio of private bond capitalization to GDP. Source: Beck and Demirgüç-Kunt (2009).

Nonetheless, even the private bond market capitalization series are not fully informative with regard to financial development. After all, it is hard to believe that Brazil and China are comparable to the UK in terms of financial development.

Given that financial development is so difficult to observe directly, it might be useful to consider the determinants of financial development. Chinn and Ito (2006) argue that key determinants are the level of institutional development (an effective legal system, the absence of corruption, and efficient administration) and *de jure* financial openness. Specifically, once a threshold level of institutional development has been achieved, financial openness spurs the development of the banking sector and – both directly and indirectly through the growth of the banking system – the equity markets. (Unfortunately, we do not have sufficient data to assess bond market development.) These two driving variables are measurable (albeit imperfectly), and are depicted in Figures 9 and 10, respectively.

Figure 9 indicates that according to the data from the International Country Risk Guide (ICRG), China and India lag far behind the US and the UK, but slightly lead Russia and Brazil.¹³ Of course, such measures are extremely subjective, and should be construed as merely suggesting that the level of institutional development is lower in these emerging markets than in the US and UK.

¹³ The indices displayed are the LEGAL variable used in Chinn and Ito (2008a). The measure is calculated as the first principal component of bureaucratic quality, law and order, and corruption.

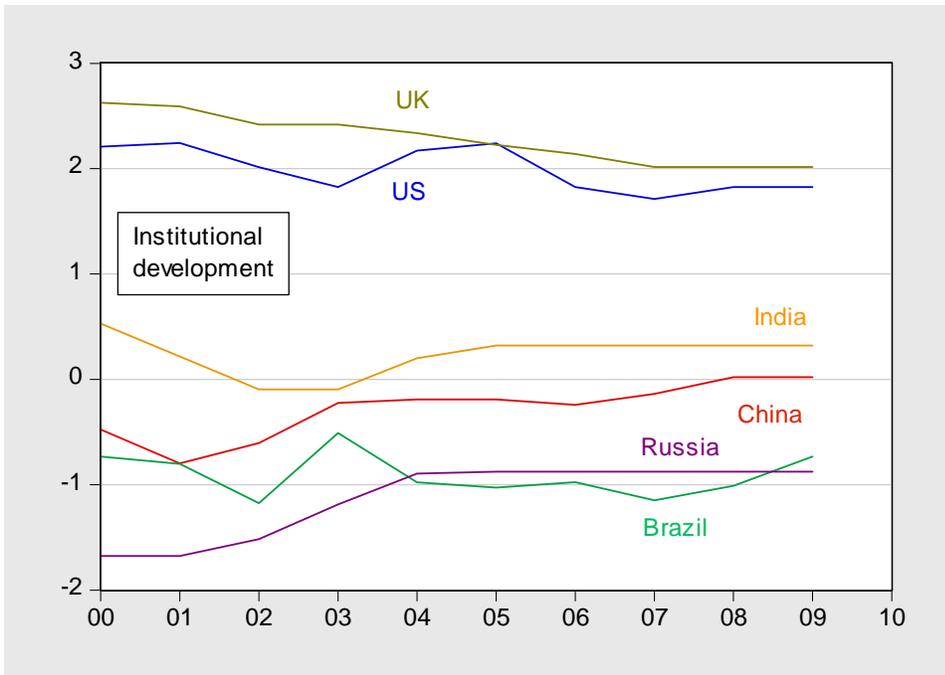


Figure 9: Institutional development index. Source: Chinn and Ito (2006), based on ICRG data. Higher values indicate higher levels of institutional development.

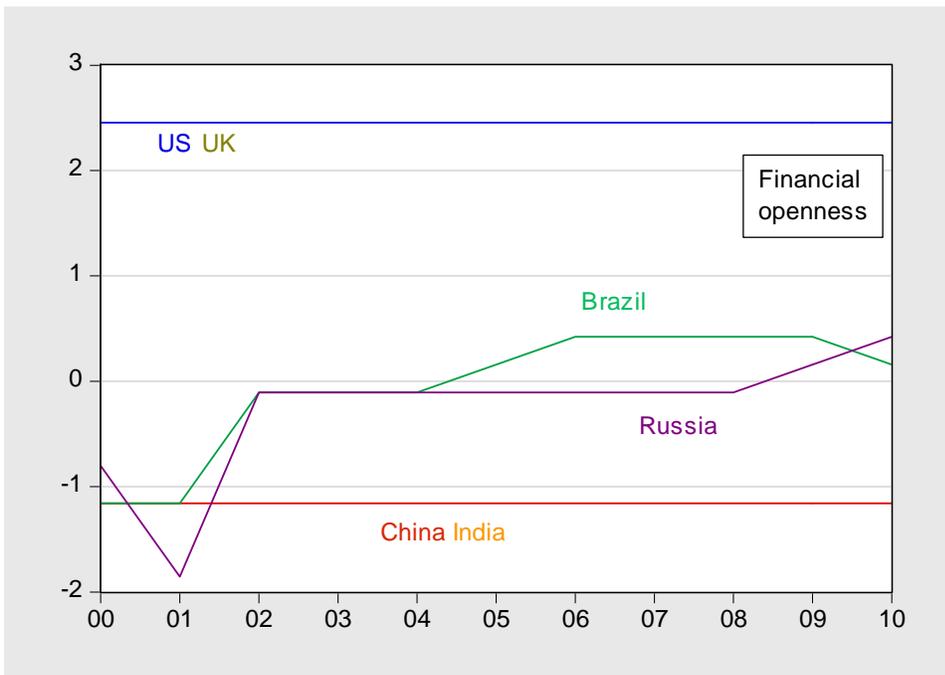


Figure 10: *De jure* financial openness index (Chinn-Ito KAOPEN). Higher values denote higher levels of financial openness.

Figure 10 plots the Chinn-Ito (2006) financial openness indicators, KAOPEN. This index is the first principal component of binary measures pertaining to restrictions on current account and capital account transactions, as well as the requirement for surrender of export proceeds and

the existence of dual exchange rates.¹⁵ The figure highlights the fact that, according to the rules and regulations reported to the IMF, China and India lag far behind Russia and Brazil in terms of financial openness (which in turn lag far behind the US and UK, as anticipated).

3.2 The Renminbi and the Other Emerging Market Currencies

Several studies have explicitly assessed the prospects for the currency of China, and to a lesser extent, of India, to achieve reserve currency status. Frankel (2011) and Prasad and Ye (2012) are the most comprehensive of these studies, while Lee (2010) and Subramanian (2011) conduct statistical analyses.

Frankel (2011) argues that while China has advanced rapidly in economic size and gaining confidence in the RMB's value, it lags particularly far behind in financial development. While the recent moves to increase the use of the RMB in trade invoicing, and has loosened restrictions on foreign exchange trading, China remains far from possessing a deep and liquid financial markets. As Frankel summarizes:

- RMB bonds and deposits in Hong Kong are small as a fraction of total RMB bonds and deposits (and of course Hong Kong is in any case part of China).
- Development of China's domestic financial market has just begun.
- It is still very highly regulated, and the domestic system is "financially repressed."
- Cross-border capital flows are subject to heavy controls. Foreign companies still cannot borrow in mainland China.

Prasad and Ye (2012) document in greater detail the low level of financial development in China. Hence, the prospects for early accession to reserve currency status are limited.¹⁶ Subramanian (2011) arrives a drastically different conclusion. Using an empirical analysis based on data spanning the 1899-2009 period, but restricting the determinants to GDP, trade, and share of world net capital surplus, he concludes that the RMB's prospects are much better; the RMB becomes the premier reserve currency by 2022 (or 2030 using a slightly different calculation). Of course, his specification omits the financial development variable; implicitly this appears to be a policy choice variable in the Subramanian model.

Lee (2010) adopts a more orthodox approach, using data for six economic regions over the 1973-2008 period, and the econometric specification used by Chinn and Frankel, replacing the FX turnover variable with capital openness. Assuming the three currency (dollar, euro, yuan) share of global reserve holdings remain constant, and Chinese financial openness rises to US levels, the RMB will account for between 3% to 12% of reserves by 2035.

¹⁵ See Chinn and Ito (2008b) for details. Data available at: http://web.pdx.edu/~ito/Chinn-Ito_website.htm

¹⁶ Other skeptical analyses include Wu et al. (2010) and Ranjan and Prakash (2011). Chen and Cheung (2011) assess the internationalization of the RMB.

Despite the variation in estimates, it is important to note how much agreement there is on the prospects for the RMB (excepting Subramanian's analysis). Even if one views the network externalities as less pronounced than in the conventional narrative, Eichengreen (2011, p. 147) concludes:

“Someday, perhaps, the renminbi will rival the dollar. For the foreseeable future, however, it is hard to see how it could match the currency of what will remain a larger economy, the United States. Regional reserve currency? Yes. Subsidiary reserve currency? Yes. But dominant reserve currency? This is harder to imagine.”

With respect to Brazil, Russia and India, the prospects for reserve currency status are much more limited, largely because their economic size is nowhere near that of China's, while financial indicators are not unambiguously more favorable. Only along the public bond dimension does Brazil exceed China. On the other hand, India ranks higher than China in terms of institutional development. Ranjan and Prakash (2010) discuss the prospects for the rupee's internationalization.

4. Implications for Developed and Emerging Market Countries

It is important to separate the prerequisites for reserve currency status from the implications for policy and behavior. As indicated above, the stability of the currency, and financial development (and hence legal/institutional development as well as financial openness) will need to be in place before achieving reserve currency status.

Once a currency has a role as a reserve currency, then several benefits will flow.

- Seigniorage
- Lower government and private borrowing costs
- Other nonpecuniary benefits (prestige)

On the other hand, there are several potential costs that will arise (in addition to those associated with implementing the pre-requisites).

- Some countries might peg their currency against the new reserve currency¹⁸, mitigating the use of the own currency as macroeconomic shock absorber
- Greater financial integration will make external shocks more easily transmitted to the reserve currency economy, above and beyond that associated with open capital markets.

¹⁸ The empirical evidence regarding choice of anchor currencies is limited. Meissner and Oomes (2009) point to trade flows, and denomination of liabilities.

4.1 The implications of achieving the prerequisites

Before assessing the benefits and costs associated with achieving reserve currency status, it is important to recount the benefits and costs that are associated with attaining the prerequisites for reserve currency status: the studies highlight openness of the capital account (and hence convertibility of the currency). However, capital account liberalization has profound implications for policy.

The trilemma (also known as the impossible trinity) is the thesis that a country can simultaneously achieve only two out of three macroeconomic objectives of full capital mobility, exchange rate stability, and monetary autonomy. Choosing any two objectives means that the third must be abandoned. Aizenman, Chinn and Ito (2010, 2011) show that measured financial openness (using the KAOPEN indices), exchange rate stability (measured as the inverse of exchange rate variability) and monetary autonomy (measured as negative of comovement of interest rates with foreign interest rates) are in fact traded-off in the expected manner.

If the key emerging market economies wish to achieve reserve currency status, then financial account openness would be required. Then these countries could achieve either exchange rate stability or monetary autonomy, but not both. The key emerging market economies assessed in this study have to this point not made that trade-off. China in particular has apparently placed great weight on retaining monetary autonomy and exchange rate stability. This highlights the fact that the pace of achieving reserve currency status is determined essentially by political developments – how willing policy authorities are to cede autonomy.¹⁹

A natural question is how to sequence the transition and whether regimes of intermediate financial openness are feasible. Eichengreen (2010b), drawing on the historical experience of the incumbent reserve currencies, argues that an appropriate sequence is to first allow limited convertibility for trade purposes, then greater exchange rate flexibility, as a prelude to the full capital account convertibility required for reserve currency status.

Prasad and Ye's argument that the attempt to financially develop through the fostering of an offshore financial center in Hong Kong can only go so far is consistent with this view. On this point, McCauley (2011, p.1) observes "One cannot find any precedent for the effort of the Chinese authorities to develop an offshore market while keeping in place extensive controls on the cross-border flows of capital." Given this, Prasad and Ye conclude that financial development will require that China eventually relax capital controls.

In sum, achieving the prerequisites for reserve currency status in itself is a daunting task. In particular, the proper sequencing of measures in order to achieve financial openness, without encountering financial and macroeconomic instability will be difficult.²⁰

¹⁹ See Patnaik and Shah (2011).

²⁰ A common view is that the first the currency must be moved toward alignment with market perceptions

4.2 The Implications for Individual Emerging Market Economies

Focusing on the pecuniary benefits, it is clear that once countries achieve reserve currency status, they will be able to more easily sell both private and government debt in their own currency, and at lower interest rates. This latter effect, in so far as the United States is concerned, has been termed “exorbitant privilege”. It is unclear whether one has to be a major reserve currency, or just a measurable reserve currency (e.g., Swiss franc) in order to reap this benefit.

Presumably, private borrowers will also benefit from lower borrowing costs, as rates fall for the public sector. Seigniorage benefits – the spending power re-allocated to the issuing monetary authority by way of inflation – which are often mentioned, will also accrue to the respective countries. However, to the extent that the actual holdings of currency are relatively small, the benefits should be minimal.²¹

One concern that has often been raised is that the increased demand for a currency that is associated with reserve status will tend to appreciate the currency. This in turn will reduce tradable sector competitiveness (Frankel, 1992). This is perhaps the most prominent cost associated with achieving reserve currency status.²²

4.3 The Implications for the Global Financial System

The impact on the international financial system depends upon how the constellation of reserve currencies evolves. Assuming more reserve currencies come into existence (perhaps supplanting existing ones), it would appear that emerging market economies would benefit, even if the dollar retains its pre-eminent role. Central banks could diversify their holdings of reserve currencies more broadly, thus insulating themselves from valuation shocks. In the current situation, those central banks holding large stocks of US dollars remain locked in a situation wherein diversifying out of dollars threatens to impose large capital losses. If they were able to hold a more diversified portfolio of currencies, such situations might be avoided.

of “fair value”, as the banking sector is strengthened and liberalized (particularly with respect to interest rates). Then as capital outflows are encouraged, domestic securities markets are developed. See for instance Brehon et al. (2012), and also Prasad and Ye (2012).

²¹ Goldberg, Choi and Hunter (2011) note “seigniorage revenues on U.S. currency outstanding can be approximated by the difference between interest earned on securities acquired in exchange for bank notes and the cost of producing and distributing those notes. In a low-interest-rate environment, seigniorage revenues have an upper bound of around \$2.5 billion per year if calculated at 25 basis points, or \$20 billion if calculated at an interest rate of 2 percent.” Figures for the emerging market economies are likely to be much smaller, as long as inflation remains low, and foreign holdings of currency are small.

²² If reserve currency status encourages cross border holdings of financial assets, then it is likely that these countries will also be exposed to greater valuation effects due to exchange rate changes. See Lane and Shambaugh (2010).

To the extent that Eichengreen's (2011a) view holds, the future international financial system will be more multipolar, with the US dollar, the euro, and eventually the yuan as more or less equal in importance. This would discipline the US, as it would not be able to finance deficits as easily and cheaply as before.²³

There is the fear that a multipolar system would be inherently unstable, as central banks re-allocate their holdings in order to gain the highest returns. Eichengreen (2010) argues that this view inappropriately analogizes central bank behavior to that of hedge funds. However, central bank managers have a variety of objectives, typically of a longer term horizon. He concludes that a multipolar system will be *more* stable than our current one.

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²³ The more general macroeconomic implications for the workings of the international financial system are difficult to investigate. See Fratzscher and Mehl (2011) for one attempt.

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Appendix 1 Data Description and Sources for Table 2

Share is the proportion of currency holdings. *GDPratio* is the share of world GDP (evaluated at market exchange rates); *Inflationdiff* is the difference between a 5 year moving average of CPI inflation and industrialized country inflation; *Depreciation* is the twenty year average annual depreciation against the SDR; *Exratevar* is the trade weighted exchange rate volatility (monthly), measured as a 5 year moving average; *Fxturnovertatio* is daily turnover divided by total 5 center turnover.

Reserve currency holdings. Official reserve holdings of member central banks, at end of year. The data used is spliced version of Updated 2003 data obtained July 1, 2004 (for 1980 onward) to an unpublished data for 1965-2001. NA observations set to 0 except for the euro legacy currencies. Then, US dollar series is based on COFER data beginning at end-2004, while Euro series is based on COFER data beginning at end 1999. 70% of unallocated reserves are categorized as dollar reserves, while 25% are categorized as euro reserves. Note the 2007 entry is for 2007Q3. In logistic transformations, 0 entries set to 0.000001 (0.0001%). Sources: IMF Annual Reports, Table I.2, IMF unpublished data, and Currency Composition of Official Foreign Exchange Reserves (COFER) data, December 28, 2007 version. <http://www.imf.org/external/np/sta/cofer/eng/index.htm> .

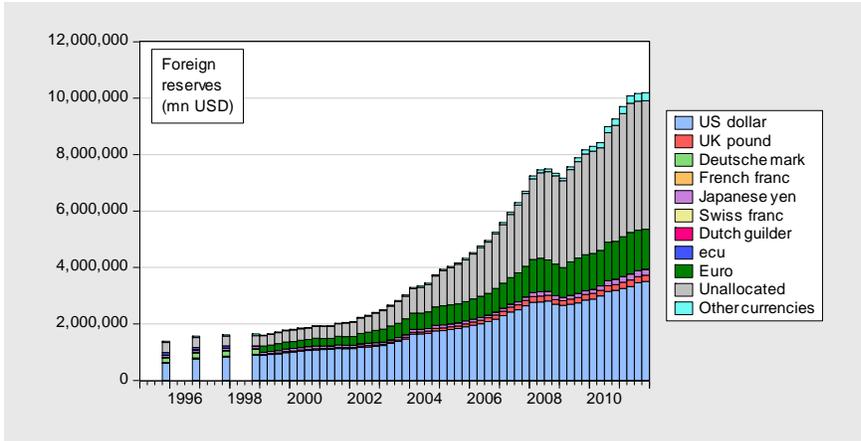
Ratio of GDP to total World GDP. Ratio of GDP in USD (converted at official exchange rates) to GDP of world aggregate. Sources: IMF, *International Financial Statistics* and IMF, *World Economic Outlook*.

Inflation. Calculated as log difference of monthly CPI, averaged. Five year moving average is centered. Source: IMF, *International Financial Statistics*; Euro area inflation for 1980-1998 is ECB data. Industrial country inflation from *International Financial Statistics*.

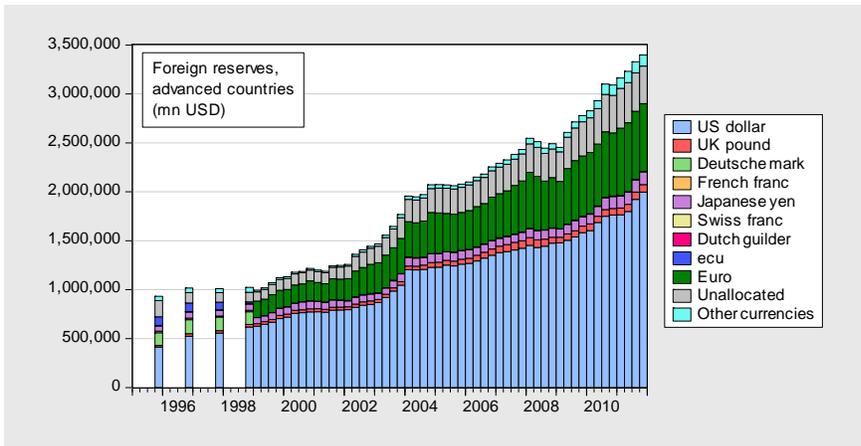
Exchange rate depreciation. Calculated as the 20 year log difference divided by 20 of the SDR exchange rate. Source: IMF, *International Financial Statistics*.

Exchange rate volatility. Calculated as the standard deviation of the log first difference of the SDR exchange rate. Source: IMF, *International Financial Statistics*.

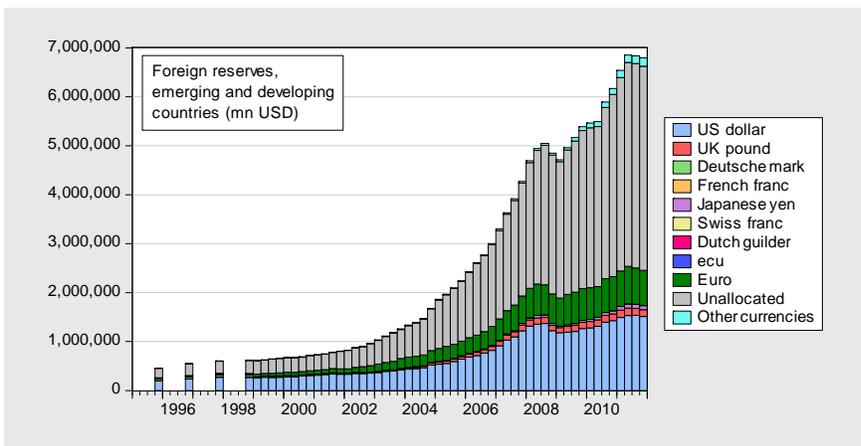
Forex Turnover. 1989, 1992, 1995, 1998, 2001, 2004, and 2007 from BIS TriannualTriennial Surveys. Billions of dollars of daily turnover, in April. Data from 1977-88 from G-30, NY Fed surveys, central bank surveys. Observations in-between survey years log-linearly interpolated. For 1973-1979, interpolation using 1977-79 relationship.



Appendix Figure 1: Holdings by all central banks. Source: IMF COFER.
<http://www.imf.org/external/np/sta/cofer/eng/index.htm>



Appendix Figure 2: Holdings by advanced country central banks. Source: IMF COFER.
<http://www.imf.org/external/np/sta/cofer/eng/index.htm>



Appendix Figure 3: Holdings by emerging market and developing country central banks. Source: IMF COFER.
<http://www.imf.org/external/np/sta/cofer/eng/index.htm>