

John Williamson and the Evolution of the International Monetary System

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Abstract

Throughout his brilliant career, John Williamson has frequently focused his considerable analytical skills and powers of persuasion on reform of the international monetary system. This paper examines two principal areas of his concern: (1) exchange rates and the adjustment process, and (2) international liquidity, seigniorage, and the stability of the system. With respect to exchange rates, I find that there has been a moderate reduction in variability, but over the past 40 years external imbalances have, if anything, worsened. The adjustment process has malfunctioned. With respect to international liquidity, reserves have expanded rapidly, but their expansion has been demand-determined, has not involved a remonetization of gold or an increase in inflation. I find that concerns about the size and maldistribution of seigniorage are misplaced. Moreover, we are seeing a steady evolution toward a multicurrency international monetary and financial system. However, reserve diversification does not appear to have adversely affected exchange rate volatility to date. I conclude that the principal benefits of the Bretton Woods international monetary system remain and the principal weaknesses remain. But the system is evolving. It could be improved with respect to the adjustment process and the role of the International Monetary Fund as the international lender of last resort.

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INTRODUCTION

Throughout his career John Williamson frequently has focused his considerable analytic skills and powers of persuasion on reform of the international monetary system (IMS). His second publication (Williamson 1963) examined international liquidity and the multiple key-currency proposal. His next publication was on the crawling peg (Williamson 1965). Exchange rates and international liquidity have been bookmarks of John's professional career. At least one-third of the items on John's curriculum vitae address one aspect or another of the international monetary system and its reform. He has been determined to keep pushing for sensible reform until policymakers and pundits finally get it right or the market for his views dries up, whichever comes first. This essay is designed to assess progress to date.

JOHN WILLIAMSON AND THE INTERNATIONAL MONETARY SYSTEM

As a consultant to Her Majesty's Treasury from 1968 to 1970, John was intimately involved in the policy process at the time of the collapse of the Bretton Woods System. Then, as advisor to the International Monetary Fund (IMF) research department from 1972 to 1974, he participated in efforts to rebuild the system during the operation of the Committee of Twenty (C-20). I first met John when he visited Yale University in the fall of 1971 to present a paper on customs unions (Bottrill and Williamson 1971), which was then a focus of my research as well. However, our professional interactions multiplied after 1972, when I joined the staff of the Federal Reserve Board. We both worked on C-20 issues, participating together on several C-20 technical groups. We were both members of a rather subversive organization called the Second Row Dining Club that would meet over dinner at the time of various international meetings and criticize the lords and masters who sat in the first rows of the meetings we all attended.

It is not an understatement that John's experience with the C-20 left him with a very bad impression of prospects for reform of the international monetary system. Indeed, he wrote a book about the C-20 effort to reform the IMS which he titled *The Failure of World Monetary Reform, 1971–1974* (Williamson 1977). John was one of the first to use the term “international monetary non-system” to characterize the IMS with which we have lived for the past 40-plus years (Williamson (1976). He elaborated on his views in his study of how the C-20 exercise failed to produce a set of well-defined rights and obligations.¹ As he put it, “There was no agreement on a set of rules for assigning adjustment responsibilities, no design of a viable adjustment mechanism, no introduction of an SDR standard [other than in empty words], no substitution account [to eliminate an overhang of reserve currencies in the system], and no curb on the asymmetries” (Williamson 1977, 73). Consequently, his concise, 203-page account of the C-20 period

1. In John's view, circa 1977, the positive benefit of rules and automaticity (compared with indicators and discretion) was that they limit tensions and political maneuvering associated with attempts to link mere indicators to change in policies or behavior (Williamson 1977, 111).

provides a useful point of departure in considering John's views on the international monetary system and its evolution.

John characterized the international monetary system as consisting of arrangements in five areas (Williamson 1977, 1): market convertibility (transactions in different currencies between private parties), the exchange-rate regime, balance-of-payments adjustment, the supply of reserve assets, and the institution charged with managing the system. This last element brings in the IMF as the manager of the system. John favored then, as well as today, a system based as much on rules as possible and a major role of the IMF is as the keeper and enforcer of the rules. John (Williamson 1997, chapter 2) dates the demise of the Bretton Woods system (a) to the termination of the convertibility of official holdings of US-dollar assets into gold on August 15, 1971 and (b) to the subsequent final collapse of the Bretton Woods exchange rate regime based on adjustable exchange rate pegs following the first devaluation of the dollar and the Smithsonian agreement of December 1971, the second devaluation of the dollar in February 1973, and the final de facto demise of the adjustable-peg regime at an international meeting in Paris on March 16, 1973. As John wrote, "The adjustable peg broke down because it did not provide a viable crisis-free method of changing exchange rates in an era of capital mobility" (Williamson 1977, 51). The adjustable-peg regime was replaced de facto with a regime of managed floating among the major currencies, but de jure the adjustable-peg regime continued to be the goal of the C-20 reform exercise.

To John's outrage, the authorities were unwilling to admit that it was time to move on from the adjustable-peg regime. Instead, in Washington later on in March 1973, the C-20 solemnly declared that "in the reformed system the exchange rates regime should remain based on stable but adjustable par values." The Committee "also recognized that floating rates could provide a useful technique in particular situations. . . . [And] on the need for exchange market stability and the importance of Fund surveillance over exchange rate policies" (IMF 1974, 215).

John considered the C-20 decision to try to perpetuate the adjustable-peg regime as "intellectual nihilism" (Williamson 1977, 125). He was, however, careful to note that two important components of the five elements of the Bretton Woods system—market convertibility and international management—remained, even as arrangements governing the exchange rate regime, balance-of-payments adjustment, and the supply of reserves were swept away.

In John's view (Williamson 1977, 77), the participants in the C-20 reform negotiations shared a common interest in preserving the progress under the Bretton Woods system in nine areas: (1) maintenance of a cooperative economic system, (2) incorporating liberal trading policies, (3) maintenance of an international capital market, (4) minimization of global cyclical fluctuations, (5) provision of development finance, (6) the absence of erratic exchange rate variations, (7) the avoidance of competitive

payments policies, (8) orderly methods of payments adjustment, and (9) the provision of reserves through a fiduciary (fiat) reserve asset, that is, the then-nascent Special Drawing Rights (SDR) system.²

Arguably, the post-C-20 system has been successful in the first four areas, which I would argue fall in the category of objectives achieved.³ The fifth area (development finance) is not a feature of the international *monetary* system per se, though some may disagree.⁴ Although development finance has not been generous over the past four decades (certainly by the standard of the early 1970s that envisaged the advanced countries devoting 1 percent of their GDP to development finance), many countries are more developed than four decades ago and development finance has not entirely dried up.

The remaining four areas are potentially desirable features of an international monetary system, but have not been established. On the other hand, with the exception of the erratic exchange rate variations, which were constitutionally excluded under the Bretton Woods system, not much progress was made on them during the 25 years of the Bretton Woods system either. It is just that no progress has been made subsequently.

John made the point that the United States and the rest of the participants in the C-20 negotiations were agreed that there was inappropriate asymmetry in the Bretton Woods system (Williamson 1977). But they disagreed on the nature of the asymmetry and what to do about it. The United States was looking for symmetry in the *adjustment process* for countries in surplus and those in deficit. The Europeans and Japanese, in particular, were looking for symmetry as it applied to the settlement of payments imbalances between the reserve currency country (the United States) and themselves and saw asset settlement as the appropriate means of achieving greater symmetry in the operation of the system as a whole.

John attributes the failure of the C-20 negotiations to a lack of political will to cooperate on seeking common solutions and to an intellectual failure, or technical inadequacy, when it came to devising a

2. The numbering and ordering is not John Williamson's.

3. The first area relates to the role of the IMF. Whatever one thinks of the post-Bretton Woods IMS and the job that institution has done in that IMS, the IMF has retained its central role in international monetary cooperation though it has been forced to share that role first with the G-7, and now with the G-20, even as before 1971 the IMF shared its central role with the G-10. The IMF has evolved and been the institution that has been employed to deal with the oil crises of the 1970s, the debt crises of the 1980s, economic transformation after the collapse of the Soviet Union and its influence in central and eastern Europe, the Mexican and Asian crises, and the global financial crisis of the first decade of the 21st century and beyond. Its provision of public goods via its surveillance activities, while insufficient and incomplete because of lack of cooperation by member countries, have been central to economic and financial reform and recovery.

4. Perhaps, John included this element because in the C-20 negotiations the issue of the transfer of real resources to developing countries was on the agenda along with the SDR-aid link, which John favored as killing two birds with one stone. (However, John, the renowned birder, would never deliberately kill a bird.) John argues that if the C-20 had reached an agreement on a thorough reform of the IMS, the developing countries would have extracted agreement on "the link" as part of their price for approving the resulting amendment to the IMF articles of agreement.

workable system, in particular with respect to the exchange rate regime (Williamson 1977, chapter 7). He rejects as major contributing factors (1) the unsettled global economic and financial situation in the context of rising oil and commodity prices and subsequent recession; (2) any deep conflict of national interests, noting that the United States achieved the current account surplus that it was seeking (but it lasted only from 1973 to 1976); or (3) the way the negotiations were handled though he argues that the handling of the negotiations may have contributed to the intellectual failure.

The bulk of John's 1977 review of the C-20 negotiations focuses on the adjustment process including the exchange rate regime (chapter 5) and reserve assets and liquidity (chapter 6). In his prescriptions for the future (chapter 8), John focused primarily on the exchange rate regime. He embraced the reference rate proposal of Wilfred Ethier and Arthur Bloomfield (1975) to establish foreign exchange market intervention rights but not impose intervention obligations.⁵

John was involved in the process that generated the IMF's guidelines for the management of floating exchange rates that were adopted by the IMF Executive Board in June 1974. The guidelines included some elements that were similar to those in the Ethier-Bloomfield approach, in particular the concept of an exchange rate target "within the range of reasonable estimates of the medium-term norm for the exchange rate in question" (IMF 1985, Volume III, 487–91) but the guidelines went further in establishing the presumption that countries would "lean against the wind" in their intervention operations. When the IMF Articles of Agreement were formally amended in 1978 to legalize floating exchange rates and when, in anticipation of the approval of the second amendment, the IMF executive board, in April 1977, adopted a decision governing the surveillance of members' exchange rate policies, the notion of a medium-term norm as well as the presumption that a member should lean against the wind in its exchange rate operations were not included (IMF 1985, Volume III, 491-94). In John's view, these were steps backward that reinforced his sense that the C-20 process had created a non-system.

This setback has not deterred John from continuing to pursue the reference rate proposal as documented by the contribution to the Williamson festschrift volume by Marcus Miller (forthcoming) on target zones. See, for example, Williamson (2006) and Williamson (2007). Also see, starting in 2008 with a Peterson Institute for International Economics Policy Brief, his exercises with William C. Cline to provide estimates of FEERs, or fundamental equilibrium exchange rates (Cline and Williamson 2008 and 2012).

Although John's primary preoccupation with the international monetary system over the past 40 years has been the adjustment process and the role of exchange rates and exchange rate management in that process, he also has addressed the reserve asset system, in particular the role of the SDR (Williamson 1977, chapter 8). In John's view at that time, the IMS should involve the collective management of

5. The Ethier-Bloomfield approach had been presented in 1974 at a conference.

international liquidity preferably by providing reserve assets to participating countries in the form of fiduciary claims, in other words SDR. Although John was sympathetic to the European attachment to asset settlement as a means to discipline US economic and financial policies, and also to the SDR-aid link as a mechanism for distributing SDR reserves to the system, his principal motivation appears to have been to redistribute the seigniorage associated with the provision of reserve assets that he saw accruing to the United States. He also held the view that controlling the volume of international liquidity was an important aspect of a healthy global economic, monetary, and (today some would emphasize even more) financial system. In recent years, as the topic of IMS reform has reemerged, some would say only marginally, on the international agenda, John has returned to assessing the role of the SDR in the international monetary system (Williamson 2009a and 2009b).

In chapter 8 of *The Failure of World Monetary Reform*, John argued that, despite the failure of the C-20 negotiations and the modest adjustments to the IMS contained in the second amendment of the IMF Articles of Agreement, reform of the IMS was desirable (Williamson 1977). Based on the attention he has paid to IMS issues in his subsequent oeuvre, we can safely conclude that John still feels that way. In 1977, John argued that reform of the IMS was desirable on political grounds (196), “In the absence of an agreed framework of rules governing rights and obligations in the economic and monetary fields, there is clearly potential scope for the inevitable differences in national interests to foment political disharmony.”⁶ John declared that he was not enough of an expert on international relations to evaluate this claim, and I am in the same position. However, from my limited perspective, the operation of the international monetary system has not been a frequent source of high political tension over the past 40 years. One prominent potential counter example over the past decade has been China’s exchange rate and associated policies.

The political argument aside, John presented five features of the post-Bretton Woods international monetary non-system as sources of economic concerns: (1) the high volatility of exchange rates; (2) the lack of defenses against the pursuit of counter-cyclical exchange rate policies; (3) a lack of control over the volume of international liquidity; (4) the misdistribution or arbitrary distribution of seigniorage; and (5) the asymmetric position of the US dollar (Williamson 1977, 197–201).⁷ On each of these concerns, John

6. My presumption is that John meant disharmony on other topics.

7. I have changed the order of John’s concerns (Williamson 1977) somewhat to group the two concerns with respect to the adjustment process together; the other three relate to the reserve asset system. John did not include international capital movements in his list of concerns about the international monetary system in the mid-1970s (Williamson 1977). The C-20 *Outline of Reform* (IMF 1985, Volume III, 170–171), which was predicated on an exchange rate regime of stable but adjustable par values, contained a single paragraph on the subject that concluded, “There will be improved consultation in the Fund on actions designed to limit disequilibrating capital flows, with the following objectives: first, to increase the effectiveness of such actions and to minimize harmful effects on third countries; and secondly, to avoid unnecessary proliferation and escalation of controls and the additional flows which might be prompted by anticipation

offered arguments on both sides as to how serious these concerns might be in the future. In a later paper (Williamson 1985), John advanced a robust defense of the Bretton Woods system that rested on three rules: (1) exchange rates were normally to remain stable and not be subjected to short-run manipulation via monetary and fiscal policies; (2) monetary and fiscal policies were to be focused on the maintenance of internal stability in the form of full employment and price stability constrained by the first and the third rules; and (3) countries were to restrict their deficits to what could be financed from available reserves and drawing on the IMF and the United States would be constrained by the need to maintain confidence in the dollar. Although John's defense of the Bretton Woods system was vigorous and robust, he admitted that the system functioned as intended only from 1958 to 1967—less than a decade.

The balance of this paper looks at John's five concerns about the post-Bretton Woods system in two groups: those about exchange rates and the adjustment process and those about international liquidity, seigniorage, and the stability of the monetary system. I will try to evaluate to what extent those concerns are or should be concerns today as well as examine progress and prospects in these areas.

THE ADJUSTMENT PROCESS

This section examines two aspects of the international monetary system as it has evolved since the early 1970s: exchange rates variability and the external imbalances. The two aspects are closely linked although adjustment is not all about exchange rate movements, or non-movements, and exchange rates are not all about maintaining external equilibrium.

Exchange Rate Variability

One frequently heard criticism of the international monetary system today is that there is excessive and unnecessary variability of exchange rates.⁸ The argument is that exchange rate variability impedes trade and adversely affects growth and/or contributes to inflation. Joseph E. Gagnon (2011, chapters 4 and 5) exhaustively examines these arguments and finds little evidence to support them. Trade has grown

thereof." In the ensuing 40 years, as detailed by the contribution of Olivier Jeanne to the Williamson festschrift volume (Jeanne forthcoming), John has directed considerable attention to global capital flows. He is a believer in the efficacy of capital controls (now politely called capital control management or regulation) and a supporter of having those controls as part of the IMS subject to international surveillance, in part, to ensure that they are not a substitute for the adjustment of fundamental policies and that their spillovers on other countries are minimized or at least recognized. After a period in which capital controls were increasingly frowned upon, though in the context of no change in Article VI blessing restrictions on capital transfers, the pendulum has swung back to about where it was in the mid-1970s: controls over capital movements are to be tolerated but they should not be used discriminatorily or as a substitute for appropriate adjustments in other underlying policies. (See the statement on this issue by the G-20 (2011).)

8. Paul A. Volcker is frequent critic. See Volcker (2012).

more rapidly than economic activity; exchange rate variability is uncorrelated with growth or inflation. Nevertheless, as Gagnon notes, lack of correlation does not establish a lack of causation.

It is difficult to believe that there are zero costs associated with the degree of exchange rate variability that has prevailed since the collapse of the Bretton Woods system. The question is what is the appropriate comparison? Optimum exchange rate policies, as long as they were associated with other optimum macroeconomic policies, should improve economic outcomes. As John in his many writings has stressed, the search for optimum exchange rate policies must start from the proposition that one can establish, in rough measure, equilibrium exchange rates for countries individually and collectively that are consistent with internal and external balance for each country and globally.

Exchange rate variability can be measured in several dimensions, including, for example, with respect to one or more time periods and with respect to one or more currencies. Concerns about the day-to-day variability in exchange rates distorting price signals in the short run differ from concerns about exchange rate variability over periods as long as a year or two, which are more relevant to the adjustment process and the costs of delaying adjustment. Those who advocate exchange rate stability, in general, focus on a particular bilateral rate, for example with the dollar or the euro, as does Gagnon in his chapter 4 but not in his chapter 5, where the focus is on effective exchange rates. It is more appropriate, in my view, to examine the behavior of effective, or average, exchange rates rather than bilateral exchange rates. In particular, the latter are more relevant for most economic questions. The economics profession over the past 40 years has failed to convince policymakers and the general public to focus not on a particular bilateral exchange rate but, instead, on the average exchange rate for the country. Therefore, that was my principal focus in the investigation of exchange rate variability summarized in what follows.

Has exchange rate variability decreased in recent years? We examined this question in terms of month-to-month changes, 12-month changes, and 24-month changes. We considered the euro-dollar and yen-dollar bilateral nominal exchange rates, as the two principal exchange rate relationships in the global economy over the past 40 years, and also the yen-euro cross rate.⁹ We looked at the behavior of nominal and real effective exchange rates for the G-20 countries, including the euro area as a whole.¹⁰ We used two tests: Has the standard deviation of log changes in exchange rates declined in the second half of the

9. To construct a longer-time series for the bilateral euro exchange rate we used the German mark and the rate at which German marks were converted into euro on January 1, 1999.

10. The time series for the effective exchange rates for the euro start in 1979 or 1980 and are linked to the rate for the European Currency Unit.

observation period? Is there an overall negative trend in the standard deviation of log changes in exchange rates?¹¹ Table 1 presents the summary results.¹²

Exchange rate variability has declined in all three time dimensions in a substantial majority of the 20 series of nominal and real effective exchange rates examined over three time intervals, on average 85 percent for the two tests, the two exchange rate series, and the three time intervals.¹³ Seventy-seven percent of the cases exhibited a significant reduction in variability, slightly more frequently for the nominal effective exchange rates, but the difference was not as pronounced as one might expect. This probably reflects the influence of nominal exchange rates on real exchange rates. On the other hand, the decline in variability has not been dramatic. Appendix table 1 shows the effect over ten years relative to the mean of the each series. The mean 10-year effect ranges from 15 to 20 percent if one discards the outsized effects for Indonesia, Russia, Saudi Arabia, and Turkey for nominal effective exchange rates, and the first three countries for real effective exchange rates.¹⁴ These are not steep trends.

The apparent general decline in exchange rate variability suggests that markets today may be coping better with flexible exchange rates than several decades ago, but that does not necessarily mean that the external adjustment process has produced better results overall or that there has been a decline in the high volatility of exchange rates about which John was concerned (Williamson 1977, 197). On the other hand, while exchange rates may not have been as stable as John would like, their variability has not been generated by manipulation through the exercise of monetary and fiscal policy, as John suggested might be the case (Williamson 1985). However, the aim should not just be stable exchange rates, but exchange rates that are consistent with internal and external stability. From this medium-term perspective, adjustment of exchange rates may have been insufficient. The next subsection examines this issue.

External Imbalances

Turning to outcomes of the adjustment process, it is conventional to focus on external imbalances.¹⁵ We worry about external imbalances for two reasons: First, for individual countries, external imbalances, outsized deficits in particular, may trigger external payments crises that are disruptive to the economy in

11. The time periods differed depending on the availability of data, but most of the series started in 1975, soon after the advent of generalized floating among the major currencies, or in 1979 or 1980. (See note at the end of appendix table 1.) Five-year rolling standard deviations in log-changes in exchange rates were computed.

12. Appendix table 1 contains more detailed results, including the results for the three nominal, bilateral exchange rates.

13. Frequently, the exchange rates for the same countries exhibited an increase in variability: India and Korea, which moved toward policies of greater exchange rate flexibility, but also Canada and the United Kingdom.

14. The time series for these four countries are shorter, starting in 1993 or 1994; see note in appendix table 1.

15. A case could be made that one should focus instead, or in addition, on broader indicators of macroeconomic performance such as growth, inflation, and unemployment rates, and technical progress. However, such an examination is beyond the scope of this study.

question and potentially to its neighbors and the global economy. Second, for the global system, external imbalances, and deficits in particular, but also potentially surpluses, can trigger a global crisis as a consequence of a forced process of adjustment or an increase in protectionism. This was a major concern in the mid-1980s when the US dollar soared and the US current account deficit widened to 3.4 percent of US GDP in 1987 and the US dollar came under intense downward pressure. The predicted hard landing was avoided, but memories of that experience informed the analysis in subsequent years.

The US current account deficit moved back above 3 percent of GDP in 1999 and persisted at that level or above for 10 years before the global economic and financial crisis hit. Whether the US deficit and associated global imbalances contributed to the crisis and, if so, to what degree, is a topic of lively debate. It is clear that the crisis did not unfold in the manner that was anticipated by those who were concerned about a run on the dollar and an abrupt process of US external adjustment. In the event, the dollar rose during the acute phase of the crisis during the fourth quarter of 2008 and the first quarter of 2009 and the US current account adjusted, at least in part, because of a collapse of US imports as the US economy went into recession and experienced a tepid recovery.

Has the incidence of significant external imbalances increased or decreased since the collapse of the Bretton Woods system? To answer this question, in the spirit of John's recent work, we looked at a sample of important countries and, first, scaled their current account positions by national GDP.

Over the past five years, William Cline and John Williamson have teamed up to examine the current account balances relative to national GDPs for 33 economies plus the euro area as projected by the IMF staff in its *World Economic Outlook* (WEO) report. They use the ratios to estimate the degree to which the effective exchange rate of the relevant economy is out of line with its fundamental equilibrium exchange rate; the rate that they estimate would produce a deficit or surplus less than their trigger, 3 percent of GDP.¹⁶

In applying this approach to data and estimates for 1980 to 2017, I expanded the Cline-Williamson set of economies to 50 in order to cover the period before establishment of the euro area. Therefore, I added the 17 euro area countries. Consequently, my sample includes an additional 14 advanced economies and 3 emerging market economies.¹⁷ I raised the cutoff for an imbalance to 4 percent of GDP because using the 3 percent cutoff generated an implausibly large number of imbalances.

16. The first such exercise was Cline and Williamson (2008). The most recent is Cline and Williamson (2012).

17. I treat Estonia, the Slovak Republic, and Slovenia as emerging market economies for this purpose. (In the WEO database, which we used as our source, the data do not go back to 1980 for these countries; they also do not go back that far for the Czech Republic and Russia as well. One observation is missing for Austria as well.) For this exercise, I treat Hong Kong, Korea, Singapore, and Taiwan as emerging market economies. (They are now treated by the IMF as advanced countries.) Consequently, there are 23 advanced economies and 27 emerging market economies in the sample. The 50 economies accounted for 92 percent of world GDP in 2011 at market prices and exchange rates and 89 percent on a purchasing-power-parity basis.

As depicted in the top panel of figure 1, even applying the higher 4-percent cutoff, in 41 percent of the observations over the 32 years to 2012, the 50 economies recorded current account positions greater than that figure as an absolute value.¹⁸ More than 40 percent of the countries had imbalances, by this measure, in the early 1980s. The incidence hit a low in 1990, but rose back above 50 percent in 2004, and hit a peak of 72 percent in 2007. The WEO projections are for the incidence to be in the 30 percent range over the next 6 years. For the historical period as a whole, the emerging market economies accounted for a disproportionate share of total imbalances—44 percent of the observations for this group compared with 38 percent of the advanced economy group. The time series for the two groups are broadly similar, except that the incidence of imbalances was much larger for the emerging market group in the 1980s. In 2007, however, both groups recorded rates of imbalance above 70 percent.

For the period as a whole, the average incidence of deficits and surplus was about the same, 21 and 20 percent respectively. However, as shown in the lower two panels of figure 1, deficit imbalances were much more common in the early 1980s and surplus imbalances were more common in recent years. The IMF projects that this relative distribution will continue within a smaller overall total. A closer inspection of the lower two panels in figure 1 reveals that it was the deficits of the emerging market economies that dominated in the 1980s and into the 1990s. Their surpluses have dominated since the year 2000. On the other hand, the incidence of surpluses among the advanced countries has also increased recently.

Table 2 summarizes the data in the figure 1. It presents data on imbalances for two sub-periods 1980–98 and 1999–2011, the entire 1980–2011 period, and the projection period of 2012–2017 for all 50 economies and several sub-groups of economies. The table reinforces the messages from figure 1. The incidence of imbalances has increased on average since 1998, in particular among advanced countries. The incidence of deficits has increased reflecting the large US deficits as well as deficits of euro area countries. The incidence of deficits among emerging market economies has declined, and the incidence of surpluses for this group has risen dramatically. This pattern holds for all sub-groups of emerging market economies except Eastern Europe where the incidence of both surpluses and deficits has risen.

The data summarized in figure 1 and table 2 are potential indicators of current account imbalances that may have been problematic for the countries involved, and in some cases they were. But these data provide less-than-perfect indicators of imbalances that threaten the global economy. For example, in the 1980 to 1998 period, 4 countries had current account deficits that exceeded 4 percent of their respective national GDP in more than 50 percent of the observations: Australia, Cyprus, Malta, and New Zealand.¹⁹ External financing problems in the first and last country could conceivably threaten global

18. Using a 3-percent cutoff produces a figure of 54 percent of the observations although the pattern in the time series is very similar.

19. The WEO database provides data for Malta for only the last four of the relevant years.

economic and financial stability, but not the middle two countries, at least during this period. On the other hand, during this period, the United States recorded no current account deficits greater than 4 percent of US GDP; the largest was 3.3 percent of GDP in 1987 and that provoked a mini-financing crisis for the United States. With respect to countries with current account surpluses, Luxembourg, the Netherlands, and Switzerland recorded surpluses during this period at more than 4 percent of GDP more than 50 percent of the time.²⁰ The surpluses of the Netherlands and Switzerland were arguably potentially systemically important during this period, but not those of Luxembourg. Moreover, Germany and Japan exceeded the 4-percent cutoff for their surpluses only 16 and 5 percent of the 17 years. The Cline-Williamson approach is misleading in an historical context.

To get a better handle on imbalances that are more likely to have global significance, an alternative approach is to use world GDP as the scale factor, as I argued in *Strengthening IMF Surveillance* (Truman 2010a). Figure 2 and table 3 present the results of this exercise using 0.05 percent of world GDP as the cutoff.²¹

From figure 2, we can see that on average the incidence of imbalances is smaller than when they are scaled by national GDP, and the incidence increases rather steadily over the period with only a small dip in the early 1990s. The contribution of emerging-market economies to the overall total of imbalances also increases over time. On this criterion, however, deficits for this group of countries disappeared between 2002 and 2005, and since 2003 the incidence of surplus imbalances for these countries has been high. Table 3 provides more detail on the results using the world-GDP criterion. Overall, when applying the world-GDP criterion, emerging markets become relatively more prominent reflecting the fact that the share of emerging market economies in world GDP has increased substantially, in particular over the past decade.²²

Returning to what this evidence says about the working of the global adjustment process, has the incidence of significant external imbalances increased or decreased since the collapse of the Bretton Woods system? The clear answer is that the incidence of imbalances has increased. In 2011, 20 of the 50

20. The WEO database provides data for Luxembourg for only the last four of the relevant years.

21. If an economy's share of world GDP, in US dollars, is 1.25 percent or higher (0.0005 divided by 0.04 times 100), it has the potential to meet the global GDP criterion but fall short of the national GDP criterion. In 1996, ten advanced countries met that test: Australia, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, the United Kingdom, and the United States. Four emerging market economies met the test: Brazil, China, Korea, and Russia. Of course, more emerging market countries meet the test today. For the 1980 to 1998 period, the number of imbalances (surpluses or deficits) meeting each criterion is comparable: 113 cases using the national-GDP cutoff and 115 cases using the world-GDP cutoff. Appendix table 2 provides a comparison of the results for 1980–1998 for the 23 advanced countries using the two criteria.

22. By 2011, India and Mexico joined the four countries listed in the previous footnote with national GDP of more than 1.25 percent of world GDP.

countries in our sample had deficits or surpluses in excess of 0.005 percent of world GDP—9 deficits and 11 surpluses. And the average incidence between 2006 and 2011 was 40 percent. The sum of the excess deficits and surpluses beyond the cutoff of 0.05 percent of world GDP in 2011 was \$1.36 trillion to \$620 billion in deficits and \$740 billion in surpluses.

The US contribution to the 2011 excess of deficits—\$439 billion of its total deficit of \$473 billion—accounted for 70 percent of the total excess of deficits. Indeed, using 0.05 percent of world GDP as the cutoff, the United States has had an excessive deficit in 29 of the past 32 years. (Using a cutoff of 4 percent of national GDP, the figure is only 8 years, but the observations are all since 1998.) One might reasonably conclude that the external adjustment process definitely has not worked in so far as the United States is concerned. Not all would agree with this argument; some would observe that the US deficit is solely the result of its own policies, for example, the United States has generated deficient net domestic savings. What is true is that, as under the Bretton Woods system, the United States has continued to have a more limited independent scope to manage its external position than other countries. For example, what would happen if the United States adopted, as some have advocated, an aggressive policy to depreciate the dollar and narrow its current account position? A reasonable expectation is that such a US policy posture would substantially increase international economic and financial tensions even if, in the eyes of some, it would be positive for the economic health of the United States. In other words, the present international monetary system, like its predecessor, has not facilitated a smooth and effective working of the international adjustment process, in particular, for the United States.

Although there are imbalances among the advanced countries, in particular in Europe, the major development over the past decade has been the shift of the emerging market and developing countries from aggregate positions in current account deficit to aggregate positions in current account surplus; see table 4. From 2001 to 2011, this group of countries had aggregate current account surpluses every year, even when the four Asian economies that the IMF now classifies as advanced (Hong Kong, Korea, Singapore, and Taiwan) are not included. The other countries in emerging and developing Asia had a combined current account surplus in all 12 years, as did the Middle East group of countries and the countries of the Commonwealth of Independent States. In five of those years, Latin American countries had a combined surplus. In three years, Sub-Saharan African countries did as well. Only the countries of Central and Eastern Europe had combined deficits in all years.

Contrast the 2001 to 2011 experience with the pattern in the previous 10 years, 1991 to 2000. The emerging and developing countries had a combined deficit every year except 2000.²³ The Latin American, the Central and Eastern Europe, and the Sub-Saharan African countries had combined deficits all ten

23. From 1991 to 1998, this was true even if the four newly industrialized economies of Asia are included.

years. The Asian and Middle East groups had deficits six of the ten years, and the Commonwealth of Independent States in four of nine years.²⁴

This change in the pattern of deficits and surpluses might be taken as evidence supporting the view that capital is flowing up hill, contrary to view in the C-20 period that it is desirable to promote the transfer of real resources from “North” to “South.” This is a mistaken interpretation of the evidence. As I have argued (Truman 2011a), the transfer of real resources from South to North has largely been facilitated by official sectors in the South accumulating reserves at a faster rate than their current account surpluses. Table 4 demonstrates this point.

As one can see from the table, from 2001 to 2011, the emerging market and developing countries had a combined, cumulative current account surplus of \$4.0 trillion, but this surplus was more than matched by increases in reserves of \$6.5 trillion, implying a net non-reserve capital inflow of \$2.5 trillion. The actual net recorded private capital inflow was \$3.5 trillion.²⁵ Countries in developing Asia had the same pattern of reserve increases exceeding their combined, cumulative current account deficit. For the Middle East and North Africa, their combined current account surplus over the dozen years exceeded their reserve accumulation, implying a net non-reserve capital outflow. However, a net private capital inflow was recorded. The Commonwealth of Independent States, dominated by Russia, recorded a current account surplus and a sizeable change in reserves, but the two measures of private capital flows show small outflows. Thus, this region is the only clear exception to the overall pattern that emerging market and developing countries received net private capital inflows over the period.

The last three country groups in the table all recorded combined current account deficits and net private capital inflows on both measures. In all three cases, the increase in their reserves was positive, and in two out of three cases larger than their current account deficits.

Overall, the evidence presented in the table demonstrates that the private sector is transferring resources net from North to South—private capital, net, is not flowing up hill. To the extent that policymakers in the South want to limit the overall net transfer from South to North, they have the means at their disposal: limit the accumulation of international reserves. This would tend to reduce their current account surpluses, increase their deficits, and encourage larger net private capital inflows to their countries and regions. The fact that they have not done so leads us to the next topic: international liquidity and its management.

24. The WEO database does not contain data for this group of countries for 1991.

25. About half of the difference between these last two figures is accounted for by other net official capital outflows largely from the Middle East and North Africa, which presumably includes both aid flows and investments by sovereign wealth funds and similar entities.

INTERNATIONAL LIQUIDITY, SEIGNIORAGE, AND THE STABILITY OF THE MONETARY SYSTEM

In this subsection, I examine three interrelated topics: international liquidity, foreign exchange reserves, and the role of the US dollar. In the wake of the final breakdown of the Bretton Woods system, John wrote a masterful, comprehensive review of the topic of international liquidity (Williamson 1973, 686).²⁶ He addressed three questions that had been debated since 1959: (1) Is there a need for additional liquidity? (2) What are the desirable characteristics of reserves? In particular, how should one design a fiduciary reserve asset, such as the SDR? (3) In what quantity should reserves be provided? The updated counterparts of these three questions focus on (1) a lack of control over the volume of international liquidity; (2) the misdistribution or arbitrary distribution of seigniorage; and (3) the asymmetric position of the US dollar in the international monetary system. These three questions are relevant today, but the difference is that these questions are embedded in a very different international monetary system than was envisaged by John in the early 1970s.

International Liquidity

In the 1960s and early 1970s, international liquidity was identified with international reserve assets. John (Williamson 1973, 686–87) was followed by the G-10 (1965, 21) in defining international reserves as “those assets of [a country’s] monetary authorities that can be used, directly or through assured convertibility into other assets, to support its rate of exchange when its external payments are in deficit.” Reserve assets, in turn, were gold, reserve positions in the IMF, SDR, and foreign exchange, “which consists principally of dollars” (Williamson 1973, 706).²⁷ The analysis of international liquidity assumed that the international monetary system was based on at least heavily managed exchange rates. The focus was on the balance of payments as a whole and the need for most countries to settle their overall payments imbalances in reserve assets not on current account positions. In this context, the analysis presumed a rational demand on the part of each country for reserves, with the implication by many analysts that if a country held or accumulated more than its preferred optimum stock of reserves it would adjust, including via inflation, according to an international quantity theory of money. Harry Johnson (1972) wrote that the

26. John summarized the state of debate on international liquidity at the time, which was before the C-20 failed to agree on a comprehensive reform of the international monetary system. In addition to clearly laying out the issues from a positive perspective (the optimal reserve holding for a single country) and a normative perspective (the optimum supply of reserves to the system as a whole), John wrote with wit, clarity, and balance. For example, on breakdown of Bretton Woods, “the long-predicted breakdown of the system in August 1971 did not bring in its wake the descent into economic warfare that had sometimes been predicted. The cooperative instincts were not strong enough to prevent breakdown, but they were strong enough to prevent breakdown turning into disaster” (Williamson 1973, 703).

27. John discusses a number of more sophisticated concepts for a country’s liquidity position, including its ability to borrow, but most of the analytical work was in terms of the four-part definition in the text (Williamson 1973).

objective should be “to establish international control over the magnitude and rate of growth of international reserves and use it to restrain the growth of those reserves to a non-inflationary pace” (Johnson 1972, 86, quoted in Williamson 1973, 738). In other words, the framework focused on the monetary in the international monetary system.

One of the central controversies surrounding the collapse of Bretton Woods and the effort to reconstruct the international monetary system was whether the foreign currency component of international reserves, which was the only elastic element, was supply determined by an essentially capricious US overall balance of payments deficit that bore “no systematic relationship to the reserve-accumulation objectives of other countries. . . . [instead] it results from a complex of such factors as demand-management policies in the United States and the rest of the world and historically-determined relative cost structures” (Williamson 1973, 706). The alternative view was that the foreign currency component of reserves was demand determined in that “the United States deficit is primarily a residual which is determined by adjustment policies on the part of other countries designed to reestablish their desired rate of reserve growth” (Williamson 1973, 706).

John convinced himself that under a fixed exchange rate system that the growth of US dollar reserves was supply determined in the short run, but probably influenced by the demand for reserves in the long run, which was consistent with the assumption of a stable rational demand for reserves (Williamson 1971). However, he concluded that there was “an urgent need to discriminate between the demand-oriented and supply-oriented theories of the United States [overall balance-of-payments] deficit” (Williamson 1973, 739).

Has this controversy been laid to rest? My answer is that it largely has been laid to rest and on the side of the demand-determined nature of the stock of international reserves.

Table 5 provides a summary of the evolution of international reserves from 1970, before the United States closed its official gold window, to 2011. After increasing by a factor of 10 from the end of 1970 to the end of 1980, reserves increased by a factor of 12 by the end of 2011, but scaled by world GDP most of the rise was since 2000. From 1980 to 2011, world GDP at market prices in US dollars rose six and a half times, and world trade rose nine times, but the US foreign investment and foreign investment in the United States, a metric for the growth of international financial transactions, rose 25 times—30 times excluding direct investment.

The emerging market and developing countries are now the dominant reserve holders both in absolute size and as a share of their combined GDP measured at market prices in US dollars. However, that is a recent phenomenon. The advanced countries held more than 50 percent of total reserves until

2006.²⁸ On the other hand, scaled by their combined GDP, the international reserves of the emerging and developing countries declined between 1980 and 1990. It was this fact that led John in the context of the global debt crises of the 1980s to advocate a resumption of SDR allocation and a reconstitution of the reconstitution provision requiring countries to maintain their holdings of SDR at a certain level of allocations on average (Williamson 1984).²⁹ The surge in the reserves of emerging market and developing countries began in the mid-1990s, returning to 9 percent of their combined GDP in 1994, the year before the Mexican-Tequila debt crises, and over 10 percent at the end of 1996. This evidence undercuts somewhat the conventional wisdom that the accumulation of reserves by these countries was motivated by a precautionary need for self-insurance that emerged only after the Asian financial crises.

On the question of whether international reserves are demand or supply determined, international reserves today are predominantly held in the form of foreign exchange—the most elastic component. That was not always the case, less than 50 percent of international reserves were in foreign exchange in 1970. However, today gold is clearly at the bottom of the pile of countries' international reserves; see box 1. Even with a special allocation of SDR of \$33.5 billion and a general allocation of SDR of \$250 billion in August 2009, the share of SDR in international reserves remains trivial. The share of reserve positions in the IMF also is very small, but this component fluctuates with borrowing from the IMF by member countries. The share reached a low of 0.3 percent at the end of 2007.

No country is forced to accumulate foreign exchange, but countries do so with a range of both precautionary and non-precautionary motives. The authorities in each country choose the level and currency composition of their foreign exchange holdings. Countries set the demand for international reserves, and the supply, as a first approximation, is perfectly elastic.

The empirical and theoretical literature on international reserves focuses almost exclusively on the demand for international reserves. Parts of that literature examine rules of thumb, such as coverage of three months of imports, one year of short-term capital flows, or some fraction, generally 20 percent, of broad money. Some authors explore optimal reserve holdings in terms of benefits, opportunity costs, and risk aversion associated with sudden stops in capital flows (Jeanne and Rancière 2006). Other studies examine adequacy of reserve with a more generalized focus on precautionary motives and exchange market pressures based on risk weights associated with short-term debt, other portfolio liabilities, broad money (M2), and income from exports differentiating between countries with fixed and floating exchange

28. Even excluding gold, discussed below, the advanced countries held more than 50 percent of international reserves until 2005. The data in the table use the current IMF grouping of advanced countries, including Hong Kong, Korea, Singapore, and Taiwan, but also include, of course, Japan whose reserves increased three and a half times between 2000 and 2011.

29. In fact, in the opening phase of the 1980s global debt crises in 1982–83, the G-5 had a tentative agreement to allocate SDR to help ease the crisis, but support for that position eroded and the SDR was pushed to the sidelines by the end of the decade only to be revived in the global financial crisis of the early 2000s.

rate regimes (IMF 2011a). These studies abstract from non-precautionary demands for reserves driven, for example, by export-led growth strategies or by structural features of economies such as a reliance on earnings from the export of non-renewable resources (IMF 2010, 16).

The central point of these studies is that they all focus on international reserves from the demand side. Moreover, even the most sophisticated, statistical models of the demand for international reserves by emerging market countries, such as that found in IMF 2011a, nine explanatory variables explain less than 40 percent of the variance of actual reserve holdings. As the IMF executive board stressed (IMF 2011b) when reviewing the staff paper assessing reserve adequacy (IMF 2011a) “there should be no ‘one-approach-fits all’ to such assessments.” More tellingly, demand for reserves has continued to expand. Jeanne and Rancière report that the buildup of reserves in Asia as of 2006 was in excess of what would be implied by their insurance model against sudden stops, suggesting other motives for reserve accumulation. Moreover, from 2006 to 2011 the international reserves of emerging Asia increased by an additional \$3.0 trillion (133 percent).³⁰ The metric developed by the IMF staff to measure the adequacy of international reserves of emerging market countries (IMF 2011a) found that as of the end of 2009 18 countries had reserves of more than 150 percent of the metric. In the subsequent two years the reserves of those countries increased by 28 percent as total reserves of emerging market and developing countries increased by \$1.7 trillion (26 percent).³¹

The demand for international reserves appears to be increasing without limit. This raises questions about the availability of supply. In that context, IMF staff papers note (IMF 2010, 5) “Absent changes in reserve policies, extrapolations suggest demand for reserves would reach levels insupportable by *reserve issuers* in the medium-to-long term.”³² The IMF staff (IMF 2012d, 9) estimated that there were \$74.4 trillion in “outstanding amounts of marketable potentially safe assets” as of the end of 2011. AAA/AA OECD (Organization for Economic Cooperation and Development) government securities were \$33.2 trillion. As of the same date, total foreign exchange reserves were \$10.2 trillion.³³ The IMF staff in some of its writing is motivated to make the case for an increased role for the fiduciary international reserve

30. These data include changes in the reserves of Hong Kong, Korea, Singapore, and Taiwan even though the IMF classifies them as advanced countries.

31. These data do not include changes in the reserves of Hong Kong, Korea, Singapore, and Taiwan, which are classified as advanced countries and were not included in the IMF study (IMF 2011a).

32. The emphasis is added. It would appear that the IMF staff has not completely abandoned the concept of the supply side of international reserves. For example the IMF (2011c, 23) refers to “large reserve currency issuers” as if there is a category of countries whose governments supply assets directly to other governments without the intermediation of the market, in contrast with those other governments purchasing assets in the open market.

33. As discussed below, based on IMF COFER data, as of the end of 2011 an estimated 5.1 percent of those reserves, or more than \$500 billion, were in assets denominated in currencies other than the US dollar, euro, pound sterling, yen, or Swiss franc. And some of the issuers of those assets were not members of the OECD.

asset, the SDR, which might substitute at a lower economic social cost for the accumulation of foreign exchange reserves and, as a result, mitigate the distortion to the adjustment process associated with that accumulation.³⁴ But, again, the implicit framework is one in which supply is adjusted to meet demand, rather than supply being forced upon unwilling holders with adverse consequences for their economies, for example, through an increase in the rate of inflation of prices of goods and services.

In this connection, table 6 lists, in the first column, the average annual growth rate of international reserves in US dollars for 1980 to 1989, 1990 to 1999, and 2000 to 2010 and, in the second column, the average annual inflation rate lagged one year (1981 to 1990, 1991 to 2000, and 2001 to 2011) for the world as a whole, the advanced countries, and the emerging market and developing countries. What we see is that, contrary to the concerns expressed by Harry Johnson, Robert Mundell, and other advocates of an international quantity theory of reserves, inflation has progressively declined on average while rates of increase in international reserve holdings, in particular by emerging market and developing countries as a group, have progressively increased. The acceleration of reserve holdings by emerging market and developing countries is relevant not only to their own inflation performance (the increases have not led to inflation at home to reduce the real value of the reserves) but also to the inflation performance of the advanced countries as the result of an increase in the demand for goods and services produced in those countries. Neither seems to have been the case. One might argue, instead, that the lower inflation in the emerging market and developing countries facilitated their being able to manage their macroeconomies to allow them to more easily satisfy their demand for international reserves.

To be fair, the globalized international economy and financial system operates as a general equilibrium system in which both demands and supplies adjust to multiple influences including the policies of countries in which monetary authorities invest their holdings of foreign exchange. Thus, policies affecting capital flows are multiple, involving push (supply) as well as pull (demand) factors, as discussed, for example, in IMF 2011c. Under the Bretton Woods system of fixed exchange rates, increases in international reserves were associated with outflows of capital (supply) from the United States that foreign monetary authorities were forced to accumulate in order to maintain the fixed parities for their currencies. Hence, the origin of the US dollar's "exorbitant privilege" in which inflows of short-term capital from official sources financed outflows of long-term capital to purchase higher-yielding assets in the rest of the world. Today some observers mistakenly analogize that the accumulation of US dollar

34. This was not the thrust in IMF 2012d. There the issue addresses was the distortions to the financial system introduced by regulatory and other requirements augmenting the demand for safe assets. Curiously, IMF 2012c does not mention the possibility of augmenting the supply of safe assets to the private sector by reducing the demand for such assets by emerging market and developing countries in their excess holding of international reserves. At the same time, the authors implicitly criticize advanced country central banks for taking sovereign debt off the market in operations designed to deal with the global financial crisis and lack of recovery.

assets by foreign monetary authorities is linked to the US current account deficit. A look at the facts undermines the possible existence of any such simple relationship. Estimated changes of holdings of US dollar assets in foreign exchange reserves as percent of the US current account deficit between 2000 and 2011 range from a low of 22 percent in 2001 and a high of 141 percent in 2010.³⁵ Capital flows remain an important part of the story.

Moreover, the analysis of policies affecting capital flows today extends well beyond the international *monetary* system, in which the government authorities are the principal actors, to the international *financial* system, in which private agents are the dominant players. In this context, international liquidity in its traditional guise of international reserves becomes global liquidity as discussed in Chen et al (2012). They describe (Chen 2012, 5) global liquidity “as the amount of global credit readily available to finance domestic and cross-border asset purchases.”³⁶ In turn, they define—it would be better to say proxy—the quantity of global liquidity (Chen 2012, 9) as “the sum of financial sector liabilities of the euro area, Japan, the United Kingdom, and the United States.” Those liabilities are further subdivided into core liabilities (total resident deposits in commercial banks and other depository institutions, approximately M3) and noncore liabilities (total nonresident deposits in those institutions plus loans and securities (not shares) of commercial banks, nonbanks, and other financial corporations. In this framework, global liquidity is largely endogenous, highly pro-cyclical, and subject to a variety of influences that can be traced to both demand and supply factors affecting the global financial system. At its peak in early 2008, global liquidity on this measure was more than \$90 trillion and core global liquidity a bit more than a third of the total. In contrast, foreign exchange reserves were a bit more than \$7 trillion, less than 10 percent of global liquidity.

Another take on global liquidity is that of the Landau report (CGFS 2011). The Landau report distinguishes between official liquidity in domestic or foreign currency provided by or to the official sector and private liquidity provided endogenously by financial institutions and markets. The report deliberately does not focus on a single measure of global liquidity. Instead, it advocates both quantity and price indicators (including leverage ratios) supplementing global credit aggregates. But, again, the focus is on the international financial system not the international monetary system. The two systems are related, of course, and those connections give rise to discussions of global financial safety nets constructed either ex ante (such as the IMF’s flexible credit line (FCL) and its precautionary and liquidity line (PLL) or ad hoc (such as central bank swap arrangements).

35. Estimates of changes in US dollar assets in official reserves are based on the IMF COFER (2012) database. This estimate assumes that the currency composition of the foreign exchange reserves of countries that do not report that composition to the IMF is the same as that for the countries that do report.

36. Compare the 1965 G-10 definition, cited above, of international liquidity—reserve assets.

The need today is not to control international liquidity because not doing so threatens to increase global inflation or deflation; rather the need is to limit distortions to the adjustment process associated with policies that lead to excessive accumulations of international reserves. With a near unlimited demand for international reserves on the part of many emerging-market and developing countries—along with their capacity to control their exchange rates to permit a continuing increase in those reserves, or more precisely the associated current account surpluses—the international adjustment process has become severely distorted as was amply demonstrated in the previous section. The notion that lack of access to temporary financing or that the so-called precautionary motive for accumulating reserves is the primary reason for the oversized accumulation of reserves by some countries is simply not credible in the current environment.

Seigniorage

One critique of the post-Bretton Woods international monetary system focused on the presumptive financial gains to the country—the United States—whose currency was almost exclusively used in international transactions, importantly including assets that are held in countries' foreign exchange reserves. As John wrote, “In so far as the issuer of money enjoys monopoly power, it is able to extract the difference between the value of produced money and the cost of producing it as ‘seigniorage’” (Williamson 1973, 723).

John focused on the social saving that could be captured by international liquidity (reserve) management at the international level, via the issuance of a fiduciary reserve asset, and how that saving should be distributed. In the context of an SDR-based system, he favored distribution of the associated seigniorage to poor countries through a link between SDR allocations and aid.

A number of variations on this theme were put forward in the 1960s and early 1970s. One would have involved the allocation of SDR to the World Bank or the International Development Association which would disburse the SDR in loans to developing countries at low interest rates; the recipients would use the SDR to facilitate a net transfer of real resources from the advanced countries. Alternatively, the developing countries would be allocated SDR in excess of their estimated need for reserves, and again the advanced countries could earn those SDR by running current account surpluses vis-à-vis the developing countries.

Against this backdrop, what can we say about the volume and distribution of international seigniorage today? Historically, seigniorage was associated with a difference between the cost of producing currency and the face value of that currency in circumstances where the issuer enjoyed a complete monopoly or was in a privileged position because of the convenience associated with the use of that currency. Many currencies circulate today outside their national jurisdictions, but for all but a few

currencies their circulation is limited to holdings brought back from, or in anticipation of, foreign travel. The principal circulating international currencies are the US dollar and the euro.

How large is the seigniorage accruing to the United States and the euro area associated with the circulation of their currencies outside their borders? Seigniorage can be measured in many ways, but one of the simplest metrics is the cost saving to the issuer on an interest free loan from the user of the currency to the government issuing the currency. Using this framework (see box 2) a back-of-the-envelope measure of the seigniorage can be constructed from an estimate of the stock of currency circulating outside the currency area multiplied by the annual interest rate on the additional government debt that would have to be issued in the absence of the interest-free loan.³⁷ On this basis, the estimated annual international seigniorage to the United States from the use of its currency internationally was between \$15 billion and \$24 billion as of the end of 2011. Similarly, the resulting annual international seigniorage to the euro area from the external use of its currency was between \$8 billion and \$10 billion. Thus, the United States received between 65 and 71 percent of the combined total, compared with the US dollar's 71 percent estimated share of foreign currency reserves in US dollars or euros as of that date.

What should be said about any seigniorage associated with the broader international use of currencies? On the one hand, in a portfolio balance framework, the international demand by residents of other countries for assets denominated in the currencies of other countries puts upward pressure on the exchange rates of those countries and on the prices of those assets in domestic currency—downward pressure on their interest rates. On the other hand, sorting out the effects of private and official cross-border demands and supplies of assets is complex. For one thing, the United States, for example, is not the sole locus of issuers of assets denominated in US dollars. Therefore, to the extent that the demand for dollar-denominated assets lowers the general cost of borrowing in US dollars, other countries benefit as well. In addition, in the context of perfect capital mobility among the major currencies, exchange-rate adjusted interest rates may fully compensate nonresident dollar holders of dollar-denominated assets with the consequence that there is no net benefit to US borrowers in US dollars from the international role of the dollar over and above the benefit that comes from an open financial market with substantial liquidity and can and is enjoyed by many countries. But I may protest too much. At a minimum, it would be interesting to calibrate the possible size and distribution associated with the international role of major

37. I am ignoring the cost of printing the currency which is small relative the total value of the stock of currency outstanding because most of that value is in large notes. In the case of the US dollar, as of the end of 2011, 75 percent of the total value of currency outstanding consists of \$100 notes, the maximum denomination currently issued by the United States (Board of Governors of the Federal Reserve System, "Value of Currency in Circulation," available at www.federalreserve.gov, accessed June 8, 2012). Euro notes are issued in denominations of 100, 200, and 500, and those three denominations account for 57 percent of currency outstanding as of the end of 2011 (European Central Bank, "Euro banknotes, values," available at <http://www.ecb.int/stats/euro/circulation/html/index.en.html>, accessed June 8, 2012).

currencies focusing, in particular, on the role of these currencies in foreign reserves since we are interested primarily in the international *monetary* system not the international *financial* system.

Four questions are addressed here: How large a benefit does the United States accrue from the expanding stock of foreign exchange reserves in US dollars? How are the benefits accruing to other countries or areas whose currencies are used to denominate reserve assets? How have these benefits to the United States and other countries evolved over the past dozen years? And is the size and distribution of seigniorage associated with the use of assets denominated in national or regional currencies a major flaw in the international monetary system?

In answering these questions with some back-of-the-envelope calculations (see box 2) I first make the simplifying assumption that the benefit accrues to the government in lowering the cost of its borrowing, analogous to the estimates of seigniorage derived from the international use of the dollar and the euro as physical currencies. Based on an assumption that this benefit is 30 basis points on the total stock of US gross general government debt, the estimated seigniorage gain to the United States in 2011 was \$47 billion.

However, in my view, that figure might well be overstated. The figure is two to three times the estimated seigniorage from the use of the US dollar as a physical currency. Demand for the US dollar as a currency is a much more specific than the demand for US government liabilities, in other words the scope for monopoly rents is greater in the case of currency. In any case, the resulting estimate of US seigniorage, \$47 billion, is grossed up by the use of US gross general government debt. Is this a big number? Compared with what? It amounts to 0.3 percent of US GDP in 2011. If one treated this seigniorage as an unrecorded transfer payment from the rest of the world to the United States, it would make only a small dent in the US current account deficit as a percent of GDP.

If the reduction in the cost of financing US government debt were 100 basis points, rather than 30 basis points, the associated estimated annual flow of seigniorage would be \$155 billion or 1 percent of US GDP. This would imply a more substantial implicit adjustment of the recorded US current account deficit. Abstracting from the fact that interest rates on US treasury obligations were very low at the end of 2011, it is implausible that for the entire prior decade the average interest rate on US government debt had been reduced to 3.6 percent from 4.6 percent.³⁸

Setting aside for the moment the evolution of the seigniorage benefit to the United States, we can use in the same framework to estimate the seigniorage gain to the euro area from the demand for euro-denominated assets as part of other countries' international reserves. On the assumption that the gain to the euro area is proportionate to the gain to the United States (see box 2), the estimated gain to

38. The average interest rate on US outstanding US treasury securities in December 2011 was only 2.27 percent.

the euro area from the denomination of reserve assets in euro was \$18.7 billion, or 0.14 percent of euro area GDP.

Table 7 presents the results of similar calculations for the other three currencies in which members of the IMF report the currency composition of reserves at the end of 2011 (sterling, yen, and Swiss franc). As described in box 2, the approach outlined here produces an estimate of total seigniorage in 2011 of \$75 billion. One might consider that for countries with a small percentage of total foreign exchange reserves held in their currencies or where the estimated amounts are small relative to the countries' gross general government debt, the estimates provided in table 7 are too large and should be scaled down relative to US estimated seigniorage by more than assumed in the exercise reported in the table. This might be the case for Japan and Switzerland where the amount of reserves in their currencies were an estimated \$359 and \$13 billion, respectively, as of the end of 2011. Those amounts were 6.1 and 1.9 percent of their 2011 GDPs, respectively, and 2.7 and 3.9 percent of their gross general government debt, respectively.

What about reserves issued in "other" currencies, which are not individually allocated in the IMF's *Currency Composition of Official Foreign Exchange Reserves* (COFER) data?³⁹ See box 3. Statistical and anecdotal reports indicate that some countries hold their foreign exchange reserves in the currencies of at least eight other advanced countries, using the IMF's WEO category of advanced countries: Australia, Canada, Korea, Singapore, Sweden, Denmark, New Zealand, and Norway. The \$539 billion in estimated foreign exchange holdings in "other" currencies in 2011 would amount to 8.5 percent of the eight countries' combined GDP and 16.9 percent of their combined gross general government debt. Consequently, the seigniorage gains for these countries may be proportionately larger than those for Japan and Switzerland, two of the traditional issuers of currencies in which foreign exchange reserves have been held. As argued in box 3, this evidence suggests that the international financial and monetary system is evolving even more rapidly than thought toward a more extended multicurrency system.

Turning from amount of seigniorage from foreign currency reserve holdings as of the end of 2011, what can we say about trends in seigniorage? How has the global total and distribution of estimated seigniorage changed since before the global financial crisis hit in 2007 and since the advent of the euro in 1999?

To make such comparisons it is appropriate to make an adjustment to the rate of seigniorage gain for the United States in 2011 as described in box 2. Table 7 presents the results for 2006 and 1999, as well as 2011. Total estimated seigniorage about doubled between the end of 2006 and 2011, from \$39 billion to \$75 billion and from 0.07 percent to 0.1 percent of global GDP. However, going back to the end of 1999, the first year of the euro, total seigniorage increased almost five times, from \$13 billion, or

39. The IMF's COFER database is available at www.imf.org/external/np/sta/cover/eng/index.htm (accessed July 26, 2012).

0.04 percent of global GDP. This increase reflected the fact that foreign exchange reserves increased by 472 percent over the dozen years, a substantially larger increase than the 231 percent increase in US gross government debt, which in turn far exceeded the increase in the 122 percent in global GDP, and the 61 percent increase in US GDP.

Estimated US seigniorage to the United States in 1999 was less than \$10 billion or 0.1 percent of US GDP, truly a drop in the bucket using 30 basis points at the interest cost saving, but far from substantial even if the cost saving were 100 basis points. Is it possible, that US seigniorage gains from the international reserve use of the US dollar were substantially higher in the mid-1970s? We do not have comparable data from that period, but we can make some estimates. Gross US government debt in 1976 was \$629 billion including holdings by the Federal Reserve and other government agencies.⁴⁰ The comparable figure for this series in 2011 is approximately the same as that shown in table 7. A reasonable estimate of foreign exchange holdings in US dollar assets at that time is \$132 billion, or 21 percent of the figure for US government debt.⁴¹ This figure is comparable to the figure for 1999 shown in table 7. Using the same methodology, would produce an estimate of US seigniorage in 1976 of \$1.0 billion or 0.06 percent of US GDP. If anything, based on the methodology in table 7 the seigniorage gains to the United States from the international reserve use of the US dollar were lower in the 1970s than even in 1999.

Decomposing the contributions to total seigniorage from 1999 to 2011 within the overall framework, about 55 percent of the increase can be attributed to the increase in holdings of foreign exchange reserves as a percent of outstanding gross general government debt indexed to the United States. About 42 percent can be attributed to the growth in US gross general government debt. The remaining amount, about 3 percent, can be attributed to the dollar's declining share in reserves (see box 2).

With respect to the first component, indexing relative to the United States might be regarded as introducing an upward bias to the estimated change in total seigniorage. This is not the case. Foreign exchange holdings in US dollar assets as a percent of US gross government debt in 2011 was 1.8 times the figure in 1999 (see table 7). The factor is only 1.4 for Japan, but the factor for the United States is about the same as that for Switzerland at 1.6. It was 2.5 and 3.4 times for the United Kingdom and euro area, respectively. For the countries issuing assets denominated in non-traditional reserve currencies, the

40. US Census Bureau. 2012. *The 2012 Statistical Abstract: The US Data Book*. Table 470: Federal Budget Debt. Available at www.census.gov (accessed July 30, 2012).

41. The estimated foreign official holdings of US dollar assets is based on the \$72.6 billion in reported direct official holdings of US government securities data on the US international investment position (US Department of Commerce, Bureau of Economic Analysis, available at www.bea.gov, accessed July 30, 2012) in 1976, scaled up by 1.8 based on reported holdings of US government securities as a percentage of estimated total dollar holdings in reserves as of the end of 1999.

increase in the factor would have been about ten if their gross general government debt had only doubled and five times if their gross general government debt had tripled.

With respect to the second component, the possible upward bias introduced by the indexing on US gross general government debt is somewhat more pronounced: the increase over the 12-year period was about 170 percent for the United States, compared with 200 percent for the United Kingdom, but only 130 percent for the euro area and Japan, while for Switzerland the increase was only 80 percent. The contribution of the third component, related to the change in the dollar's share of foreign exchange reserves, is small, and even if the share had dropped from 71 percent to 50 percent—double the amount of the actual decline—the contribution, *ceteris paribus*, would have remained tiny.

Commensurate with the declining share of the US dollar in foreign exchange reserves by 8.8 percentage points from the end of 1999 to the end of 2011, although total estimated seigniorage from reserves held in foreign exchange rose by a factor of almost six, the factor for the United States was only five, while that for the euro area was almost eight, and that for “other” currencies was almost 20 times the amount in 1999.

Returning to the basic question of whether the size and distribution of seigniorage associated with the use of assets denominated in national or regional currencies is a major flaw in the international monetary system today, I am not convinced that this has been a significant issue affecting the performance of the system, or even its fairness, as the system has evolved over the past 40 years since the collapse of the Bretton Woods system.

First, even if one accepts an estimate that there is \$250 billion in global seigniorage today, associated with a benefit to the United States of 100 basis points on the cost of issuing its government debt (and I would argue that the true figure is less than \$75 billion) this is a feature of the system that has manifested itself only over the past half a dozen years. For most of the past 40 years, the annual flow of seigniorage was trivial; at 100 basis points it would have been about \$45 billion for the world in 1999, or 0.14 percent of world GDP.

Second, seigniorage has become increasingly widely distributed, in particular over the past dozen years. One can reasonably expect that the distribution of seigniorage will continue to widen as the international monetary and financial system evolves into even more of a multicurrency system. These earnings can reasonably be viewed as rewards for the achievement by the individual countries of relatively stable and open economic and financial systems and the development of attractive national financial markets as well as compensation for the downside of moving into economic and financial circumstances that are more exposed to global financial turbulence.

Third, as a practical matter, it is difficult to envisage efficient mechanisms to capture and redistribute the seigniorage associated with the accumulation of reserve assets denominated in the currencies of

other countries or areas. A more regimented or disciplined system, as was envisaged by John and others in the wake of the breakdown of the Bretton Woods system, might have included as a by-product such a mechanism, for example, in the form of an SDR-aid link. But that genie is long since out of the bottle. Of course, \$250 billion or even \$75 billion might be worth trying to capture, assuming that one is prepared to reject the view that seigniorage is payment for services rendered and risks taken. But it properly belongs way down the list of possible reforms of the international monetary system.

Fourth, all this is not to say that there is not a strong case for limiting the accumulation of international reserves.⁴² A case also can be made for regular allocations of SDR as part of such a reform, but that case rests on the distortion of the adjustment process introduced by that behavior. Against an implausible, maximum distortion of \$250 billion associated with the complete maldistribution of seigniorage in 2011, consider the \$1.4 trillion in surpluses and deficits that year in excess of 0.05 percent of world GDP.

Stability of the Multicurrency System

Over the past 15 years at least, the international monetary and financial system has evolved toward a multicurrency system as is developed in more detail in box 3. The US dollar's reserve role has decreased, as has its role in the broader financial system. After the introduction of the euro in 1999, that currency's share in reserves and finance has increased, but that trend appears to have stalled. The shares of the other traditional reserve currencies (sterling, the yen, and the Swiss franc) have been essentially unchanged over the past dozen years or so. In recent years, as discussed in box 3, the most significant development has been the emergence of other non-traditional reserve currencies—the multicurrency system is becoming truly multicurrency.

The concern raised by some observers is that a multicurrency system will be unstable, as private and official holders of assets denominated in the various currencies abruptly and in large volume change the currency composition of their portfolios. Not much could be done to affect the behavior of the private sector without returning to tight controls on all international financial transactions and portfolios. A case could be made that the official sector should be alert to abrupt changes in private sector asset preferences and be prepared to intervene to offset their effects, but there does not seem to be much appetite for doing so among the authorities issuing the major currencies, with the possible exception of the Japanese.

On the other hand, if changes in the asset preferences of the official sector were regarded as a problem, this would strengthen the case for creating a substitution account to take a large portion of reserve holdings in all currencies off the market in exchange for SDR-denominated assets. To be effective, the establishment of a substitution account would have to be accompanied by restrictions on

42. See Joseph Gagnon (2011, 2012a, and 2012b) for forceful presentations of this case.

the accumulation of additional sizeable balances of foreign exchange reserves or by a code of conduct governing the composition of reserve portfolios and changes in that composition. Alternatively, the major reserve holders could agree on a code of conduct, such as the one suggested by Truman and Wong (2006), without resorting to the establishment of a substitution account and all the issues it would raise (see Williamson 2009a for a discussion of some of those issues).

It would be preferable, first, to consider what evidence we have that there is a problem. Are changes in the currency composition of international reserves contributing to exchange rate volatility? To provide a partial answer to this question, we used estimates of exchange-rate-adjusted shares of international reserves from the IMF COFER database, for 1999 to 2011, employing the method described in Truman and Wong (2006).⁴³ We estimated regressions of log changes in quarterly average exchange rates on log quarterly changes in exchange-rate-adjusted currency (quantity) shares of foreign exchange reserves.⁴⁴ If reserve diversification manifested in this way were a significant problem, a reduction in the dollar's share of reserves would be associated with depreciation of the dollar, and vice versa, with similar relationships with respect to changes in the shares of other currencies in reserves and their effects on exchange rates.

Table 8 presents the regression results. The dependent variable is the index that the staff of the Federal Reserve Board computes of the dollar's foreign exchange value against seven other major currencies. In two of the three regressions, the current-quarter coefficients were significant but had the wrong (unexpected) sign: a rise in the dollar's share was associated with a depreciation of the dollar, and a rise in the euro's share was associated with an appreciation of the dollar. The coefficient is significant both for the current quarter change in share and the change in share lagged one quarter. Only in the case of changes in the share of the yen did the coefficient for the current quarter have the expected right sign, and it was only marginally significant at the 10 percent level. Moreover, the coefficient is small, and the change in the yen's quantity share over the period was a 55 percent decline, implying that the foreign exchange value of the dollar was boosted by the reduction in the yen's share.

In other regressions, not reported in the table, the current-quarter coefficient of the euro's share and the dollar-per-euro exchange rate was not significant and of the wrong sign. The current-quarter

43. If we did not adjust for the effect of exchange rate changes on shares of foreign exchange reserves we would introduce a spurious positive correlation between changes in shares and changes in exchange rates even if the countries holding the reserves had not acted to adjust the currency composition of those reserves. If the dollar depreciates, the dollar's share in total reserves declines as the result of the devaluation of the existing stock of dollar-denominated assets relative to the dollar value of assets held in other currencies.

44. We included two lags of changes in the relevant shares. The results omitting those lags were essentially identical.

coefficient has the expected sign, but was not significant, for the sterling share and the dollar-per-pound rate, the yen share and the dollar-per-yen rate, and Swiss franc share and the dollar-per-Swiss franc rate.⁴⁵

We also ran regressions where we reversed the dependent and the independent variables. Here the underlying behavioral rationale was not to detect destabilizing portfolio adjustments but rather whether currency appreciation induced a relative move into assets denominated in that currency, and vice versa.⁴⁶ In these regressions, the current quarter coefficients were even more often significant with the wrong sign. We did not try to discriminate between the current-quarter results in the two sets of regressions. Again, the effect of changes in exchange rates had the expected sign only for the share of yen in foreign exchange reserves and the dollar-yen exchange rate; in this case it was significant at the 5 percent level.

How should these results be interpreted? The currency composition of international reserves at the aggregate level is influenced by many factors, including which countries are accumulating reserves, their asset preferences, and the factors affecting both their reserve accumulation and asset preferences. Moreover, in the aggregate, the average absolute change in the US dollar's quantity share of foreign exchange reserves was 0.457 percentage points for the 51 quarters of data, from the first quarter of 1999 and stopping at the fourth quarter of 2011. For the first 17 quarters the average change was 0.402 percentage points, for the second 17 quarters 0.403 percentage points, and for the last 17 quarters 0.567 percentage points. Applied to the \$11.2 trillion in foreign exchange reserves as of the end of 2011, the most recent average change amounts to only \$58 billion a quarter in movement into or out of US dollar assets, or less than \$1 billion each day markets are open. This scale of net portfolio adjustment can hardly be expected to have much effect on exchange rates. Global daily foreign exchange market turnover in April 2010 was \$4.0 trillion and turnover involving the dollar was \$3.4 trillion (BIS 2010).

One cannot prove a negative: that the reallocation of official foreign exchange portfolios will never be a problem. But I conclude from this evidence that the evolving multicurrency international monetary and financial system is not at risk from this source. I further conclude that the substitution account proposal, whatever its merits may have been in a more structured international monetary system, today is a solution in search of a problem. The evidence presented earlier on the trend toward somewhat reduced exchange rate variability also suggests that the private sector portfolio reallocations have not been a source of instability in the global financial system. This is not to say that all private sector capital flows push exchange rates toward values consistent with external balance, but only that they are not a dominant source of instability.

45. In the last case, the sum of the three coefficients had the wrong sign and those for the lags of one and two quarters were significant at the 5 and 10 percent level.

46. We ran these regressions with four lags.

CONCLUSIONS

This paper has evaluated the extent to which the concerns that John had about the international monetary system 40 years ago are, or should be, concerns today. In this concluding section I also assess progress in reforming the system and prospects for future reforms.

Abiding Concerns?

Exchange rate variability appears to have been substantial over the past 40 years. However, because economists and policymakers lack a robust model of exchange rate determination, it is difficult to know how much variability is too much. The evidence provided in this paper suggests that, in general, exchange rate variability has declined somewhat in recent years. However, John's concerns about exchange rate variability have been less about variability per se and more about countries' exchange rate policies or lack thereof and their consequences for the international external adjustment process. Contrary to the concerns John expressed in 1985, the policies of concern today are not the mix of monetary and fiscal policies, which were alleged to be driving the US dollar higher, in the advanced countries, but the policies on intervention and capital controls in the principal emerging market and developing countries (Williamson 1985).⁴⁷

The international external adjustment process over the past 40 years has shown no improvement over the adjustment process in the 1960s. The failure of that process underlay the breakdown of the Bretton Woods system. Indeed, during most of the first years of this century external imbalances increased. How debilitating these imbalances have been to the overall performance of the global economy is a controversial topic that is beyond the scope of this paper. Suffice it to say that the imbalances have been a concern. In the aftermath of the global financial crisis, global imbalances have been reduced somewhat. They are projected by the IMF not to reemerge, but this may well be wishful thinking.

Turning to the management of international liquidity, the good news is that two of John's concerns of 40 years ago have not materialized. Gold has not reemerged as a central reserve asset. It continues to be counted as part of international reserves, but is at the bottom of the pile.⁴⁸ International reserves, almost

47. The latest Cline and Williamson (2012) estimates of significant deviations of real effective exchange rates from their estimates of fundamental equilibrium exchange rates, which would be consistent with achieving a current account surplus or deficit of less than 3 percent of national GDP, include five emerging market and developing economies with undervalued rates (China, Hong Kong, Malaysia, Singapore, and Taiwan) and two advanced economies (Sweden and Switzerland). Only Sweden can be identified as a country that has a market determined exchange rate that, therefore, may be subject to manipulation via the country's mix of monetary and fiscal policies.

48. In 1984 John proposed the statistical demonetization of gold and argued that the complete demonetization of gold, the sale of official gold stocks, would be desirable (Williamson 1984). I am with him on both proposals and have written advocating the sale of the US official gold stock, attracting a lot of criticism in the process. There has been some progress, but it has not escaped notice that there are those who still cling to gold and to advocate its virtues as an investment for the

exclusively in the form of foreign exchange reserves, have expanded rapidly, in particular over the past 15 years. However, the monetarists' link between rapid reserve growth and increased inflation has not been widely observed. Without a doubt, the expansion of international reserves has been demand-determined by the policies of individual countries accumulating those reserves rather than supply-determined by the policies of countries whose currencies are used to denominate reserve assets. The policies of the former group are an important distortion to the international external adjustment process.

Over the past decade or so, we have observed the evolution toward a multicurrency international monetary and financial system. In this context, any concerns about the maldistribution of seigniorage associated with countries' choices of currencies for the denomination of reserve assets are being defused. Moreover, in this paper, I have presented evidence that such seigniorage is not, and probably never was, substantial.

Private and official portfolio diversification in an increasingly multicurrency international monetary and financial system has the potential to be destabilizing. But this paper has provided indirect evidence that official reserve diversification has not magnified exchange rate movements. It also has provided evidence that exchange rate variability, more generally, has declined somewhat in recent years, suggesting an absence of destabilizing private portfolio diversification for the system as a whole.

Progress and Prospects for Reform

Although John's concerns 40 years ago about the international monetary (non) system have not materialized to the degree that the global economy and financial system have been substantially adversely affected, the system could have worked better. The principal failings, as was the case with the Bretton Woods system that preceded the current arrangements, involve the working of the adjustment process not the management of international liquidity. However, both could be improved.

The central challenge posed by the adjustment process is an unwillingness of participating countries to establish rules and procedures and to abide by them. As Paul Volcker (2012) recently pronounced, "active participation in an open world economy, with all the enormous benefits of international trade and investment, requires some surrender of economic sovereignty. Or, to put the point more positively, there must be a willingness to find the means of coordinating policies more effectively." In Truman (2010a), I have proposed a comprehensive approach to strengthening IMF surveillance that involves the establishment of norms, a procedure for reviewing compliance with those norms, and consequences in the form of escalating sanctions for those countries that are found not to be in compliance. That approach

official sector largely, one suspects, to protect the valuation of existing investments in gold by the private sector as well as to advocate the return to gold as the basis for national and the international monetary systems.

was broadly endorsed by members of the Palais Royal Initiative (2011) and by Paul Volcker (2012), who was another member of the group that produced the Palais Royal report.

It is unlikely that countries in the immediate future will agree to such an approach although progress is always possible. Under the G-20's program of strong, sustainable, and balanced growth and the associated multilateral assessment process, agreement has been reached to focus on a limited set of norms on external balances and other indicators. The intense discussions surrounding this process offer some promise of progress in identifying issues, arriving at common diagnoses, and adopting agreed policies to deal with those issues. As I discuss in more detail in Truman (forthcoming), this process can provide the infrastructure for improved international economic policy coordination.

An encouraging step is the *Pilot External Sector Report* recently released by the IMF (2012c). The report is a companion to the IMF Executive Board's approval, on July 18, 2012, of a new decision on bilateral and multilateral surveillance (IMF 2012a). The decision provides a formal framework for integrating the two types of IMF surveillance and establishing explicit procedures for multilateral surveillance, for example as part of annual Article IV consultations. Previously, only bilateral surveillance was covered by a formal decision and that surveillance was restricted to a limited set of policies. Multilateral surveillance and the stability of the global economic and financial system were in procedural limbo. Now, for the first time, the IMF Executive Board has recognized explicitly that a member's policies may affect other members and, consequently, the operation of the international monetary system as a whole. By agreeing to the decision, each member now implicitly accepts some responsibility in its own policies for global economic and financial stability. Operationally, the decision gives the IMF staff and management the authority to discuss how a member's policies may affect the international monetary system and to report on those discussions to the Executive Board and to the public at large. In the past, members could, and did, decline to discuss such matters with IMF staff and management. For a number of years, some have been advocating addressing this loophole (Truman 2010a). More important, this type of framework would help to implement John's long-time recommendation, drawing on the reference-rate proposal of Ethier and Bloomfield (1975), to establish norms for exchange rates, or, more formally, fundamental equilibrium exchange rates.

The external sector report itself provided for the first time a "multilaterally consistent analysis of the external positions of major world economies" (IMF 2012c, 1). The report defines an external imbalance for a country as the gap between its actual current account and the value of its current account that would be consistent with fundamental economic and financial conditions and desirable policies for the country (IMF 2012b, 4). For 28 major economies, the report provides estimates of differences between those countries' real effective exchange rates and the effective exchange rates that would be consistent with fundamentals and desirable policies (IMF 2012c, 11). The latter are exchange rate norms, fundamental equilibrium exchange rates, or reference rates, even if the report does not use these precise terms that are associated with John's work.

One can quarrel with the estimates in the report, which are partly based on judgments and partly based on models, which are less normative than some would like because they include some variables that merely reflect past behavior. Some of the results are far from intuitive, and the report itself is short on explanations. However, the report provides the basis for policy conversations between the IMF management and staff and the countries, between the particular country and its partners, and involving outside analysts.

Consequently, in my view, even if he has reservations about the *Pilot External Sector Report* itself, John should take some satisfaction and considerable pride that approaches to improving the international external adjustment process that he has advocated for 40 years are coming closer to fruition. These recent developments are evolutionary, not revolutionary. Moreover, the key to their success will be how the IMF staff and management implement the new integrated surveillance decision, including future external sector reports, and how responsive the general membership of the IMF is to that implementation. We are still a long way from a rules-based system of exchange rate norms that are supported by guidelines with respect to intervention and other policies influencing exchange rates and with sanctions for deviations (Williamson 2006, 158), but we are closer to that objective.

With respect to the management of international liquidity, the first requirement is to recognize that the global economy and financial system remains underprepared financially to deal with crises. IMF managing director Christine Lagarde has recently reached tentative agreement with a group of IMF members to lend the IMF \$456 billion. The majority of the funds would come from European members of the IMF in effect using the IMF to help them deal with their crises. Be that as it may, the potential infusion of financing to the IMF would raise its potential lending capacity to about \$1.25 trillion compared with \$250 billion five years ago when the global financial crisis was reaching its virulent stage.

The urgent need is to cement that additional financing permanently in the context of the 15th general review of IMF quotas to be agreed by January 2014. I favor a doubling of IMF quotas to \$1 trillion in effective available financing and a doubling of the IMF New Arrangements to Borrow to \$500 billion, making a total potential IMF financing capacity of \$1.5 trillion. It will be difficult get countries, in particular advanced countries such as the United States and European countries, to agree to this type of augmentation of the IMF's resources because of the difficulty in obtaining the necessary legislative approvals, especially in the United States, and an excessive concern about the potential moral hazards associated with IMF lending, especially in Europe. The United States should recognize that it is in its interest to "surrender a bit of economic sovereignty," to use Paul Volcker's phrase, by supporting the IMF to a greater degree. European countries, one would hope, have learned from their crises that the adverse economic and financial consequences of not having an operational fire department are greater than those that might be associated with encouraging countries not to follow adequate fire-prevention procedures.

Turning to the SDR, I do not see it becoming the principal reserve asset in the international monetary system as called for in the IMF Articles of Agreement. Nor do I foresee the development of a private market in SDR-denominated assets; the demand is not there, and a convincing case has not been made for official sponsorship. However, the SDR has a useful role to play in the international monetary system. In Truman (2010b), I advocated giving the IMF expedited authority temporarily to allocate SDR in a crisis. I have also advocated an experiment under which \$200 billion in SDR would be allocated per year for five years for a total of \$1 trillion, with the authorities tracking whether such substantial cumulative allocation affects the propensity of countries to accumulate foreign exchange reserves (Truman 2011b). I am skeptical that it would, in part because the distribution of excess reserves differs from the current SDR allocation key (IMF quota shares) or any likely key that could be developed. But the cost of an experiment would be low. Absent such evidence, or a commitment on the part of IMF members to limit their reserve accumulations, I would not join John in support of a resumption of regular SDR allocations, and I doubt it will happen.

All of these steps would not turn the IMF into an international lender of last resort. For that reason, I favor an addition to the global financial safety net that would institutionalize a global network of swaps centered on the central banks that issue the principal international currencies: the US dollar, euro, sterling, yen, and Swiss franc. I have sketched out a three-key framework, involving the IMF, central banks as a group, and individual central banks, that would preserve central bank discretion and independence, but would provide greater assurance that countries could obtain needed liquidity in a global crisis.

The principal benefits of the Bretton Woods international monetary system remain today: an open and cooperative international trade and financial system, a generally prosperous global economy, and an IMF essentially in the center of the system. A more controversial issue is whether the international economic and financial system is more crisis-prone today than it was prior to 1971, and, if so, whether the post-Bretton Woods system can be held responsible. I would be inclined to argue no on both points. In the 1960s, the advanced countries of the day had their share of crises. Their global ramifications were smaller, but that is primarily because the global economic and financial system was not as integrated. Not everyone in the mid-1970s would have predicted that the international monetary non-system would have performed as well as it has.

This conclusion, to the extent that one accepts it, does not mean that, with a reformed or more coherent international monetary system, global economic and financial performance might not have been better in the past and be better in the future. Therefore, consideration should continue to be given to international monetary reform and the role of the IMF in this process, drawing on an impressive body of work by John Williamson. The most promising initiatives are enhancing the role of the IMF with respect to the international adjustment process and as the international lender of last resort. But any reforms will be evolutionary, rather than revolutionary.

Box 1: Gold in International Reserves

The data presented in table 5 include official gold holdings at the prevailing market price of gold.¹ I present the data in this form because one of John's concerns (Williamson 1977, 199) was that gold would effectively be remonetized by the US-French agreement on gold in August 1975 which included abolishing the official price of gold, a two-year commitment among the G-10 (which was made up of the major gold holders) not to increase their total holdings, allowing transactions in gold, and disposal of one-third of the IMF's gold (50 million ounces), half of which was returned to members and half of which was sold in the market. John's concern was that a bubble in the price of gold (if the rise carried the level of their reserves beyond their optimal level) would lead countries to act rationally and seek to dispose of their reserves and disrupt the international monetary system by following uncoordinated intervention and other policies.

The share of gold in international reserves increased substantially between 1970 and 1980 in the context of the rise in US and global inflation and an increase in the market price of gold by the end of 1980 to \$589.50, almost 16 times its price at the end of 1970, \$37.70. However, it is difficult to sustain an argument that the rise in the gold price caused the inflation because of attempts by holders to reduce their reserves to optimal levels. Non-gold reserves alone rose more than seven times from 1970 to 1980. But they more than doubled from the end of 1975 to 1980 as authorities of the G-10 countries resisted the weakening of the US dollar; they intervened heavily buying US dollars and adding to their holdings of foreign exchange. If reserves became excessive because of the rise in the price of gold, threatening to stimulate inflation, these countries should not have continued to accumulate foreign exchange. They should have allowed their currencies to appreciate.

Physical official gold holdings declined through 2007 and have only increased slightly in recent years. Despite the rise in the market price of gold from its low at the end of 2000, the share of gold in total reserves has not changed. Gold's share has risen for the advanced countries. Some emerging market and developing countries have diversified their reserve holdings into gold starting in 2005, but the overall share of gold in their reserves has continued to decline.²

1. Using the prevailing market price clearly places a maximum value on gold reserves. This is a reasonable approach in the context of John's concern, but it clearly exaggerates the effective value of large holdings of gold.

2. The IMF sold an additional 12.97 million ounces of gold in 2009 and 2010 to build an endowment to help pay for the Fund's administrative expenses. About 60 percent of the sales were to four emerging market and developing countries, and the rest was in the market.

Box 2 Estimating Seigniorage

One measure of seigniorage associated with currency issuance can be constructed from an estimate of the stock of physical currency circulating outside the currency area multiplied by the annual interest rate on the additional government debt that would have to be issued in the absence of the interest-free loan.¹

For the United States, the total amount of currency outstanding as of the end of 2011 was \$1,034.5 billion. Estimates of the fraction of US currency held outside of the United States range from 40 to 65 percent, or between \$414 billion and \$672 billion.² Over the past decade, the average interest rate on US Treasury securities has averaged 3.628 percent, which may or may not be representative of any period other than the past 10 years.³ On this basis, the estimated annual international seigniorage to the United States from the use of its currency internationally was between \$15 billion and \$24 billion as of the end of 2011.

For the euro area, currency outstanding as of the end of 2011 was €888.6 billion, or \$1,153 billion at the prevailing exchange rate with the US dollar. According to ECB (2012, 20) estimates, between 20 and 25 percent of euro currency circulates outside the euro area, probably closer to the second figure, or between \$230 billion and \$288 billion. In the absence of a conveniently available average interest rate on euro area government debt over the past decade, we can use the US interest rate. On this basis, the resulting annual international seigniorage as of the end of 2011 was between \$8 billion and \$10 billion.

Measuring the seigniorage associated with the broader international use of currencies is a much murkier subject. Below I provide estimates of seigniorage benefits to the United States and, then, to other countries or areas whose currencies are used to denominate foreign exchange reserve holdings. I also provide estimates of how these benefits have evolved over the past dozen years.

I make the simplifying assumption that the benefit to the US government lowers the cost of its borrowing, analogous to the estimates of seigniorage derived from the international use of the dollar and the euro as currencies. We know that foreign exchange reserves are invested in assets other than government bonds, including bank deposits, corporate bonds, and equities. In this sense, we are attributing some of the “benefits” from this type of seigniorage to government borrowers when that might not be entirely appropriate. On the other hand, we are ignoring the potential benefits that flow from the reserve role of a currency to the broader international use of that currency that accrue to non-governmental borrowers, domestic and foreign.⁴

(continues on next page)

1. I am ignoring the cost of printing the currency which is small relative to the total value of the stock of currency outstanding because most of that value is in large notes. In the case of the US dollar, as of the end of 2011, 75 percent of the total value of currency outstanding consists of \$100 notes, the maximum denomination currently issued by the United States (Board of Governors of the Federal Reserve System, “Value of Currency in Circulation,” available at www.federalreserve.gov, accessed June 8, 2012). Euro notes are issued in denominations of 100, 200, and 500, and those three denominations account for 57 percent of currency outstanding as of the end of 2011 (European Central Bank, “Euro banknotes, values,” available at <http://www.ecb.int/stats/euro/circulation/html/index.en.html>, accessed June 8, 2012).

2. The range of estimates is illustrated chronologically by Richard Porter and Ruth Judson (1996) at 53 to 67 percent, Edgar Feige (1997) at 40 percent, and most recently, Linda Goldberg (2010) at about 65 percent.

3. Source: <http://www.treasurydirect.gov/govt/rates/pd/avg/avg.htm> (accessed June 8, 2012).

4. It is somewhat counterintuitive in the context of the increased globalization of financial markets, but a larger proportion of estimated foreign exchange holdings in US dollar assets are in the form of direct claims on the United States and in the form of US treasury securities than at the end of 1999. (The estimated amount of foreign exchange reserves held in US dollar assets as of the end of 2011 is derived from the IMF’s COFER data. I assume that the US dollar share of total allocated reserves (62.1 percent) is a reasonable estimate of the US dollar share of total reserves as of the end of 2011, which were \$10,197 billion, and similarly for previous years.) Direct claims on the United States include US treasury securities and US liabilities reported by US banks and securities dealers, not included elsewhere, from data on the US international investment position (US Department of Commerce, Bureau of Economic Analysis. Available at www.bea.gov, accessed July 30, 2012). At the end of 2011, they were 71 percent of estimated foreign exchange reserves in US dollar assets, and holdings of US treasury securities alone were 67 percent. The comparable figures as of the end of 1999 were 66 and 55 percent. One might suspect that part of the explanation for the larger share of US treasury securities is distrust for other assets. That appears to be the case in part, but only in part. The comparable figures for the end of 2007 were 68 and 59 percent. In the peak years, 2008 and 2009, 75 percent of estimated US dollar reserves were direct claims on the United States, about 70 percent in US treasury securities.

Box 2 Estimating Seigniorage (continued)

As summarized by the McKinsey Global Institute (2009, 42), estimates of the effect of reserve accumulation on US Treasury yields range from 30 basis points to 200 basis points. These estimates are derived from a number of different approaches using different assumptions. In some cases, the analysis is in terms of stocks, and in other cases, it is in terms of flows, for example the effects of a halt in US dollar reserve accumulation which leads to a dollar-for-dollar drop in the net flow of foreign saving to the United States, which is a rather extreme assumption, in effect, ruling out any asset substitution.

I start from the assumption that as of the end of 2011 the effect on the interest rate on US gross general government debt (\$15,537 billion) of \$6,343 billion in estimated foreign exchange holdings of US dollar assets is to lower the cost of financing of that debt by 30 basis points. This effect (call it α) per dollar of US gross general government debt (D) gives us an estimate of US seigniorage as of the end of 2011 of \$47 billion based on the following formula:

$$S_{i,t} = \alpha D_{i,t} \text{ for } i = \text{United States and } t = 2011.$$

We can use the same framework to estimate the seigniorage gain to the euro area from the demand for euro denominated assets as part of other countries holding foreign exchange reserves.⁵ Assume the gain to the euro area is proportionate to the gain for the United States. To estimate a factor of proportionality, call it beta (β), I consider international reserve holdings in euro as a percentage of gross general government debt for the euro area relative to the same ratio for the United States. In 2011, US dollar reserves were 40.1 percent US gross general government debt ($R_{US,t}$ for US = United States and $t = 2011$). The equivalent percentage for the euro area ($R_{\epsilon,t}$ for $\epsilon =$ euro and $t = 2011$) was 22.1 percent. The ratio of the euro area percentage to the US percentage was 0.54; call this figure β_{ϵ} . I, therefore, assume that the seigniorage gain to the euro area is at the rate of 0.54 times the rate of seigniorage gain to the United States ($\alpha \beta_{\epsilon}$) or 16.2 basis points. Applying this figure to the stock of euro area gross general government debt (\$11,555 billion) yields an estimated gain for the euro area of \$18.8 billion, or 0.14 percent of euro area GDP.

For country or area i , whose currency is used to denominate assets in other countries' foreign exchange reserves, seigniorage (S_i) at time $t = 2011$ estimated to accrue to the issuer is provided by the following simplified formula:

$$S_i = \alpha \beta_i D_i.$$

We can sum this expression for all countries i and simplify. The resulting algebra yields an estimate of total seigniorage (ST) at time t according to the following formula:

$$ST = \alpha D_{US} (1/C_{US}), \text{ where } C_{US} \text{ is the US dollar share of international reserves.}$$

Applying this simplified formula, yields an estimate of total seigniorage at the end of 2011 of \$75 billion or about 0.1 percent of global GDP of \$69.7 trillion. It follows from a bit more algebra that the seigniorage of area or country i can be simplified into the expression below:

$$S_i = \alpha D_{US} (R_i/R_{US}) = \alpha D_{US} (R_i/RT), \text{ where } RT \text{ is total foreign exchange reserves.}$$

Correspondingly, each country or area's seigniorage is just the share of reserves in that currency i times the estimated total seigniorage.

(continues on next page)

5. See the previous footnote for the derivation of the estimated amount of foreign exchange reserves held in US dollar assets as of the end of 2011. The figures on US gross general government debt, and for other countries, are derived from the IMF's *World Economic Outlook* database for April 2012. The database provides estimates of GDP in US dollars and of gross general government debt as a percent of GDP.

Box 2 Estimating Seigniorage *(continued)*

Thus, in this approach, the size of each area or country's estimated seigniorage is normalized on the assumed α and the size of US gross general government debt and reserves held in its currency relative to reserves held in US dollars. Given the amount of seigniorage that is estimated to accrue to the United States, total seigniorage is inversely proportional to dollar's share in reserves. An individual area's or country's seigniorage rises with its own share of reserves held in its currency relative to those held in dollar-denominated assets.

Turning from amount of seigniorage from foreign currency reserve holdings as of the end of 2011, we can also extend the approach to make estimates for other years. We need to adjust the α (the rate of seigniorage gain for the United States) for 2011, which we can now regard as an α with a subscript t . Consistent with the approach employed so far, we can compute a gamma (γ_t for $t = 2011, 2006, 1999$) as an adjustment factor. To construct this adjustment factor, I took the ratio of international reserves in dollars to US gross general government debt in year t to the same ratio in 2011. For 2011, the adjustment factor is, of course, 1.0. For 2006, the adjustment factor is 0.96, which is close to 1.0 reflecting the fact that the growth of foreign exchange reserves over the previous five years was only slightly outpaced by the growth of US gross general government debt. On the other hand, the adjustment factor for 1999 is 0.55. It is not necessary to adjust the betas (β s) for previous years because in the simplified approach, the need for that adjustment drops out. Thus,

$$S_{i,t} = \alpha \gamma_t D_{US} (R_{i,t}/RT_{,t}).$$

Box 3 Reserve Diversification and the Evolution of the Multicurrency Reserve Currency System

The currency composition of international reserves at the aggregate level is influenced by many factors, including which countries are accumulating reserves, their asset preferences, and the factors affecting both their reserve accumulation and their asset preferences. Thus, generalizations from aggregate trends are hazardous. Nevertheless, it is useful to make a stab at doing so.

At the end of the first quarter of 1999, 89 percent of foreign exchange reserves were held in assets denominated either in the US dollar (71 percent) or in the euro (18 percent); see box 3 table. Since that time, the dollar's share has declined by about 9 percentage points, the euro's share has risen, but the combined share is only slightly lower at 87 percent. However, most of the movement in relative shares was in the early part of the 13-year period. The dollar's value share has stabilized since early 2009, and its quantity share stabilized a year later. This stabilization may be because of the challenges the euro area has faced over the past two years. However, I doubt it.

As noted in the text, the emerging market and developing countries as a group are the holders of the major portion of international reserves. At the start of 1999, their combined holdings of assets denominated in the US dollar or in the euro was 92 percent. But that total has since declined to 85 percent. Moreover, the share of euro assets in their holdings reached approximately the current level in early 2005, having risen a bit further in the later years but subsequently having declined. The most telling information in the table is the apparent relative collective preference of emerging market and developing countries for reserves denominated in assets other than the US dollar or the euro, which is now 15 percent of the total, almost double what it was in early 1999. In contrast with the advanced countries, the share of these countries' reserves in the traditional minor currencies (sterling, yen, and Swiss franc) has risen slightly, but the share of their reserves in non-traditional currencies has increased dramatically to almost 7 percent. Combined with the increased weight of the emerging market and developing countries in total reserves, this shift in aggregate preferences has increased the overall share of reserves in non-traditional currencies to 5.2 percent as of the end of 2011, an estimated \$539 billion.¹ This amount of reserves held in assets denominated in non-traditional currencies exceeds the total estimated non-dollar reserves at the end of the first quarter of 1999, after the birth of the euro and the start of a consistent COFER database, which was \$513 billion.

What currencies are attracting managers of foreign exchange reserves? Unfortunately, the IMF has been unable, so far, to prevail upon its members to expand their reporting of the currency composition of their reserves beyond the traditional five currencies. We must rely on partial and anecdotal reports. For example, the Swiss National Bank reports that it holds investments as part of its international reserves in five non-traditional currencies: Australian dollar, Canadian dollar, Korea won, Singapore dollar, and Swedish krona. Anecdotal reports indicated that foreign exchange reserves are held in assets denominated in the currencies of three other advanced countries (Denmark, New Zealand, and Norway), but the list of countries might well be substantially longer, extending to emerging market and developing countries.

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1. This estimate assumes that the currency composition of the foreign exchange reserves of countries that do not report that composition to the IMF is the same as that for the countries that do report.

Box 3 Reserve Diversification and the Evolution of the Multicurrency Reserve Currency System *(continued)*

Jochen R. Andritzky (2012) reports that in 2011 nonresident holdings of Australian government securities was 75 percent of the total, and for Canada and Korea the percentages were 24 and 15 percent respectively. The Citigroup World Government Bond Index (Citigroup 2012) includes the sovereign debt denominated in the domestic currencies of nine countries other than the five traditional reserve currencies: Australia, Canada, Denmark, Malaysia, Mexico, Norway, Poland, Singapore, and Sweden. Citigroup also produces indexes that include the domestic currency bonds of 16 other countries. Morgan Stanley (2012) reports that foreign investors hold between 25 and 45 percent of the government bonds of Malaysia, Mexico, and Poland. Morgan Stanley also reports that foreign investors hold at least 10 percent of the government bonds of seven other countries: Brazil, Hungary, Indonesia, Korea, South Africa, Thailand, and Turkey.

Finally, we know from anecdotal information that the People's Bank of China has allowed a certain number of foreign central banks to hold debt in renminbi. The renminbi is not a convertible currency on financial account; therefore, we do not know for certain whether the central banks holding these renminbi assets count those holdings as part of their foreign exchange reserves. Lines are blurred as they are between asset holdings included in international reserves and asset holdings by sovereign wealth funds.

We do not know for certain that the managers of foreign exchange portfolios mimic the managers of the portfolios of private investors, but it is a reasonable supposition that the latter are leading the former. It follows that the list of non-traditional reserve currencies is long and growing. It also follows that the original sin of many countries, whose domestic currency formerly could not be used to borrow abroad or to borrow long term even domestically, is rapidly dissipating (Eichengreen and Hausmann 1999). It is being replaced by the privilege that once extended only to the dollar and one or two other currencies. Time will tell whether that privilege is exorbitant or merely just another sin in the form of a loosened budget constraint.² One could argue, for example, that the euro sovereign debt crisis has been associated with too many euro area economies taking advantage of the reserve currency status of the euro. My conclusion is that we are rapidly moving toward a multicurrency international financial and monetary system.

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2. On June 25, 2012, the Securities and Exchange Board of India raised the cap on foreign investors in government bonds by \$5 billion in the context of pressure on India's access to foreign funds and its rising fiscal needs. The press release from the Reserve Bank of India read, "The existing limit for investment by Securities and Exchange Board of India (SEBI) registered foreign institutional investors (FIIs) in Government securities (G-Secs) has been enhanced by a further amount of USD 5 billion. This would take the overall limit for FII investment in G-Secs from USD 15 billion to USD 20 billion. . . . [I]t has also been decided to allow long term investors like Sovereign Wealth Funds (SWFs), multilateral agencies, endowment funds, insurance funds, pension funds and foreign central banks to be registered with SEBI, to also invest in G-Secs for the entire limit of USD 20 billion." Note the inclusion of foreign central banks and SWFs.

Box 3 Reserve Diversification and the Evolution of the Multicurrency Reserve Currency System *(continued)*

Box 3 Table Currency composition of foreign exchange reserves: selected dates, 1999–2011 (percent)

Currency	1999-Q1	2005-Q1	2009-Q2	2010-Q2	2011-Q4
Advanced countries					
Value share					
US dollar	71.2	65.5	62.8	62.5	62.2
Euro	18.1	25.1	27.6	26.2	25
Other traditional reserve currencies	9.1	7.6	7.4	7.4	7.5
Non-traditional reserve currencies	1.6	1.8	2.2	3.8	5.3
Quantity share					
US dollar	71.2	69	66	62.8	63.5
Euro	18.1	21.7	24	25.9	24.1
Other traditional reserve currencies	9.1	7.4	7.7	7.5	7
Non-traditional reserve currencies	1.6	1.9	2.3	3.8	5.4
Emerging market and developing countries					
Value share					
US dollar	75	61.3	59.4	58.9	57.6
Euro	16.6	30.2	30.7	28.1	27.4
Other traditional reserve currencies	7.1	7.1	7.7	8.5	8.1
Non-traditional reserve currencies	1.3	1.4	2.3	4.5	6.9
Quantity share					
US dollar	75	64.8	61.7	58.2	57.9
Euro	16.6	26.9	27.8	28.3	26.9
Other traditional reserve currencies	7.1	6.8	8.1	9.1	8.3
Non-traditional reserve currencies	1.3	1.5	2.4	4.4	6.9

Note: Value and quantity shares by construction are equal in 1999-Q1, and the quantity shares for the non-traditional reserve currencies are residuals; see Truman and Wong (2005) for the methodology employed. Shares may not sum to 100 because of rounding.

Source: International Monetary Fund (IMF) *Currency Composition of Official Foreign Exchange Reserves* (COFER) database, June 29, 2012, www.imf.org/external/np/sta/cofer/eng/index.htm (accessed on June 29, 2012).

REFERENCES

- Andritzky, Jochen R. 2012. *Government Bonds and Their Investors: What Are the Facts and Do They Matter?* IMF Working Paper WP/12/158. Washington: International Monetary Fund.
- BIS (Bank for International Settlements). 2010. Triennial Central Bank Survey: Report on Global Foreign Exchange Market Activity in 2010. Basel.
- Bottrill, Anthony, and John Williamson. 1971. The Impact of Customs Unions on Trade in Manufactures. *Oxford Economic Papers* 23, no. 3 (November):323–351.
- Citigroup. 2012. *Citigroup Global Fixed-Income Index Catalog: 2012 Edition* (January 17). Available at www.citi.com (accessed July 6, 2012).
- Chen, Sally, Philip Liu, Andrea Maechler, Chris Marsh, Sergejs Saksonovs, and Hyun Song Shin. 2012. *Exploring the Dynamics of Global Liquidity*. IMF Working Paper *forthcoming*. Washington: International Monetary Fund.
- Cline, William R., and John Williamson. 2008. *New Estimates of Fundamental Equilibrium Exchange Rates*. Peterson Institute for International Economics Policy Brief 08-7. Washington: Peterson Institute for International Economics.
- Cline, William R., and John Williamson. 2012. *Estimates of Fundamental Equilibrium Exchange Rates, May 2012*. Peterson Institute for International Economics Policy Brief 12-14. Washington: Peterson Institute for International Economics.
- CGFS (Committee on the Global Financial System). 2011. *Global Liquidity: Concept, Measurement, and Policy Implications (Landau Report)*. Basel: Bank for International Settlements.
- Eichengreen, Barry, and Ricardo Hausmann. 1999. Exchange Rates and Financial Fragility. In *New Challenges for Monetary Policy*. Proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City.
- ECB (European Central Bank). 2012. *The International Role of the Euro*. Frankfurt.
- Ethier, Wilfred, and Arthur Bloomfield. 1975. *Managing the Managed Float*. Essays in International Finance 112. Princeton, NJ: Princeton University, International Economics Section.
- Feige, Edgar L. 1997. Revised Estimates of the Underground Economy: Implications of U.S. Currency Held Abroad. In *The Underground Economy: Global Evidence of Its Size and Impact*, ed. Owen Lippert and Michael Walker. Vancouver: The Fraser Institute.
- G-10 (Group of Ten). 1965. *Report of the Study Group on the Creation of Reserve Assets (Ossola Report)*. Rome: Bank of Italy Press.
- G-20 (Group of Twenty). 2011. *Cannes G-20 Coherent Conclusions for the Management of Capital Flows Drawing on Country Experiences*. Available at www.g20.utoronto.ca (accessed March 14, 2012).
- Gagnon, Joseph E. with Marc Hinterschweiger. 2011. *Flexible Exchange Rates for a Stable World Economy*. Washington: Peterson Institute for International Economics.
- Gagnon, Joseph E. 2012a. *Global Imbalances and Foreign Asset Expansion by Developing-Economy Central Banks*. Peterson Institute for International Economics Working Paper 12-5 Washington: Peterson Institute for International Economics.
- Gagnon, Joseph E. 2012b. *Widespread Currency Manipulation*. Peterson Institute for International Economics Policy Brief 12-19. Washington: Peterson Institute for International Economics.

- Goldberg, Linda S. 2010. Is the International Role of the Dollar Changing? *Federal Reserve Bank of New York, Current Issues in Economics and Finance* 16, no. 1: 1–7.
- IMF (International Monetary Fund). 1974. *International Monetary Reform: Documents of the Committee of Twenty*. Washington.
- IMF (International Monetary Fund). 1985. *The International Monetary Fund 1972–1978: Cooperation on Trial* (Volume III, *Documents*), ed. Margaret Garritsen de Vries. Washington.
- IMF (International Monetary Fund). 2010. *Reserve Accumulation and International Monetary Stability*. Washington.
- IMF (International Monetary Fund). 2011a. *Assessing Reserve Adequacy*. Washington.
- IMF (International Monetary Fund). 2011b. *IMF Executive Board Discusses Assessing Reserve Adequacy*. Public Information Notice No. 11/47 (April 7). Washington.
- IMF (International Monetary Fund). 2011c. *The Multilateral Aspects of Policies Affecting Capital Flows*. Washington.
- IMF (International Monetary Fund). 2012a. *Bilateral and Multilateral Surveillance: Executive Board Decision—July 18*. Washington.
- IMF (International Monetary Fund). 2012b. *Fiscal Monitor* (April). Washington.
- IMF (International Monetary Fund). 2012c. *Pilot External Sector Report*. Washington.
- IMF (International Monetary Fund). 2012d. *Safe Assets: Financial System Cornerstone?* Chapter 3 in the *Global Financial Stability Report* (April). Washington.
- Jeanne, Olivier, and Romain Rancière. 2006. *The Optimal Level of International Reserves for Emerging Market Countries: Formulas and Applications*. IMF Working Paper WP/06/229. Washington: International Monetary Fund.
- Jeanne, Olivier. Forthcoming. Capital Mobility and Regulation in International Economics. In *Global Economics in Extraordinary Times: Essays in Honor of John Williamson*, eds. C. Fred Bergsten and C. Randall Henning. Washington: Peterson Institute for International Economics.
- Johnson, Harry G. 1972. *Inflation and the Monetarist Controversy*. Amsterdam: North Holland.
- McKinsey Global Institute. 2009. *An Exorbitant Privilege? Implications of Reserve Currencies for Competitiveness*. McKinsey Global Institute Discussion Paper (December). Available at www.mckinsey.com/mgi (accessed June 11, 2012).
- Miller, Marcus. Forthcoming. Target Zones. In *Global Economics in Extraordinary Times: Essays in Honor of John Williamson*, eds. C. Fred Bergsten and C. Randall Henning. Washington: Peterson Institute for International Economics.
- Morgan Stanley. 2012. *Emerging Markets Local Markets Guidebook* (March). Available at www.morganstanley.com (accessed June 19, 2012).
- Palais-Royal Initiative. 2011. Reform of the International Monetary System: A Cooperative Approach for the Twenty First Century. Reprinted as chapter 2 in *Reform of the International Monetary System: The Palais Royal Initiative*, eds. Jack T. Boorman and André Icard. New Delhi: Sage Publications.
- Porter, Richard D., and Ruth A. Judson. 1996. The Location of U.S. Currency: How Much is Abroad? *Federal Reserve Bulletin* 82: 883–903.
- Truman, Edwin M. 2010a. *Strengthening IMF Surveillance: A Comprehensive Proposal*. Peterson Institute for International Economics Policy Brief 10-29. Washington: Peterson Institute for International Economics.

- Truman, Edwin M. 2010b. *The G-20 and International Financial Institution Governance*. Peterson Institute for International Economics Working Paper 10-13. Washington: Peterson Institute for International Economics.
- Truman, Edwin M. 2011a. *Asian Regional Policy Coordination*. Peterson Institute for International Economics Working Paper 11-21. Washington: Peterson Institute for International Economics.
- Truman, Edwin M. 2011b. Three Evolutionary Proposals for Reform of the International Monetary System (Extension of prepared remarks delivered at the Bank of Italy's Conference in Memory of Tommaso Padoa-Schioppa, December 16). Available at www.piie.com (accessed March 14, 2012).
- Truman, Edwin M. Forthcoming. *International Economic Policy Coordination Reconsidered*. Washington: Peterson Institute for International Economics.
- Truman, Edwin M., and Anna Wong. 2006. *The Case for an International Reserve Diversification Standard*. Peterson Institute for International Economics Working Paper 06-2. Washington: Peterson Institute for International Economics.
- Volcker, Paul A. 2012. Toward a New World of Finance. Keynote Address at the Asia-Global Dialogue 2012, Hong Kong. Photocopy (May 31).
- Williamson, John. 1963. Liquidity and the Multiple Key Currency Proposal. *American Economic Review* 3, no.2 (June):427-433.
- Williamson, John. 1965. *A Choice of a Pivot for Parities*. Princeton Essays in International Finance 50. Princeton, NJ: Princeton University, International Economics Section.
- Williamson, John. 1971. *A Choice of a Pivot for Parities*. Princeton Essays in International Finance 90. Princeton, NJ: Princeton University, International Economics Section.
- Williamson, John. 1973. Surveys in Applied Economics: International Liquidity. *The Economic Journal* 83, no.331 (September): 685-746.
- Williamson, John. 1976. The Benefits and Costs of an International Monetary Nonsystem. In *Reflections on Jamaica, Essays in International Finance 115*, eds. Edward M. Bernstein et al. Princeton, New Jersey: International Finance Section, Department of Economics, Princeton University.
- Williamson, John. 1977. *The Failure of World Monetary Reform, 1971-1974*. New York: New York University Press.
- Williamson, John. 1984. International Liquidity: Are the Supply and Composition Appropriate? In *The International Monetary System: Forty Years after Bretton Woods*. Proceedings of a Conference Held at Bretton Woods, New Hampshire sponsored by the Federal Reserve Bank of Boston.
- Williamson, John. 1985. On the System in Bretton Woods. *American Economic Review* 75, no.2: 74-79.
- Williamson, John. 2006. Revamping the International Monetary System. In *Reforming the IMF for the 21st Century*, ed. Edwin M. Truman. Washington: Peterson Institute for International Economics.
- Williamson, John. 2007. *Reference Rates and the International Monetary System, Policy Analyses in International Economics* 82. Washington: Peterson Institute for International Economics.
- Williamson, John. 2009a. *Understanding Special Drawing Rights (SDRs)*. Peterson Institute for International Economics Policy Brief 09-10. Washington: Peterson Institute for International Economics.
- Williamson, John. 2009b. *Why SDRs Should Rival the Dollar*. Peterson Institute for International Economics Policy Brief 09-20. Washington: Peterson Institute for International Economics.

Table 1 Summary of tests of trends in foreign exchange rate variability for G-20 countries
(number of countries in each category)

	Mean standard deviation test ^a	Regression standard deviation test ^b		Mean standard deviation test ^a	Regression standard deviation test ^b
Interval	Nominal effective exchange rate		Interval	Real effective exchange rate	
Month-to-month			Month-to-month		
Less variability	18	18	Less variability	13	17
Significant	18	15	Significant	11	17
Not significant	0	3	Not significant	2	0
More variability	2	2	More variability	7	3
Significant	2	1	Significant	4	2
Not significant	0	1	Not significant	3	1
12-month			12-month		
Less variability	18	17	Less variability	16	17
Significant	16	16	Significant	15	16
Not significant	2	1	Not significant	1	1
More variability	2	3	More variability	4	3
Significant	0	3	Significant	1	2
Not significant	2	0	Not significant	3	1
24-month			24-month		
Less variability	18	16	Less variability	17	18
Significant	17	16	Significant	11	16
Not significant	1	0	Not significant	6	2
More variability	2	4	More variability	3	2
Significant	1	1	Significant	1	1
Not significant	1	3	Not significant	2	1

a. Test of whether the mean of the rolling five-year standard deviations of the series is higher or lower in the second half of the period.

b. Test of whether in a regression of the rolling standard deviations against time the coefficient is positive or negative.

Source: See appendix table 1.

Table 2 Current account imbalances relative to national GDP (percent of observations)

Time period	All countries	Advanced^a	Emerging market^b	Asia^c	Eastern Europe^d	Latin America^e	Other^f
1980–1998							
Imbalances	35	28	41	42	37	38	100
Deficits	22	16	27	22	32	28	74
Surpluses	13	12	14	20	5	10	26
1999–2011							
Imbalances	50	52	48	55	61	22	44
Deficits	21	25	16	1	48	4	10
Surpluses	30	27	32	55	12	18	33
1980–2011							
Imbalances	41	38	44	47	50	31	48
Deficits	21	20	22	13	41	18	26
Surpluses	20	18	22	34	9	13	22
2012–2017 projected							
Imbalances	34	38	30	38	23	8	67
Deficits	13	16	10	0	21	0	33
Surpluses	21	22	20	38	2	8	33

a. Australia, Austria, Belgium, Canada, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

b. China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Czech Republic, Estonia, Hungary, Poland, Russia, Slovak Republic, Slovenia, Turkey, Argentina, Brazil, Chile, Colombia, Mexico, Venezuela, Israel, Saudi Arabia, and South Africa.

c. China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

d. Czech Republic, Estonia, Hungary, Poland, Russia, Slovak Republic, Slovenia, and Turkey.

e. Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela.

f. Israel, Saudi Arabia, and South Africa.

Note: Elements may not add to total because of rounding.

Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed June 9, 2012).

Table 3 Current account imbalances relative to world GDP (percent of observations)

Time period	All countries	Advanced ^a	Emerging market ^b	Asia ^c	Eastern Europe ^d	Latin America ^e	Other ^f
1980–1998							
Imbalances	20	28	12	11	6	16	21
Deficits	12	16	8	2	6	15	16
Surpluses	8	12	5	9	0	1	5
1999–2011							
Imbalances	33	46	21	29	18	13	20
Deficits	13	22	5	2	6	9	0
Surpluses	20	24	17	27	12	4	20
1980–2011							
Imbalances	26	36	16	18	13	15	21
Deficits	12	19	6	2	6	12	9
Surpluses	13	17	10	16	7	2	12
2012–2017 projected							
Imbalances	32	38	28	40	19	17	33
Deficits	13	15	12	10	15	17	0
Surpluses	19	22	16	30	4	0	33

a. Australia, Austria, Belgium, Canada, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

b. China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Czech Republic, Estonia, Hungary, Poland, Russia, Slovak Republic, Slovenia, Turkey, Argentina, Brazil, Chile, Colombia, Mexico, Venezuela, Israel, Saudi Arabia, and South Africa.

c. China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

d. Czech Republic, Estonia, Hungary, Poland, Russia, Slovak Republic, Slovenia, and Turkey.

e. Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela.

f. Israel, Saudi Arabia, and South Africa.

Note: Elements may not add to total because of rounding.

Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed June 9, 2012).

Table 4 Did the South finance the North: 2001–2011? (billions of US dollars)

Country group	Current account	Change in reserves	Net non-reserve capital inflow	Net recorded private capital inflow
Developing Asia	2,298	3,874	1,575	1,664
Middle East and North Africa	2,977	1,082	–894	139
Commonwealth of Independent States	753	568	–185	–8
Sub-Saharan Africa	–66	134	201	86
Latin America and Caribbean	–117	600	717	737
Central and Eastern Europe	–809	230	1039	870
Total emerging market and developing countries	4,034	6,488	2,454	3,486

Notes: The South and the North refer to the emerging market and developing countries and the advanced countries respectively. The elements may not add to totals because of rounding.

Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed July 25, 2012).

Table 5 Evolution of international reserves

	1970	1980	1990	2000	2011
Reserves and components	World				
Total reserves (billions of dollars)	95	997	1,293	2,282	12,103
Percent of world GDP	n.a.	9.3	5.8	7.1	17.4
Composition (percent)					
Foreign exchange	48	38	67	85	84
Gold	41	59	28	12	12
Special drawing rights	3	1	2	1	2
Reserve position in the IMF	8	2	3	3	1
	Advanced countries				
Total reserves (billions of dollars)	77	756	1,049	1,515	4,845
Percent of national GDP	n.a.	9.2	5.9	5.9	10.9
Percent of world GDP	n.a.	7.1	4.7	4.7	6.9
Composition (percent)					
Foreign exchange	43	30	65	80	70
Gold	44	66	30	15	23
Special Drawing Rights	3	2	2	1	4
Reserve position in the IMF	9	2	3	4	2
	Emerging-market and developing countries				
Total reserves (billions of dollars)	18	240	244	767	7,258
Percent of national GDP	n.a.	9.5	5.5	11.7	28.7
Percent of world GDP	n.a.	2.2	1.1	2.4	10.4
Composition (percent)					
Foreign exchange	67	61	76	94	94
Gold	25	35	20	5	4
Special drawing rights	3	1	1	1	1
Reserve position in the IMF	5	3	2	1	1

n.a. = not available.

IMF = International Monetary Fund

Source: IMF, *International Financial Statistics*, CD-ROM, June 2012 (accessed in June 2012).

Table 6 Increase in international reserves and inflation (percent)

	Reserves^a	CPI inflation^b
World		
1980s	7	17
1990s	7	16
2000s	16	4
Advanced countries		
1980s	9	6
1990s	5	3
2000s	10	2
Emerging and developing countries		
1980s	2	51
1990s	13	48
2000s	23	7

CPI = Consumer Price Index

a. Average annual change in international reserves for 1980–1989, 1990–1999, 2000–2010.

b. Average annual change in inflation for 1981–1990, 1991–2000, 2001–2011.

Sources: International Monetary Fund (IMF), *International Financial Statistics* (IMF) CD-ROM, June 2012 (accessed June 25) and IMF, *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed June 24, 2012).

Table 7 Estimates of seigniorage from foreign exchange holdings in 1999, 2006, and 2011 based on 2011 effect of 30 basis points on US interest cost

Country/region	Share of reserves/seigniorage^a (percent)	Reserves in currency (billions of dollars)	Gross general government debt (billions of dollars)	Reserves/debt (percent)	Reserves/debt relative to the United States	Seigniorage (billions of dollars)	Seigniorage/GDP (percent)
2011							
United States	62.2	6,343	15,537	40.1	1.00	46.6	0.31
Euro area	25.0	2,552	11,555	22.1	0.54	18.8	0.14
United Kingdom	3.8	390	1,994	19.6	0.49	2.9	0.12
Japan	3.5	359	13,466	2.7	0.07	2.6	0.04
Switzerland	0.1	12	309	3.9	0.10	0.1	0.02
All other	5.3	539	n.a.	n.a.	n.a.	4.0	n.a.
Total	100.0	10,195	n.a.	n.a.	n.a.	74.9	n.a.
2006							
United States	65.5	3,440	8,913	38.6	1.00	25.7	0.19
Euro area	25.1	1,318	7,374	17.9	0.46	9.9	0.09
United Kingdom	4.4	230	1,056	21.8	0.56	1.7	0.07
Japan	3.1	162	8,103	2.0	0.05	1.2	0.03
Switzerland	0.2	9	253	3.6	0.09	0.1	0.02
All other	1.7	94	n.a.	n.a.	n.a.	0.7	n.a.
Total	100.0	5,253	n.a.	n.a.	n.a.	39.3	n.a.
1999							
United States	71.0	1,255	5,691	22.2	1.00	9.45	0.10
Euro area	17.9	319	4,938	6.5	0.29	2.38	0.03
United Kingdom	2.8	51	656	7.8	0.35	0.38	0.03
Japan	6.4	114	5,845	2.0	0.09	0.84	0.02
Switzerland	0.2	4	164	2.4	0.11	0.03	0.01
All other	1.6	28	n.a.	n.a.	n.a.	0.21	n.a.
Total	100.0	1,782	n.a.	n.a.	n.a.	13.31	n.a.

n.a. = not available.

a. As explained in box 2, a country or region's share in foreign exchange assets held in its currency is the same as its estimated share of total seigniorage.

Note: Elements may not add to totals because of rounding.

Sources: International Monetary Fund (IMF), *Currency Composition of Official Foreign Exchange Reserves (COFER)* database, June 29, 2012, www.imf.org/external/np/sta/cofer/eng/index.htm (accessed on July 26, 2012); IMF, *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed on July 27, 2012).

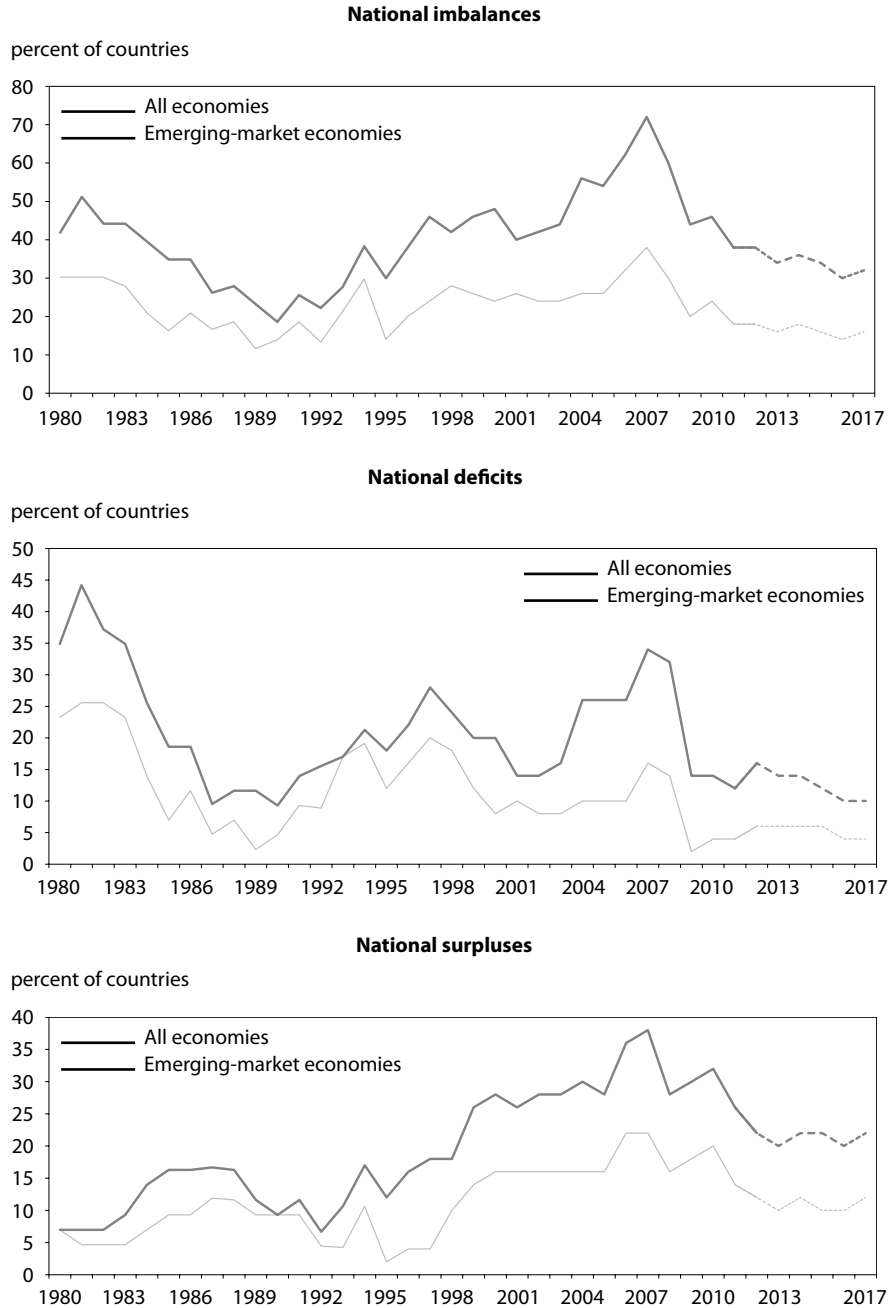
Table 8 Effects of reserve diversification on the US dollar: Log of Federal Reserve Board staff's major currency index

	Dollar share	Euro share	Yen share
Expected sign	+	-	-
Log change in quantity share of total reserves			
Dollar t	-1.082**		
Dollar t-1	-0.920*		
Dollar t-2	0.091		
Euro t		0.531***	
Euro t-1		0.377**	
Euro t-2		-0.219	
Yen t			-0.138*
Yen t-1			-0.008
Yen t-2			0.084
Observations	49	49	49
R-squared	0.166	0.328	0.114

Note: *, **, and *** represent rejecting the null hypothesis of no significance at levels of 10, 5, and 1 percent, respectively.

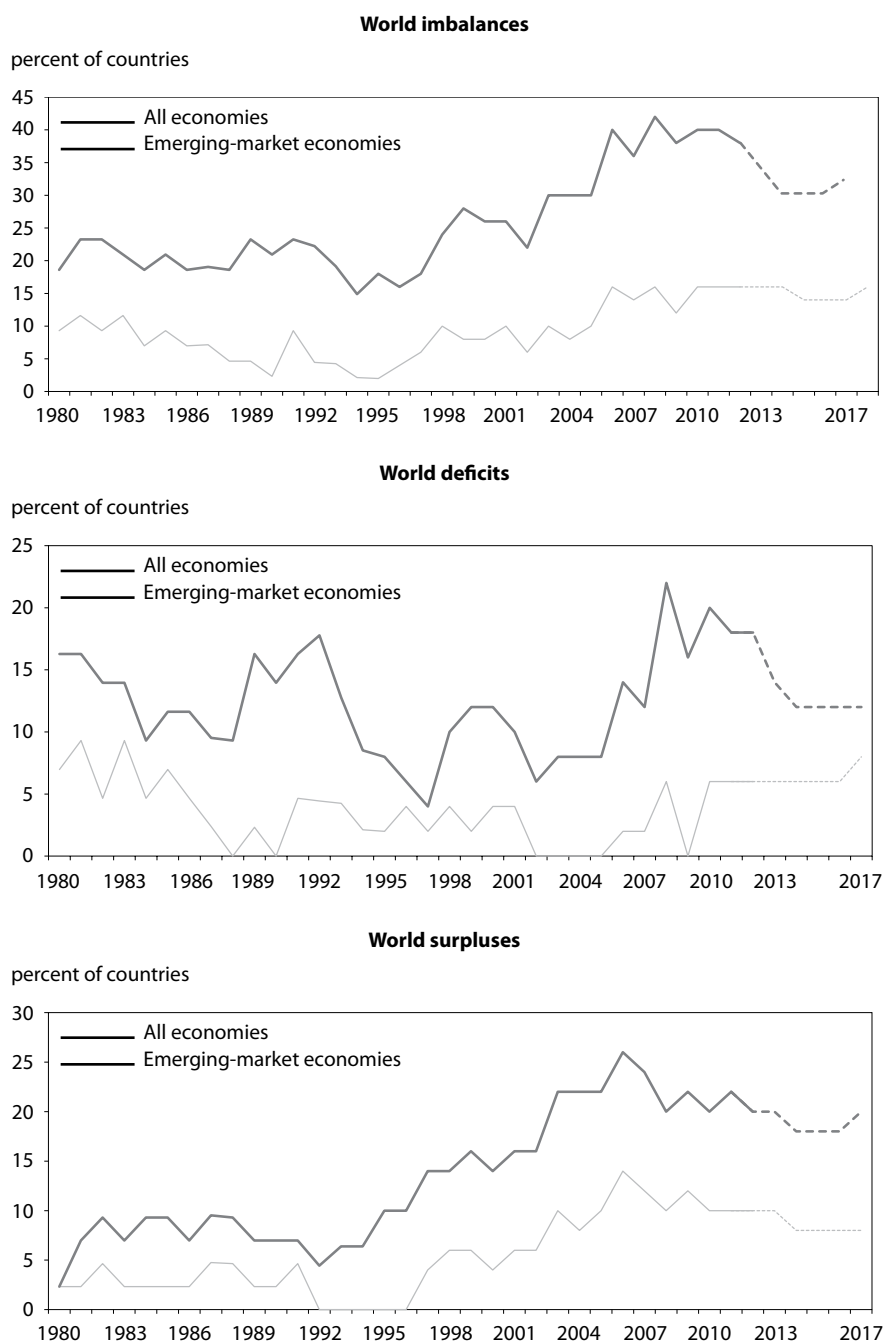
Source: International Monetary Fund (IMF), *Currency Composition of Official Foreign Exchange Reserves* (COFER) database (June 19, 2012), www.imf.org/external/np/sta/cofer/eng/index.htm (accessed July 19, 2012); Board of Governors of the Federal Reserve System, Foreign Exchange Rates, <http://www.federalreserve.gov/releases/h10/hist/> (accessed June 19, 2012); and author's calculations.

Figure 1 Current account imbalances relative to national GDP, 1980–2017 (percent of countries with current account positions greater than or equal to 4 percent)



Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012.

Figure 2 Current account imbalances relative to world GDP, 1980–2017 (percent of countries with current account positions greater than or equal to 0.05 percent)



Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012.

Appendix Table 1 Trends in variability of exchange rates

Rate/time interval/country	Test of standard deviations ^a	Regression of standard deviations on time		
		Sign/Significance ^b	Mean	Ten-year effect ^c
Nominal bilateral				
Month-to-month				
Euro/dollar	-/**	-/***	37.8	-8.3
Yen/dollar	-	-/***	38.8	-9.4
Yen/euro	+/**	+/**	37.8	4.1
12-month				
Euro/dollar	-/***	-/***	11.1	-14
Yen/dollar	-/***	-/***	11.4	-19.9
Yen/euro	-	-/***	11.7	-8.5
24-month				
Euro/dollar	-/***	-/***	7.4	-21.1
Yen/dollar	-/**	-/***	7.8	-10.8
Yen/euro	+/**	+/**	7.1	7
Nominal effective exchange rates				
Month-to-month				
United States	-/***	-/***	30.8	-7.9
Japan	-/***	-/***	58.7	-21.1
Euro area	-/***	-/***	43	-35.5
France	-/***	-/***	18.8	-30.8
Germany	-/***	-/***	19.2	-22.6
Italy	-/***	-/***	28.1	-36.3
United Kingdom	-/***	-	72.9	-2.4
Canada	+/**	+	27.9	2.6
Australia	-/***	-/***	39.4	-8.6
Argentina	-/***	-	118.6	-22.1
Brazil	-/***	-/***	657.4	-40.7
China	-/***	-/***	56	-25.5
Korea	-/***	-	56.3	-0.2
India	+/**	+/**	21.2	38.8
Indonesia	-/***	-/***	107.7	-210.1
Mexico	-/***	-/***	163.6	-61.8
Russia	-/***	-/***	104.1	-220.1
Saudi Arabia	-/***	-/***	104.5	-221.5
South Africa	-/***	-/***	33.3	-23.6
Turkey	-/***	-/***	179.8	-191.7
12-month				
United States	-/***	-/***	2.8	-15.4
Japan	-/**	-/***	4.3	-14.6
Euro area	-/***	-/***	3	-18.9
France	-/***	-/***	1.4	-22.6

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Appendix Table 1 Trends in variability of exchange rates *(continued)*

Rate/time interval/country	Test of standard deviations ^a	Regression of standard deviations on time		
		Sign/Significance ^b	Mean	Ten-year effect ^c
12-month <i>(continued)</i>				
Italy	-/***	-/***	2	-10.3
United Kingdom	-/***	+/**	4.9	9.4
Canada	+	+/**	2.2	8.3
Australia	-	-/**	3.6	-4
Argentina	-/***	-	10.3	-11.6
Brazil	-/*	-/***	19	-13.7
China	-	-/***	4.1	-19.6
Korea	-/***	-/**	4.6	-5
India	+	+/**	1.7	27.8
Indonesia	-/***	-/***	9.4	-224.9
Mexico	-/***	-/***	8.9	-49.8
Russia	-/***	-/***	8.7	-213.6
Saudi Arabia	-/***	-/***	8.7	-215.5
South Africa	-/***	-/***	2.6	-18
Turkey	-/***	-/***	16	-197.5
24-month				
United States	-/***	-/***	1.7	-12.1
Japan	+	+	2.9	2
Euro area	-/***	-/***	2	-21.3
France	-/***	-/***	0.9	-29.2
Germany	-/*	-/***	1	-15.2
Italy	-/***	-/***	1.3	-8.6
United Kingdom	-/***	+/*	3.2	5.5
Canada	-/**	-/***	1.5	-8.9
Australia	-/***	-/***	2.4	-17.2
Argentina	-	+	5.4	7.4
Brazil	-/***	-/***	14.6	-17.8
China	-/***	-/***	2.9	-23.9
Korea	-/***	-/***	2.2	-10.6
India	+/*	+	0.8	0.8
Indonesia	-/***	-/***	5	-245
Mexico	-/***	-/***	6.7	-56.9
Russia	-/***	-/***	5.6	-228.5
Saudi Arabia	-/***	-/***	5.6	-229.6
South Africa	-/***	-/***	1.8	-28.5
Turkey	-/***	-/***	8.5	-200.2

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Appendix Table 1 Trends in variability of exchange rates (continued)

Rate/time interval/country	Test of standard deviations ^a	Regression of standard deviations on time		
		Sign/Significance ^b	Mean	Ten-year effect ^c
Real effective exchange rates				
Month-to-month				
United States	+/**	-/**	34	-12.7
Japan	-/**	-/**	50.1	-15.3
Euro area	-/*	-/**	30.7	-14.2
France	-	-/**	14.1	-13.8
Germany	+/**	-/**	18.8	-17.3
Italy	-/**	-/**	22.6	-27.6
United Kingdom	-	-/**	53.4	-5.8
Canada	+	-/**	35.3	-14.4
Australia	+	-/**	40.1	-14.2
Argentina	-/**	-/**	83.4	-37
Brazil	+/**	+	77	1.6
China	-/**	-/**	57.7	-66.1
Korea	+	+/**	43.2	19.8
India	+/**	+/**	17.2	35.2
Indonesia	-/**	-/**	79.6	-163.5
Mexico	-/**	-/**	62	-45.9
Russia	-/**	-/**	73	-103.6
Saudi Arabia	-/**	-/**	73.2	-103.5
South Africa	-/**	-/**	38.5	-49.9
Turkey	-/**	-/**	48.5	-40.1
12-month				
United States	-/**	-/**	3.122	-19.7
Japan	-/**	-/**	4.251	-13
Euro area	-/**	-/**	2.967	-18.6
France	-/**	-/**	1.315	-18.2
Germany	-/**	-/**	1.728	-25
Italy	-/**	-/**	1.991	-18.4
United Kingdom	+	+	4.902	2.1
Canada	-/**	-/**	2.775	-19.3
Australia	-	-/**	3.627	-12.7
Argentina	-/**	-	7.321	-25.2
Brazil	+	-/**	6.633	-5.6
China	-/**	-/**	4.449	-55.8
Korea	+	+/**	3.546	18.2
India	+/**	+/**	1.378	23.1
Indonesia	-/**	-/**	6.94	-171.9
Mexico	-/**	-/**	5.796	-48.9

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Appendix Table 1 Trends in variability of exchange rates (continued)

Rate/time interval/country	Test of standard deviations ^a	Regression of standard deviations on time		
		Sign/Significance ^b	Mean	Ten-year effect ^c
12-month (continued)				
Russia	-/***	-/***	5.752	-190.1
Saudi Arabia	-/***	-/***	5.773	-191.4
South Africa	-/***	-/***	2.766	-37
Turkey	-/***	-/***	4.177	-33.9
24-month				
United States	-	-/***	1.9	-16.1
Japan	-	-/***	3	-8.4
Euro area	-	-/***	1.9	-17.9
France	-	-/***	0.8	-13.5
Germany	-/***	-/***	1.1	-23.6
Italy	-/***	-/***	1.3	-14.2
United Kingdom	-	-	3.1	-0.6
Canada	-/***	-/***	1.7	-21.3
Australia	-/**	-/***	2.4	-29.1
Argentina	+	-	3.9	-3
Brazil	-	-/***	4.1	-13
China	-/***	-/***	3.1	-64
Korea	+/**	+/**	1.7	16.2
India	+	+	0.7	7.8
Indonesia	-/***	-/***	3.7	-180.3
Mexico	-/***	-/***	3.8	-52.7
Russia	-/***	-/***	3.8	-208.4
Saudi Arabia	-/***	-/***	3.8	-209.7
South Africa	-/***	-/***	1.8	-45.8
Turkey	-/***	-/***	2.2	-22.8

NEER= Nominal effective exchange rates; REER= real effective exchange rate.

a. Test of whether the mean of the five-year rolling standard deviations of the series is higher or lower in the second half of the period. The table shows the sign of the difference in means between the second and first half and the significance of any difference, where *, **, and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent, and 1 percent, respectively.

b. Test of whether in a regression of the five year rolling standard deviations against time the coefficient is positive or negative. The table shows the sign of the coefficient on time (+ or -) and the significance where *, **, and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent, and 1 percent, respectively.

c. The coefficient on time times 120 (12 months for ten years) divided by the mean of the sample expressed as a percentage.

Note: The following series are from 1975–2011: bilateral exchange rates, Australia (NEER/IFS), Brazil (NEER/IFS), Canada (NEER/IFS), China (NEER/IFS), France (NEER/IFS), Germany (NEER/IFS), Italy (NEER/IFS), Japan (NEER/IFS), Korea (NEER/IFS), Mexico (NEER/IFS), South Africa (NEER/IFS), United Kingdom (NEER/IFS), United States (NEER/IFS), Canada (REER/IFS), Germany (REER/IFS), Korea (REER/BIS). The following series start at a later year: United Kingdom (REER/IFS/1977), United States (REER/IFS/1977), Euro (NEER/IFS/1979), Australia (REER/IFS/1980), Brazil (REER/IFS/1980), China (REER/IFS/1980), Euro (REER/IFS/1980), France (REER/IFS/1980), Italy (REER/IFS/1980), Japan (REER/IFS/1980), Mexico (REER/IFS/1980), South Africa (REER/IFS/1980), Russia (NEER/IFS/1993), Argentina (NEER/BIS/1994), Argentina (REER/BIS/1994), India (NEER/BIS/1994), India (REER/BIS/1994), Indonesia (NEER/BIS/1994), Indonesia (REER/BIS/1994), Russia (REER/IFS/1994), Saudi Arabia (NEER/IFS/1994), Saudi Arabia (REER/IFS/1994), Turkey (NEER/BIS/1994), and Turkey (REER/BIS/1994).

Sources: Bank for International Settlements (BIS), Effective Exchange Rates, <http://www.bis.org/statistics/eer/index.htm> (accessed June 2012); International Monetary Fund (IMF), *International Financial Statistics* (IMF) CD-ROM, June 2012 (accessed June 2012).

Appendix Table 2 Current account imbalances relative to national and world GDP, 1980–1998 (percent of observations for each country)

Country	National GDP		World GDP	
	Deficits	Surpluses	Deficits	Surpluses
Australia	53	0	63	0
Austria	6	6	0	0
Belgium	5	32	0	5
Canada	5	0	53	0
Cyprus	58	0	0	0
Finland	21	21	0	0
France	0	0	5	16
Germany	0	16	37	37
Greece	26	0	0	0
Ireland	32	0	0	0
Italy	0	0	37	21
Japan	0	5	5	89
Luxembourg	0	100	0	0
Malta	100	0	0	0
Netherlands	0	53	0	53
New Zealand	63	0	0	0
Norway	16	26	0	0
Portugal	26	0	0	0
Spain	0	0	21	0
Sweden	0	5	0	0
Switzerland	0	68	0	37
United Kingdom	11	0	37	5
United States	0	0	84	0
All advanced countries	16	11	16	12

Source: International Monetary Fund (IMF), *World Economic Outlook* database, April 2012, www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx (accessed on June 9, 2012).