THE DEBATE ABOUT THE REVIVED BRETTON-WOODS REGIME: A SURVEY AND EXTENSION OF THE LITERATURE

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Abstract. This paper surveys the literature dealing with the thesis put forward by Dooley, Folkerts-Landau and Garber (DFG) that the present constellation of global exchange-rate arrangements constitutes a revived Bretton-Woods regime. DFG also argue that the revived regime will be sustainable, despite its large global imbalances. While much of the literature generated by DFG’s thesis points to specific differences between the earlier regime and revived regime that render the latter unstable, we argue that an underlying similarity between the two regimes renders the revived regime unstable. Specifically, to the extent that the present system constitutes a revived Bretton-Woods system, it is vulnerable to the same set of destabilizing forces – including asset-price bubbles and global financial crises – that marked the latter years of the earlier regime, leading to its breakdown. We extend the Markov switching model to examine the relation between global liquidity and commodity prices. We find an evidence of commodity-price bubbles in both the latter stages of the earlier Bretton-Woods regime and the revived regime.

Keywords. Bretton-Woods regime; International liquidity; Markov switching model; Price bubbles

There is also the consideration that politicians and officials are, on the basis of all previous experience, incapable of thinking about long-range problems unless either a crisis has already come upon them or a major war has prevented them from pursuing short-run victories over each other and obliged them to think about long-range problems as a relief from the boredom of enforced political inactivity. That consideration alone guarantees us another international monetary crisis in the not-too-distant future. We will have a plethora of plans, but a paucity of action.

Harry G. Johnson (1973, pp. 437–438)

1. Introduction

What kind of exchange-rate arrangement characterises the current international monetary system? Although the exchange rates of many of the major currencies – including the US dollar, the euro, the yen and the pound sterling – float against each other, the currencies of many Asian emerging-market economies and oil-exporting economies are pegged to the US dollar. This circumstance has provoked
a series of papers by Dooley, Folkerts-Landau and Garber (hereafter DFG), who argue that the present constellation of global exchange-rate arrangements constitutes a revived Bretton-Woods, or Bretton-Woods II regime. As was the situation under the Bretton-Woods I regime, which was an arrangement formally agreed among the participants during the period from the mid-1940s until the early 1970s, DFG posit that the USA serves the role of asymmetric centre of the current regime, running current account deficits, providing global (US dollar) liquidity and absorbing exports from the rest of the world. In the earlier Bretton-Woods regime, Japan and the countries of Western Europe formed a periphery with the USA at the centre of the international monetary system. The periphery maintained undervalued, pegged exchange rates and accumulated large amounts of US-dollar-denominated reserves in the pursuit of export-led growth. In the Bretton-Woods II regime, the emerging-market economies of Asia, including China, largely serve as dollar peggers and dollar accumulators. The Bretton-Woods I regime lasted for about a quarter of a century. DFG have argued that the present system, despite its large global imbalances, will also be sustainable.

Many commentators (e.g. Eichengreen, 2004, 2007; Roubini, 2006; Hunt, 2008) have accepted the broad thrust of DFG’s thesis, but point to specific differences (discussed in Section 4) between the earlier and present Bretton-Woods regimes which they believe render the current regime structurally unstable. We argue that an underlying similarity between the earlier regime, especially as it is evolved in the late 1960s and early 1970s, and the current regime renders the latter regime vulnerable to asset-price booms and financial crises. That is, we argue that to the extent that the current regime constitutes a revived Bretton-Woods regime, it is vulnerable to the same set of destabilizing forces – including asset-price bubbles and global financial crises – that led to the breakdown of the earlier regime. In this connection, we argue that actions by the Federal Reserve and the US government in the late 1960s and early 1970s to demonetise gold at the margin marked a structural change in the earlier Bretton-Woods regime, leaving the global financial system without an anchor to restrict the creation of international liquidity. Specifically, actions to remove the requirement making the dollar convertible into gold (at a fixed price) eliminated any disciple on US monetary policy. These actions set the stage for an explosion of international liquidity in the early 1970s, culminating in a commodity-price bubble and a major exchange-rate crisis and leading to the collapse of the earlier Bretton-Woods regime. The absence of a convertibility requirement on the anchor currency has carried over to the revived Bretton-Woods regime of the 2000s. That regime has also been marked by a sharp expansion of global liquidity, asset-price bubbles and a major financial crisis.

The remainder of this paper consists of six sections. Section 2 outlines key characteristics of the original Bretton-Woods regime, circa the mid-1940s until its collapse in 1973. Section 3 describes the central features of the revived Bretton-Woods thesis put forward by DFG. Section 4 provides an overview of the literature that has emerged in the reaction to the DFG thesis. Section 5 discusses the relation between global liquidity creation and asset-price booms under both Bretton-Woods regimes. Section 6 provides a formal test of regime-switching behaviour; in particular, we investigate whether the period marking the latter stages of the earlier Bretton-Woods regime and the period marking the revived regime exhibited similar bubble-like behaviour in commodity prices. Section 7 concludes.

2. Bretton-Woods I, Revisited

A monetary regime can be defined as a set of monetary arrangements and institutions that constrain the ability of the monetary authorities to influence the evolution of the macroeconomic aggregates (Bordo and Schwartz, 1997, p. 1; Eichengreen and Temin, 2010, p. 4). Regimes have both domestic and international components. The domestic component relates to the policy actions and institutional arrangements of the monetary authorities. The international component concerns the monetary relations – including exchange-rate arrangements and permittable degree of capital mobility – among economic
entities (Bordo and Schwartz, 1997, p. 2). In what follows, we focus on the international component of monetary regimes.

The regime that was agreed at Bretton Woods, New Hampshire, in July 1944 had several major objectives, including the following.5

- It sought to avoid the exchange-rate instability of the floating-rate regime of the 1920s, which was seen as having impeded external adjustment and the post-World War I reconstruction of trade and finance.6
- It aimed to prevent a repetition of the beggar-thy-neighbour policies that had characterised the latter stages of the interwar gold-exchange standard, during the existence of which countries used trade restrictions and competitive currency devaluations to increase trade surpluses (or reduce trade deficits) in attempts to reduce domestic unemployment, shifting that unemployment to other countries (Solomon, 1977, p. 1; Bordo, 1993, p. 35; Cohen, 2001, p. 2).
- It endeavoured to provide autonomy for monetary and fiscal authorities to pursue domestic policies targeted at achieving full employment.
- It sought to attain symmetric adjustment between those economies with balance-of-payments surpluses and those with balance-of-payments deficits.
- It aimed to achieve symmetric positions among currencies within the international financial regime.

To help achieve these objectives, a new institution, the International Monetary Fund (IMF), was established and charged with promoting collaboration on international monetary issues, facilitating the maintenance of full employment, maintaining stable exchange rates, providing a multilateral payments system, eliminating exchange restrictions and providing financial assistance to members with balance-of-payments deficits, thereby reducing external disequilibria (Yeager, 1976, pp. 390–391; Solomon, 1977, p. 12; Bordo, 1993, pp. 34–35).7 Each member of the fund was required to establish a par value for its currency in terms of either gold or the US dollar and to maintain the market exchange rate of its currency within 1% of the declared par value through intervention in the foreign-exchange market by buying and selling the currencies of other countries. Instead of the rigid exchange rates of the gold-exchange standard and the floating rates that characterised the mid-1920s, the earlier Bretton-Woods regime featured fixed-but-adjustable exchange rates. Parities could be changed with fund approval if a member faced a “fundamental disequilibrium” on its external accounts.8 Moreover, each member of the fund was expected to make its currency convertible for current account transactions (Solomon, 1977, p. 12; Bordo, 1993, p. 35; Kenen, 1993, p. 235; Bordo and Eichengreen, 2008). Fund members were allowed to use controls on capital account transactions. Controls on the capital account permitted some autonomy for the conduct of domestic monetary policy.9

The system that emerged was considerably different from that which had been intended (Bordo, 1993). Instead of a system of equal currencies, the US dollar was the centre of the system. The US Treasury, which entered the Bretton-Woods period holding three-fourths of the global monetary gold stock (Meltzer, 1991), pegged the price of the dollar at 35 dollars per ounce of gold, freely buying and selling gold to official bodies at that price. Others intervened to keep their currencies within 1% of parity against the dollar by buying and selling dollars (Bordo, 1993, pp. 37 and 49). In 1949, a group of 24 countries devalued their currencies against the dollar; however, exchange-rate adjustments among the major currencies became less-frequent over time, reflecting, in part, concerns that a devaluation would result in a decline in national prestige and lead to competitive devaluations by other countries (Obstfeld, 1993, p. 230).

For most of the 1950s and the 1960s, major European countries and Japan used capital controls to maintain undervalued real exchange rates against the US dollar in the pursuit of export-led growth (Meltzer, 1991, p. 87). In turn, for most of the 1950s and the 1960s, the USA ran balance-of-payments deficits, supplying dollar liquidity to the rest of the world.10 In this connection, a key characteristic
of the system was that the USA played the role of world banker; specifically, the USA engaged in maturity transformation, providing short-term liquidity services (i.e. borrowing short-term) and lending long term to the rest of the world (Despres et al., 1966).

During the late 1960s and early 1970s, several events transformed the Bretton-Woods I regime from a regime based on the convertibility of the US dollar into gold (at a fixed price) to a regime based on fiat money. In this connection, prior to 1958, less than 10% of cumulative US balance-of-payments deficits since the end of World War II had been financed through US gold sales; from 1959 until 1968 almost two-thirds of the US cumulative balance-of-payments deficits were financed from US gold reserves (Cohen, 2001, p. 6). When the Bretton-Woods regime started, the USA held about three-quarters of the world’s monetary stock (Meltzer, 1991, p. 56); by 1968, the share had declined to about one-quarter. To preserve its remaining gold stock, the following measures were taken to sever the link between the dollar and gold.

- A run on sterling and the dollar into gold brought a collapse of the gold-pool agreement in March 1968. Created in 1961 by eight major countries (Belgium, France, Federal Germany, Italy, the Netherlands, Switzerland, the UK and the USA) to stabilise the US dollar price of gold at $35 an ounce on the London market (the main trading centre for gold), the gold pool became a key pillar of the Bretton-Woods I regime.11 With the abandonment of the gold pool, the price of gold for official transactions remained at $35 per ounce but the members of the gold pool did not attempt to control the price of gold in private transactions; in order to prevent arbitrage between the private and official markets for gold, central banks agreed not to sell in the private gold market (Meltzer, 1991, p. 63).
- In March 1968, the Federal Reserve removed the 25% gold backing requirement for the issuance of Federal Reserve notes. As Bordo (1993, pp. 70–72) argued, “the key effect of these [two] arrangements was that gold was demonetised at the margin... In effect, the world switched to a de facto dollar standard.”12
- Following a sharp rise in the US balance-of-payments deficit in the first quarter of 1971 and a resulting run against the US dollar, in August 1971, President Richard Nixon ended US gold loss by announcing that the USA would no longer sell gold to foreign central banks. This action severed the remaining link between the dollar and gold.13

Why did the USA sever the links between the dollar and gold during the late 1960s and early 1970s? Beginning in the early 1960s, the Federal Reserve implemented expansionary monetary policies, which led to rising inflation, declining competitiveness and growing balance-of-payments deficits (Meltzer, 1991; Bordo, 1993); the Fed’s monetary policy “concentrated almost excessively on domestic objectives” (Meltzer, 1991, p. 79). As foreign central banks accumulated US dollar reserves, the USA came under the threat of a convertibility crisis. To address this threat, the US government and the Federal Reserve severed all links between the dollar and gold. However, those actions transformed the international monetary system from a commodity-based system to a fiat-money system. The Bretton-Woods regime was set adrift without an anchor.14 As a result, growth of global liquidity exploded in the early 1970s (Section 5, below) and, in early 1973, the old regime collapsed, ushering in a new regime of managed floating exchange rates.

3. Bretton-Woods Revived

DFG attempted to explain a major paradox within the international financial system that emerged in the early 2000s – namely, that rapidly growing capital-poor-but-labour-rich developing economies were exporting capital, on net, to the capital-rich USA. To explain this paradox, DFG postulated that sometime during the early 2000s, the international monetary regime metamorphosised into a new
Bretton-Woods regime. Two developments that occurred during the 2000s form the main backdrop to their thesis. First, beginning in the early 2000s, an enormous expansion in global liquidity took place; during the period 2003–2007, global reserves increased 127%, compared with a 33% increase during the preceding five-year period. Moreover, much of the reserve accumulation during the latter period was by Asian emerging-market economies. Second, the large accumulation of reserves was used mainly to finance growing US current-account deficits. All other factors held the same; the deficits should have become increasingly difficult to finance as the net international investment position of the USA declined. With investors becoming increasingly reluctant to invest in US-dollar-denominated financial instruments, yields and spreads on those instruments would have been expected to rise. In fact, however, nominal yields and spreads on dollar-denominated instruments fell during the period 1999 through the mid-2000s (DFG, 2006). What accounts for this circumstance? DFG argued that after the collapse of Bretton-Woods I, the structure of the international monetary system came “full circle to its essential Bretton-Woods era form,” allowing the US current-account deficits to be financed while both nominal interest rates and interest rate spreads on US financial instruments fell (DFG, 2003, p. 2).

The DFG argument runs as follows. During the late 1980s/early 1990s, with the fall of the planned economies, millions of previously unemployed workers entered the world’s market economies. This situation created an excess supply of labour that should have driven global interest rates upward. To absorb the excess labour, emerging Asian economies followed export-led growth strategies based on undervalued real exchange rates against the US dollar, similar to the strategies followed by many European countries and Japan under the Bretton-Woods I regime. DFG (2003, 2004a, 2004b, 2005) argued that the emerging Asian economies form a new periphery. Under the revived Bretton-Woods regime, the new workers were, in the aggregate, large net savers. As a result, an enormous increase in saving occurred in emerging Asian economies. Based on this circumstance – that is, a huge increase in the supply of labour that came with an enormous rise in saving – DFG posited that the global economy did not face a problem of excess saving. Instead, the global economy faced a problem of an excess supply of labour; the export-led growth strategy of the new periphery allowed the countries comprising the periphery to experience high-growth rates, providing jobs for the previously unemployed workers. As was the case under the earlier Bretton-Woods system, the USA provides the “export market of last resort” (Eichengreen, 2007, p. XI) for the new periphery, validating the export-led growth strategy of that group of countries. As was also the situation under the earlier regime, the reserve accumulation associated with the periphery’s foreign-exchange-market interventions allows the US monetary authorities to neglect external factors in setting interest rates.

In turn, rapid growth in Asia contributed to high oil prices, leading to high saving rates in oil-producing countries (mainly in the Middle East). In this connection, DFG (2005, p. 3) pointed out that during the first half of the 2000s, almost all of the increase in saving rates in the Asian and Middle-Eastern regions was matched by a fall in the saving rate of the USA. Moreover, almost all of the increase in the dollar value of saving in emerging Asia and the Middle East was placed in dollar-denominated instruments, reflecting both growth strategies aimed at maintaining undervalued currencies (against the US dollar) in those economies, the underdeveloped state of domestic financial systems in those regions, and the deep and broad US financial system.

The role of China figures prominently in the DFG analysis. That country faces the challenge of mobilizing an enormous pool of domestic savings to create an internationally competitive capital stock that can employ hundreds of millions of workers in productive activities (DFG, 2005, p. 1; Frankel, 2005, p. 1). However, China lacks a domestic financial system and the managerial skills that can channel these savings in productive investment. To deal with this situation, China relies on export-led growth to absorb millions of workers from its agricultural sector in its industrial-traded goods sector. In turn, reserve accumulation by Asian and other central banks allowed the USA to rely on domestic demand to underpin its growth and finance its current account deficits.
In DFG’s view, reserve accumulation by China and other emerging-market economies can be thought of as collateral held against the stock of foreign direct investment (FDI) in those economies. The basic idea is that while financial intermediation by the USA facilitates growth in the periphery, it also generates asymmetric risks for the centre country since the periphery is less creditworthy than the USA (DFG, 2004c, p. 3). To offset these risks, the periphery must post-collateral for actual and potential mark-to-market losses. In DFG’s view, it is the goods and services already delivered to the USA that provide a hedge against the stock of direct investment claims held by that country. As stated by DFG (2004c, p. 3), “it follows that . . . the USA must be willing to run a current account deficit in order to fulfill its role as the centre country in the system.” In this total return swap, China gets the return on dollar-denominated financial instruments (mainly US Treasury securities) and foreign investors get the return on equity. Thus, as under the Bretton-Woods I, the USA engages in maturity transformation, borrowing short term, on net, from the periphery, and lending long term, on net – mainly in the form of FDI – to the periphery. DFG have also argued that the old periphery – consisting of Western Europe, Canada, Japan and parts of Latin America – interacts with the centre with flexible exchange rates; its aggregate current account has been roughly in balance. As under the older system, the USA remains the centre country, pursuing a monetary-policy strategy that ignores the exchange rate.

What are the implications of the global financial crisis that erupted in August 2007 for the DFG thesis? DFG (2009) argued that global financial crisis was not caused by the global current-account imbalances since the crisis did not entail a sudden stop of capital flows to the USA, which would have lead to a large depreciation of the US dollar. To the contrary, they pointed out that the US dollar appreciated against most major currencies during the crisis. In their view, “the crisis was caused by ineffective supervision and regulation of financial markets in the US and other industrial countries” (DFG, 2009, p. 3). Consequently, DFG (2009) argued that the Bretton-Woods analogy continues to define the international monetary system.

In sum, DFG identified a number of similarities between the international monetary regime of the 1950s and 1960s and the regime that has operated in recent years. (i) As was the case under the Bretton-Woods I regime, the present regime is composed of a centre country and a group of economies constituting a periphery. The centre country has been the USA in both regimes. (ii) Under both regimes, there is asymmetric behaviour, with the US ignoring external factors in setting interest rates and the periphery paying close attention to external factors. (iii) Under both regimes, the periphery follows an export-led growth strategy based on undervalued currencies, pegged against the US dollar and supported by controls on capital flows. (iv) Under both regimes, the undervalued currencies give rise to a massive accumulation of foreign-exchange reserves mainly in the form of low-yielding US-dollar-denominated financial instruments. (v) Under both regimes, the USA provides the main export market for the periphery, underpinning the periphery’s export-led growth strategy. (vi) As was the situation in the earlier regime, in the current regime, the USA serves as a world banker, providing financial-intermediation services for the rest of the world. (vii) As was the case with the Bretton-Woods I regime, the present system will prove to be sustainable and metamorphic. At some point in time, “there will be . . . another wave of countries, as India is now doing, ready to graduate to the periphery” (DFG, 2004, p. 308).

4. Assessments of the DFG Thesis

The idea that the international monetary system has evolved into a revived Bretton-Woods regime has generated two (sometimes overlapping) strands of critical literature. One group of authors has accepted the general validity of the Bretton-Woods metaphor but also points to substantial differences from the earlier Bretton-Woods system. A second group of authors has challenged some of the key assumptions – especially with regard to the central role of China – underlying the revived Bretton-Woods story.
4.1 Regimes Differences

As noted, while accepting the general validity of the DFG thesis, one group of critics of that thesis posits that the Bretton-Woods metaphor is incomplete because it overlooks crucial differences between the earlier and the revived Bretton-Woods regimes. These differences, according to this group of writers, will render the revived regime unstable. The key differences cited in the literature are as follows.

1. External position of the USA. Eichengreen (2004, 2007) and Roubini (2006) pointed out that unlike the situation under Bretton-Woods II in which the USA has been running large current account deficits and incurring a rapidly-expanding net foreign debt position, the USA registered current account surpluses through most of the period 1954–1971 and was a net investor abroad. In addition, Roubini (2006, p. 306) noted that unlike the situation that emerged in the 2000s, US fiscal deficits were relatively modest under the Bretton-Woods I regime. Consequently, the above-cited authors have argued that the combination of large US fiscal and external deficits will undermine the stability of the Bretton-Woods II regime so that, unlike the earlier regime, it will be short-lived (Roubini, 2006, p. 306; Eichengreen, 2007, pp. 27–28; see also Munchau, 2007).

2. Accumulation of US dollar liabilities. Closely related to the previous argument, some authors have maintained that the magnitude of the financial flows required to finance US current-account deficits will increase at a faster rate than the willingness of the world’s central banks and global private investors to accumulate dollar reserves (Roubini and Sester, 2005; Roubini, 2006; Hunt, 2008; Sester, 2008; Bibow, 2010). In this connection, Roubini argued that the durability of the Bretton-Woods II system required a sustained and robust expansion of US domestic demand to absorb the exports of the periphery. Roubini (2006) posited that expansionary fiscal and monetary policies in the USA needed to sustain an expansion of domestic demand were underpinning a housing-market bubble in that country; that author also predicted that the bubble would burst, leading to an economic showdown and driving the exchange rate of the US dollar downward. Wolf (2008) and Bibow (2010) argued that the large US current-account deficits of the mid-2000s were unsustainable because a domestic counterpart of those deficits was a build-up of US household debt, which was being used to finance an unsustainable expansion of private consumption.

3. The international role of the US dollar. Several authors (Eichengreen, 2004, 2007, 2011, p. 51; Frankel, 2005; Munchau, 2007) stressed that during the 1950s and 1960s, there was no major alternative to challenge the US dollar as the key international currency; under the new regime, the dollar faces a strong alternative in the euro; therefore, unlike the situation that existed in the 1960s, the USA will not be able to supply unlimited dollar liquidity to the rest of the world without generating a run on the dollar. The knowledge that an excess supply of dollar liquidity could lead to a run on the dollar is said to act as a constraint on the behaviour of US policy makers, thereby differentiating the present regime from the earlier regime (Eichengreen, 2004, 2007). In addition, Eichengreen (2007, p. 6) argued that under the earlier regime, the European countries that formed the periphery constituted a cohesive bloc; thus, these countries were “ready and able to act in their collective interest.” Under the new regime, in contrast, the countries of the Asian periphery tend to act in a heterogeneous fashion (Eichengreen, 2007, pp. 24–25).

4. A key similarity. Frankel (2005) and Obstfeld and Rogoff (2005) presented a different argument from those above to support the view that the Bretton-Woods II regime would be unsustainable. In this connection, Frankel noted that although the USA ran current account surpluses in the 1960s, it nevertheless ran balance-of-payments deficits beginning in 1958. These deficits “defined the 1960s as a period of excess supply of dollars” (2005, p. 197), just as an excess supply of dollars marked the period that began in the early 2000s. It was this underlying similarity between the Bretton-Woods I and II regimes that, according to Frankel, would lead to the unravelling of the latter regime. Similarly, Obstfeld and Rogoff (2005) pointed to the parallels, in terms of the large US twin deficits, between the periods marking the early 1970s and the mid-2000s to support their argument that the revived regime would not be sustainable. We develop this argument in the sections below.
4.2 Is the Bretton-Woods Metaphor Valid?

As mentioned, a second group of critics has questioned the validity of the Bretton-Woods metaphor. The main arguments made by these critics are the following.

1. The role of FDI. DFG pointed that the Bretton-Woods II regime provides China with a large flow of FDI, contributing to the build-up of a highly efficient capital stock that would otherwise have been unattainable in that country because of inefficiencies and distortions in the domestic financial system. Goldstein and Lardy (2005a, 2005b) provided the data, showing that foreign investment in China funded less than 5% of fixed-asset investment in that country in the early-to-mid-2000s – “far too small a share to offset the misallocation of investment financed through China’s weak domestic banking system” (Goldstein and Lardy, 2005b, p. 15). Those authors concluded that in the absence of the efficient-capital-stock argument, the Bretton-Woods II thesis “is just another ill-informed employment-oriented case for exchange-rate undervaluation” (Goldstein and Lardy, 2005a, p. 11).

2. Sterilisation. To maintain undervalued currencies against the US dollar, China and other Asian emerging-market economies have engaged in sterilisation operations. DFG argued that in the case of China, this policy was feasible because the interest rate on its domestic debt was lower than the interest rate earned on US government securities. Roubini (2004), Eichengreen (2004, 2007), Rajan and Subramanian (2004) and Goldstein and Lardy (2004, 2007) have argued, however, that DFG underestimated the costs of sterilisation. Specifically, this group of authors has put forward the view that prolonged sterilisation will lead to financial repression, leading to depressed consumption and forced savings, inhibiting the efficient allocation of resources and undermining long-term potential growth. In addition, Roubini (2005) argued that the enormous growth of reserves in the Asian periphery was becoming more difficult to sterilise, especially in China where the resulting increase in the money supply was fueling a lending boom and an asset-price bubble.

3. Exchange-rate policy of the periphery. Goldstein and Lardy (2008) and Truman (2008) have argued that the exchange-rate policies of many Asian economies, including China, have been more flexible than assumed by DFG. Although the periphery has, for the most part, maintained undervalued exchange rates against the dollar, there is a marked difference between the exchange-rate regime used by the earlier periphery and the regime used by the new periphery. Specifically, unlike the adjustable peg of the earlier Bretton-Woods regime, which featured occasional – but large and discrete adjustments in nominal exchange rates – the revived regime resembles a crawling peg. That is, the revived regime combines the elements of both the adjustable peg of the Bretton-Woods I regime and a more flexible exchange-rate arrangement. Consequently, it is not entirely accurate to describe the present regime as a revived Bretton-Woods regime (Goldstein and Lardy, 2008).

Kamin (2005) agreed with DFG that the authorities in the Asian periphery had maintained competitiveness of their exports by limiting the nominal appreciations of their currencies vis-à-vis the US dollar. However, that author attributed the current account surpluses in that region mainly to special on-going effects related to the decline in investment and domestic demand in the aftermath of the Asian financial crisis of 1997–1998. Kamin (2005, p. 3) argued that once these effects wane, the surpluses will wane as well (so that over time, the revived Bretton-Woods regime would come to an end).

4.3 Asymmetric Behaviour

Hall et al. (2011) formally tested whether (1) the USA, the centre country under both Bretton-Woods regimes, ignored external factors (proxied by the change in foreign-exchange reserves divided by high-powered money) in formulating monetary policy (as proxied by short-term interest rates) in these regimes and (2) the periphery also ignored external factors in setting monetary policy under both regimes. The idea underlying this study was to test whether there was asymmetry between
the behaviour of the centre country, which, under the asymmetry hypothesis, conducts monetary policy strictly on the basis of domestic objectives, and the periphery, which takes external factors into account in setting interest rates under the asymmetry hypothesis. The quarterly sample period used by the authors for the Bretton-Woods I regime was 1959:Q2–1971:Q4; for the Bretton-Woods II regime, the sample period was 1998:Q1–2009:Q4. The countries assumed to comprise the periphery under the earlier periphery were France, Germany, Japan and the UK. For the Bretton-Woods II regime, the countries comprising the periphery were China, Hong Kong, Korea, Japan, Malaysia and Singapore. The results suggested that the USA did not take external factors into account in formulating monetary policy under both regimes, as stipulated under the asymmetry hypothesis. Under the Bretton-Woods I regime, most countries in the periphery were found to have taken external factors into account in setting interest rates. Under the revived regime, in contrast, most of the countries comprising the periphery did not take external factors into account in setting interest rates. An implication of these results is that the regime comprising the period from the late 1950s until the early 1970s differed from the regime marking the period from the late 1990s until 2007 in terms of the policy responses of the economies comprising the periphery.

5. Asset-Price Bubbles and International Liquidity

5.1 Global Liquidity and Asset Prices

There are no precise empirical definitions of either an asset-price bubble or an asset-price boom. Following Kindleberger (1993), an asset bubble can loosely be defined as a sharp rise in the price of an asset or a range of assets in a continuous process with the initial rises leading to self-fulfilling expectations of further increases. Effectively, speculators are interested mainly in generating profits from trading in assets, not the underlying risk-adjusted expected rate of return on the asset (Kindleberger, 1993, p. 243). The rise is typically followed by a sharp reversal in price, often resulting in a financial crisis. Asset-price booms are (loosely) differentiated from bubbles in that the price rise in the former tends to be milder and more extended than in the former and is less likely to lead to a crash. Commodities are an alternative (to such assets as stock market shares and bonds) asset class that has experienced rapid growth in both open positions at future exchanges and investments in commodity-indexed assets (Mongars and Marchal-Dombrat, 2006; IMF, 2008, p. 88). In what follows, the relationship between global liquidity creation and commodity-price booms is investigated.

Our thesis is that to the extent that the Bretton-Woods metaphor is valid, the Bretton-Woods II regime is marked by an underlying bias in favour of excessive global liquidity creation that can lead to asset-price bubbles as measured by changes in commodity prices. In particular, the specific combination of (1) a large (in terms of economic size) periphery that maintains pegged and undervalued exchange rates, (2) a large hegemon, the currency of which is used by the periphery as the anchor for the peg and (3) the absence of a convertibility requirement on the hegemon leads to a bias conducive to “excessive” global liquidity creation. During most of the earlier Bretton-Woods regime, Federal Reserve monetary policy operated under a convertibility restraint – that is, the requirement to sell gold to foreign central banks at a fixed price of $35 per ounce of gold. As noted above, however, in the late 1960s and early 1970s, as the constraint became binding, the US loosened the constraint. As a result, under the latter stages of the Bretton-Woods I regime, the absence of a convertibility requirement on the hegemon left it free to issue its fiat liabilities without a convertibility constraint. With the sharp increase in the US balance-of-payments deficits, the issuance of US fiat liabilities swelled, contributing to a huge increase in global liquidity as non-US central banks acquired dollar reserves in an effort to maintain their exchange-rate pegs against the dollar (Meltzer, 1991; Bordo, 1993).
## Table 1. Commodity Prices and International Reserves, 1969–2007 Annualised Percent Changes.

|                          | 1960–1969 | 1970–1974 | 1975–2002 | 2003–2007 |
|--------------------------|-----------|-----------|-----------|-----------|
| Reserves                 | 6.8       | 30.5      | 9.7       | 17.1      |
| Real GDP (world)         | N/A       | 4.8       | 3.4       | 4.1       |
| Nominal GDP (world, US dollars) | 7.5       | 13.8      | 7.1       | 9.7       |
| Commodities              | 0.9       | 33.9      | 2.6       | 21.5      |
| Commodities (excluding gold and energy) | 1.4       | 20.9      | 0.1       | 17.9      |
| Energy                   | −0.5      | 56.2      | 5.7       | 23.5      |
| Gold                     | 0.2       | 42.2      | 5.1       | 19.8      |

**Notes:** 1. Reserves; the data are from the IMF’s International Financial Statistics, line 1ds; reserves are denominated in SDRs and exclude gold holdings.
2. Nominal GDP (world) and real GDP (world) are from the World Bank online database, World databank.
3. Commodities, commodities excluding gold and energy, and energy are from the European Central Bank database. The index for commodities is based on the prices of 30 commodities. The energy component of the index consists of the prices of coal and crude oil.
4. The price of Gold is from the IMF’s International Financial Statistics. It is the spot price in US dollars on the London market.

How does global liquidity affect asset prices? There are several channels through which an increase in liquidity may be associated with a rise in asset prices. First, an increase in liquidity tends to boost the demand for assets, such as government bonds, equities, commodity-indexed securities and real estate, and thereby, reduce the rates of returns on these instruments (Baks and Kramer, 1999, p. 5). If inflation in goods-and-services prices is relatively low because of, for example, productivity growth, the prices of assets will rise in real terms (IMF, 2000, pp. 88–89). Second, according to the Austrian view of financial crisis, a rise in asset prices, whatever the cause, can lead to a bubble if monetary policy passively allows bank credit to expand, fueling the boom (Bordo and Wheelock, 2004, p. 20). The Austrian view associates rising asset prices and financial imbalances (including current account imbalances) with general inflation regardless of developments in the prices of goods and services.  

Third, in the specific case of commodities, economies, such as that of China, that maintain undervalued exchange rates to boost growth contribute to a price spike in two ways: (1) The increase in the demand for commodities as inputs into production leads, other things being the same, to higher prices of commodities. (2) In turn, the initial price increases can lead to the expectations of further increases, making commodities more attractive as an investment vehicle.

Table 1 provides the data on the annual growth rates of global reserves, global gross domestic product (GDP) (both real and nominal) and four categories of commodity prices – (1) a comprehensive index at the prices of 30 commodities compiled by the European Central Bank, (2) the price of those commodities excluding gold and energy, (3) the price of energy and (4) the price of gold. (Definitions and sources are provided in the table.) Four subperiods over the period 1960–2007 are considered: 1960–1969, 1970–1974, 1975–2002 and 2003–2007. The period 1970–1974 corresponds to the latter stages of the Bretton-Woods I regime (with an added year to capture lagged effects), a period marked by the severance of the convertibility link between the dollar and gold. The period 2003–2007 corresponds to the initial years of Bretton-Woods II regime. The starting point of the sample reflects the unavailability of data on the ECB’s commodity-price series before 1960. The ending point of the sample corresponds to the year of the eruption of the global financial crisis.

As reported in Table 1, reserves rose by an annual rate of 6.8% during 1960–1969, but, following the break of the link to gold, the increase surged to an annual rate of 30.5% in the period 1970–1974.
The growth rate of reserves declined to 9.7% during 1975–2002, but then again rose sharply, to 17.1%, during 2003–07. To formally examine whether global liquidity expanded more rapidly during the 1970–1974 and 2003–2007 periods than during other years since 1970, we constructed an H-P trend of the change in the log of global reserves. The sample period was 1970–2007 and the data were annual. The results are reported in Figure 1. If global reserves were above the mean, then reserve growth was above its trend growth. As shown in the figure, reserve growth was above trend during the period 1970–1974 and during the period 2003–2007, confirming the view that global liquidity expanded rapidly during these periods.

Why should the period 1975–2001 has been marked by lower growth rate of reserves than the periods 1970–1974 and 2003–2007? After all, the gold-convertibility requirement was absent in all three periods. As noted, the earlier Bretton-Woods regime broke down in 1973, leaving most of the major currencies floating against the dollar. Effectively, most of world trade was conducted under floating exchange rates against the dollar. However, with the emergence of the revived Bretton-Woods regime in early 2000s, an increasing share of global trade was conducted under pegged rates against the dollar. Under the Bretton-Woods II regime, as under the earlier latter stages of the Bretton-Woods regime, the trinity of (1) a large periphery that maintains pegged, undervalued exchange rates, (2) a large hegemon, the currency of which is used by the periphery as the anchor for the peg, and (3) the absence of a convertibility requirement on the currency of the hegemon was operational, leaving the global financial system susceptible to a bias in favour of excessive liquidity creation.

Commodity prices surged during both 1970–1974 and 2003–2007. As reported in Table 1, the composite price index of commodities rose by annualised averages of 33.9% in 1969–1974 and by 21.5% in the period 2002–2007; energy prices increased by annualised averages of 56.2% in the former period and by 23.5% in the recent period. By comparison, during the period 1975–2002, the price index of commodities declined by an annual average of 0.5%; the price of energy rose by an annual average of 5.7% during that period. The prices of gold and commodities excluding energy and gold followed similar patterns as those of the other commodity categories listed in Table 1.

Several common factors were associated with the booms in commodity prices (IMF, 2008, pp. 84–87). First, the initial phases of the booms coincided with accelerations in global economic growth (Radetski, 2006; IMF, 2009). Second, reflecting prior periods of low commodity prices, both booms
started with lower-than-usual spare productive capacity and inventory levels (IMF, 2008, p. 85). Third, supply constraints – including weather-related crop failures and the impact of the OPEC cartel – influenced prices in both booms (IMF, 2008, p. 88). Finally, speculative activity involving the purchase of commodities intended for resale at higher prices rather than for commercial use drove up commodity prices during both booms.\(^27\)

As mentioned above, the surges in commodity prices during both 1970–1974 and 2003–2007 originated during periods of strong global growth. Nevertheless, the historical association between commodity booms and global growth is not always robust: (1) global growth turned sharply downward towards the end of 1973, but the boom in commodity prices continued for another year; and (2) long periods of sustained global economic growth during the 1980s and 1990s were not accompanied by broad-based commodity-price booms involving fuel and food commodities (IMF, 2008, pp. 84–85).

Are there additional factors that can explain the commodity-price booms of 1970–1974 and 2003–2007? As reported above, the sharp rises in commodity prices during both periods were associated with exceptionally large increases in global liquidity. To further investigate the relationship between commodity prices and global liquidity, the following regression was estimated:

\[
\Delta \left[ \log \left( \frac{\text{CommP}}{\text{CPI}} \right) \right]_t = a_0 + a_1 \Delta \left[ \log \left( \frac{\text{Res}}{\text{CPI}} \right) \right]_t + a_2 \Delta \log IP_t \tag{1}
\]

where \((\text{CommP}/\text{CPI})_t\) is the price of commodities deflated by world consumer prices, \((\text{Res}/\text{CPI})_t\) is the global reserve deflated by consumer prices and \(IP_t\) is the industrial countries’ industrial production.\(^29\) Clearly, the above specification is over-simplified; other variables, including variables representing supply constraints and inventories, should be included, but data on such variables are not available for many commodities. The first-difference specification, however, helps deal with omitted-variable biases and produces stationarity of the variables. Separate regressions were estimated for four commodity groups: (1) an index (used above) of the prices of 30 commodities, excluding gold; (2) the same index, but also excluding coal and oil; (3) an index of the prices of oil and coal and (4) the price of gold. Regressions were estimated over the period 1970–2007. The data are annual.

The results are reported in Table 2. In all equations, there is a strong procyclical effect of industrial production on commodity prices; however, in the regressions with both the changes in energy prices and gold prices as the dependent variable, the demand variable is not significant. The coefficient on the change in reserves variable is positive and significant in all regressions with a coefficient that is generally above unity; in general, the results suggest that a 1% increase in the growth of reserves increases the growth rate of commodity prices between 1% and 2%.\(^30\)

5.2 The Houthakker Hypothesis

In the above discussion, we presented evidence showing that the periods 1970–1974 and 2003–2007 were marked by high global liquidity creation and surges in commodity prices. We also provided regressions suggesting that the rises in commodity prices in both periods were associated with the exceptionally large increases in global liquidity. If, then, both the 1970–1974 and 2003–2007 periods were the periods of excessive liquidity and rapid rises in commodity prices, an issue that arises concerns the precise link between excess global liquidity and surges in commodity prices. The above discussion focused on the relation between global liquidity and asset prices in general. Yet, especially during the period 1970–1974, the rise in international liquidity did not set-off price bubbles in other asset classes, such as housing or equities. Why should excessive global liquidity result in exceptionally high increases in commodity prices, rather than large increases in asset prices more broadly or in consumer prices?
Table 2. Regression Results: Effects of Reserves and Demand on Commodity Prices.

| Dependant variable                                      | Constant | Change in reserves | Change in industrial country industrial production | $\bar{R}^2$ | Durbin–Watson (1 D.F.) | Durbin–Watson (4 D.F.) | LM Stat (1 D.F.) | LM Stat (4 D.F.) | Bera–Jarque |
|---------------------------------------------------------|----------|--------------------|---------------------------------------------------|-----------|-----------------------|-----------------------|-----------------|-----------------|-------------|
| Change in price of commodities (excluding gold)        | −0.09    | 1.41               | 1.52                                              | 0.31      | 1.23                  | 8.5                   | 7.7             |                  | 21.8        |
|                                                          | (4.0)    | (3.1)              | (1.65)                                            |           |                       |                       |                 |                 |             |
| Change in price of non-energy and non-gold commodities  | −0.09    | 0.88               | 2.34                                              | 0.42      | 1.30                  | 5.6                   | 6.8             |                  | 2.1         |
|                                                          | (5.2)    | (2.8)              | (3.6)                                             |           |                       |                       |                 |                 |             |
| Change in price of energy                              | −0.09    | 2.0                | 0.54                                              | 0.22      | 1.61                  | 2.1                   | 2.9             |                  | 54.6        |
|                                                          | (2.8)    | (3.0)              | (0.4)                                             |           |                       |                       |                 |                 |             |
| Change in price of gold                                | −0.07    | 1.09               | 1.56                                              | 0.14      | 1.40                  | 3.5                   | 7.0             |                  | 3.6         |
|                                                          | (2.2)    | (1.8)              | (1.2)                                             |           |                       |                       |                 |                 |             |

Notes: - Figures in parentheses are absolute values of Newey–West corrected t-ratios.
- All variables are in first differences of logarithms. Prices of commodities and reserves are each deflated by the world price level as reported in the International Financial Statistics.
- The data are annual.
- The estimation period is 1970–2007.
- Definitions of variables are provided in Table 1.
- D.F. denotes degrees of freedom.
An answer to this question was provided by Houthakker (1975) in the context of the commodity-price boom of the first half of the 1970s. Houthakker’s explanation of that boom, which we call the Houthakker hypothesis, was the following.

My hypothesis is that commodity markets are inherently more sensitive to supply and demand changes than are any other markets in the economy. . . . So, it is very easy for such markets to register both large and small differences in supply and demand. What I think we are observing in these markets is the intensification of inflationary pressure that began 1972. I would attribute this increase in general to the breakdown of the Bretton Woods system and in particular to the large accumulation of international reserves between 1969 and 1972. Such an accumulation created a tremendous amount of excess purchasing power. And, while in most markets, excess demand generally takes a long time to show up in prices, it showed up quite rapidly in the sensitive commodity markets (Houthakker, 1975, p. 718).

In presenting the above hypothesis, Houthakker noted that the institutional and informational characteristics of commodity markets render them much more sensitive to changes in supply and demand conditions than the markets for other products or assets. What are the characteristics of commodity markets that render them more sensitive to supply and demand changes than other markets? Because commodities tend to be homogeneous and widely traded internationally, trading in commodities facilitates the need of efficient communication of prices. In turn, the need of efficient communication typically leads to the establishment of a centralised commodity exchange that registers the changes in supply and demand conditions at a single geographic point, with prices denominated in a single international currency (McKinnon 1979, p. 75; Magee and Rao, 1980, p. 396; Tavlas and Ozaki, 1992, p. 6). Since commodities exhibit high-price variability, commodities future markets in a major financial centre are likely to be an important component of the centre’s capital market (McKinnon, 1979, pp. 76–77). These characteristics help explain the fact that trade in commodities is often centred in the USA (New York and Chicago) and the UK (London), the fact that the prices of such products are typically denominated in US dollars, and the fact that the structure of trading is usually dominated by spot contracts or other relatively short-term contracts. As a result, there is very little to buffer the impact of changes in global liquidity, as would be the case with a largely domestic price (say, the price of autos in Germany), which could also be affected (or offset) by the nominal exchange rate, domestic economic conditions and domestic policies. Additionally, most domestic prices are fixed by institutional arrangements for a year or more, another feature that causes a certain degree of stickiness in prices. The combined effect of these factors makes world commodity markets more prone to price bubbles compared with the markets for other asset classes or products. In markets having the characteristics exhibited by commodity markets, a bubble may start more quickly than in other markets and, once started, there is relatively little that national authorities can do to deflate the bubble without inducing recession.

6. A Formal Test of Bubbles

The main counterpart of the build-up of reserves during five years ending in 2007 was the US current-account deficits of that period (Table 3). Consider the following:

- US current-account deficits averaged 5.4% of GDP during the five years ending in 2007, peaking at 6.0% in 2006.
- During that period, the cumulative total of the US current-account deficits amounted to 2.68 trillion special drawing rights (SDRs).
### Table 3. Current Account Balances and International Reserves, 2003–2007.

| Year | US current account | Change in reserves |
|------|--------------------|-------------------|
|      | Percent GDP | Amount (billions of SDRs) | World | China | Hong Kong | India | Korea | Malaysia | Singapore | Taiwan | Total of seven Asian economies |
| 2003 | −4.7 | −372.4 | 265.5 | 60.6 | −2.7 | 16.8 | 16.2 | 5.0 | 4.3 | 20.1 |
| 2004 | −5.3 | −426.2 | 377.5 | 121.0 | −0.1 | 14.9 | 23.8 | 12.9 | 7.7 | 16.7 |
| 2005 | −5.9 | −506.8 | 581.2 | 179.1 | 7.4 | 11.7 | 19.0 | 6.5 | 8.8 | 21.5 |
| 2006 | −6.0 | −546.2 | 455.4 | 135.5 | 1.6 | 21.2 | 11.6 | 5.9 | 9.3 | −1.0 |
| 2007 | −5.2 | 474.7 | 745.1 | 258.1 | 6.1 | 55.5 | 7.1 | 9.3 | 12.5 | −6.8 |
| Cumulative balance | −2,680.8 | 2,424.6 | 754.1 | 12.3 | 120.1 | 77.7 | 35.6 | 42.8 | 50.5 | 1,093.1 |

Source: IMF, *International Financial Statistics.*
The change in global reserves during the same period was 2.42 trillion SDRs, close to the cumulative US current-account deficits during the period (Table 2).

Global reserve accumulation was underpinned by the accumulation of reserves by Asian emerging-market economies. Seven economies – those of China, Hong Kong, India, Korea, Malaysia, Singapore and Taiwan – accounted for over 45% of the build-up of global reserves during the five years ending in 2007 (Table 2). The main drivers of reserve accumulation among the Asian emerging-market economies were the following: (i) an excess of domestic saving in some economies, (ii) underdeveloped financial systems so that there may have been difficulties in channelling saving to domestic investment, (iii) the desire to unilaterally to self-insure against future crises in the aftermath of the financial crises that hit several emerging-market economies in the 1990s and early 2000s, and (iv) the pursuit of expert-led growth strategies supported by undervalued exchange rates, that is, the DFG thesis.

There is neither a precise nor a unidirectional relationship among the foregoing developments. Instead, the developments were marked by interconnected feedback loops. (i) Low US interest rates contributed to higher US domestic demand, increasing the current-account deficit and contributing to higher US asset prices. (ii) Higher US asset prices led (through wealth and balance sheet effects) to an increase in US economic growth, raising the current account deficit. In turn, a widening of the US current-account deficit may have pushed-up US asset prices. (iii) The exchange-rate policy of the periphery, whereby the periphery accumulated reserves and invested in US financial instruments, raised the prices of those instruments and fed the asset-price boom. (iv) The exchange-rate policy of the periphery led to higher export-led growth in the periphery, increasing the demand for commodities as inputs. To the extent that the counterpart of the periphery’s exports represented a rise in US imports, the USA experienced a larger current account deficit than it would have otherwise. Other things being equal, higher global commodity prices also widened the US current-account deficit. (v) Higher commodity prices led to higher current account surpluses for commodity exporters. Since many oil-exporting countries maintain dollar pegs, these surpluses resulted in higher global reserves and lower US interest rates.

In what follows, we apply a formal test of a collapsing rational bubble, extending the technique of Hall et al. (1999), who proposed a switching augmented Dickey-Fuller (ADF)-type test to capture collapsing and expanding bubbles. The aim of the test is to assess whether the relationship between global liquidity and commodity prices differed fundamentally during the early 1970s and the 2000s from the other years in our sample. Specifically, we aim to determine whether the periods marking the early 1970s and the 2000s were characterised by commodity price bubbles.

The basic idea is that we use an extension of a Markov switching model to view the world as consisting of two regimes, either an expanding bubble or a stationary (or at most an untrended unit root) process. To capture these regimes, we allow the parameters of our model to switch between two discrete states. The conventional Markov switching model assumes that the probabilities of either remaining in a regime or switching are constant parameters. Here, we extend the standard model in two ways. First, we make the transition probabilities functions of global liquidity so that (assuming that we obtain the correctly-signed parameters) the probabilities change when liquidity is growing rapidly. Therefore, if we are in a bubble state and liquidity is growing at a relatively high rate, we are more likely to remain in the bubble regime. Alternatively, if we are not in a bubble state, but liquidity is rising at a relatively fast rate, we are more likely to switch into a bubble state. The second extension we make is to allow the probabilities to adjust gradually over time using a partial adjustment process.

The basic framework for this test is an extension of the standard ADF test for nonstationarity as follows:

$$\Delta y_t = \mu_0(1 - s_t) + \mu_1 s_t + (\eta_0(1 - s_t) + \eta_1 s_t)y_{t-1} + \epsilon_t$$  (2)
where \( y \) is the log of commodity prices, \( s \) is an indicator of the regime \( s_t \in \{0, 1\} \) and \( \varepsilon_t \) is an IID error process. Following Goldfeld and Quandt (1973) and Hamilton (1989), we would then set up a system under which the probability of being in regime \( s_t \) at time \( t \) is a function of the regime at \( t-1 \) and this is specified as a Markov chain on the state space with the following transition probabilities:

\[
\Pr(s_1 = 1 | s_{t-1} = 1) = p
\]

\[
\Pr(s_1 = 0 | s_{t-1} = 1) = 1 - p
\]

\[
\Pr(s_1 = 0 | s_{t-1} = 0) = q
\]

\[
\Pr(s_1 = 1 | s_{t-1} = 1) = 1 - q
\]

where \( p \) and \( q \) are constants, representing the probabilities of being in the two regimes. For example, equation (3) says that if we were in regime 1 last period, there is a probability, \( p \), of being in that regime this period. In what follows, we generalise this model, making the evolution of \( p \) and \( q \) functions of a variable, in this case the rate of growth of global liquidity. Since \( p \) and \( q \) are the probabilities, any function that generates these probabilities must bind them to be between zero and one. The following parameterisation has been used:

\[
P_1 = \omega p_{t-1} + (1 - \omega)(e^{(\alpha_0 + \alpha_1 x_t)})/(1 + e^{(\alpha_0 + \alpha_1 x_t)})
\]

\[
q_1 = \omega q_{t-1} + (1 - \omega)(e^{(\beta_0 + \beta_1 x_t)})/(1 + e^{(\beta_0 + \beta_1 x_t)})
\]

where \( \alpha_1 \) is the probability of remaining in the stable regime if liquidity growth is high; a negative coefficient on \( \alpha_1 \) indicates a high probability of switching to a bubble regime from the stable regime if liquidity growth is high. Similarly, \( \beta_1 \) is the probability of remaining in a bubble regime if liquidity growth is high; a positive coefficient indicates a high probability of remaining in the bubble regime. The effect of \( \omega \) is to smooth sudden movements in the transition probabilities, while the effect of the growth in liquidity is to change the probabilities of switching into a bubble or remaining in a bubble through time. Thus, when liquidity grows rapidly, we would expect to see a significant shift in the probabilities so that if we are not in a bubble regime, we are more likely to switch to a bubble; correspondingly, if we are in a bubble regime, we are more likely to stay there. The key parameters in terms of our hypothesis are \( \alpha_1 \) and \( \beta_1 \), the coefficients of the growth of liquidity in the two equations generating \( p \) and \( q \). If the hypothesis that high liquidity growth (1) results in a regime switch from a stable regime to a bubble regime and (2) leads to a high probability of remaining in a bubble regime is correct, we would expect that \( \alpha_1 < 0 \) and \( \beta_1 > 0 \).

We estimated the above model using maximum likelihood. The model is quite demanding of the data because we need a large number of observations for both regimes to allow us to successfully identify the regimes and the transition from one regime to the other. In Section 4 above, we used annual data on liquidity and commodity prices; however, annual data provided an insufficient number of observations to estimate the above model. We have, therefore, used a monthly all-commodity price index, compiled by UNCTAD, which is available from 1962 to mid-2010, providing us with over 500 observations. Monthly data on global liquidity do not exist; therefore, the data on liquidity have been interpolated to a monthly frequency from the annual data used in earlier parts of this paper.

The results from estimating this model are reported in Table 4. The \( \alpha_1 \) coefficient is significant, which suggests that there is a significant effect of a change in liquidity on the probability of changing a regime. It is also negative, which means that it reduces the probability of remaining in the nonbubble regime and increases the chances of moving into the bubble regime. The \( \beta_1 \) coefficient is positive, as...
Table 4. Parameter Estimates of the Switching Dickey-Fuller Model.

|        | $\mu_0$ | $\mu_1$ | $\eta_0$ | $\eta_1$ | $\alpha_0$ | $\alpha_1$ | $\beta_0$ | $\beta_1$ |
|--------|---------|---------|----------|----------|------------|------------|-----------|-----------|
| coefficient | 0.14    | -0.013  | -0.027   | -0.003   | 5.3        | -1.13      | 1.6       | 0.9       |
| $t$ ratio | 2.0     | 0.9     | 1.84     | 0.8      | 5.3        | 2.3        | 1.5       | 0.9       |

In these results, the parameter $\omega$ has been restricted to 0.3.

Figure 2. The Probability of Each Regime.

hypothesised but is not significant. Overall, the model works reasonably well, although some of the coefficients are not very significant. Regime 1 is virtually a unit root (since $\eta_1$ is close to zero) while the other regime is more stationary.

A key finding concerns the timing of the two regimes. Figure 2 shows the probability of being in one regime or the other, where 1 indicates being in the more unstable (i.e. bubble) regime and 0 indicates the stable one. From the early 1960s, the model suggests that commodity markets were predominantly in a stable regime until the early 1970s, during which time, the model suggests that the world moved into a largely unstable one, until 1975. From that point on, although there are some brief periods in which the commodity markets are unstable, the model is predominantly stable through late 2002, at which point it switches mainly to the unstable regime for the rest of the decade. These episodes then match the dating of the original and revived Bretton-Woods periods remarkably well, strongly supporting our hypothesis that there was a qualitative difference in the relationship between global liquidity and commodity prices during the periods corresponding to both the latter stages of the earlier Bretton-Woods regime and the revived Bretton-Woods regime.
7. Concluding Remarks

The breakdown of the earlier Bretton-Woods regime ushered in a regime of managed floating exchange rates among the major currencies. The managed floating regime withstood a series of shocks to the global economy – including several oil-price shocks and crises in emerging-market economies. It encompassed much of the period marked by the Great Moderation – that is, the long period of sustained US economic growth and relatively low US inflation of the 1980s and 1990s. Although the USA ran persistent current-account deficits during the period from the breakdown of the earlier Bretton-Woods regime to the emergence of the revised Bretton-Woods regime, the size of the deficits was modest compared with those that emerged in the 2000s.

In this paper, we have extended the DFG-revived Bretton-Woods metaphor. Following Frankel (2005) and Obstfeld and Rogoff (2005), we identified underlying similarities – rather than differences stressed by most critics of Bretton Woods II thesis – between the Bretton Woods I and II regimes that render the latter regime unstable. Specifically, both the latter stages of the Bretton Woods I regime and the Bretton Woods II regime have been conducive to rapid growth of global liquidity. Following Houthakker (1975), we argued that rapid expansion of global liquidity gives rise to bubbles in price-sensitive commodity markets. We interpreted sharp spikes of global liquidity creation and booms in commodity prices as recurrent features of an international monetary system marked by the trinity of (1) a large periphery that maintains pegged and undervalued exchange rates, (2) a large hegemon, the currency of which is used by the periphery as the anchor for the peg, and (3) the absence of a convertibility requirement on the currency of the hegemon. Operating in the absence of the self-adjusting features of floating exchange rates against the economies that form the periphery and the discipline imposed by a convertibility requirement, the hegemon pursues the domestic monetary policy unconstrained by its large current account deficits, which are, in part, the result of a policy imposed by the periphery. Under the revived Bretton-Woods system, the Fed has attained its inflation objective, but the interactions of its monetary policy, which essentially takes no account of external factors, and the policy of the periphery have created a situation conducive to global imbalances, excessive global liquidity creation and asset-price bubbles.

Acknowledgements

We are grateful to two referees for helpful suggestions on an earlier draft of this paper. The views expressed are those of the authors and should not be interpreted as those of their respective institutions.

Notes

1. See DFG (2003, 2004a, 2004b, 2004c, 2005, 2006, 2009). See also Dooley and Garber (2005a, 2005b).
2. DFG (2003, p. 5) included China, Hong Kong, Korea, Malaysia, Singapore and Taiwan in the group comprising the new periphery.
3. DFG (2005) stated that the current regime would last for another 10 years (from the mid-2000s). They also put forward the view that at some point in the future, the regime will metamorphosise into a Bretton-Woods III regime as a new group of countries graduate to the periphery. Caballero et al. (2008) also stressed the sustainability of the mid-2000s’ regime.
4. Commodities comprise an asset class and are also used as inputs into production. On the use of commodities as an investment vehicle, see Mongars and Marchal-Dombrat (2006)
5. The architecture of the system was decided before the Bretton-Woods conference, in negotiations that began in 1942 between UK officials and US officials (Kenen, 1993). The following account is based on Yeager (1976), Solomon (1977), Meltzer (1991), Bordo (1993), Kenen (1993), McKinnon (1993), Cohen (2001) and Eichengreen (2008; 2011, pp. 39–63).
6. Broadly stated, there were three exchange-rate regimes during the interwar period: (1) general floating from 1919 to 1925; (2) the gold exchange standard from 1926 until the early 1930s and (3) a managed float from the early 1930s until 1939 (Bordo, 1993, p. 6). The view that floating exchange rates discourage international trade and finance and impede external adjustment gained prominence as a result of Nurske’s report (1944) for the league of nations. Nurske’s view was based mainly on his interpretation of France’s experience with flexible exchange rates during the mid-1920s. Nurske’s interpretation of that episode was criticised by Friedman (1953).

7. The Fund’s Articles of Agreement came into effect at the end of 1945. The Fund’s governing body, the Board of Governors, first met in March 1946.

8. The term “fundamental equilibrium” was never defined. The Fund could not disapprove a change in parity, however, if the change was less than 10% (Bordo, 1993, p. 35).

9. A post-war transitional period was provided during which fund members could circumvent the ban on controls over current account transactions. Countries maintaining controls for more than five years after the start of fund operations – that is, beyond 1952 – were expected to consult with the fund about them annually. See Yeager (1976, p. 391) and Bordo (1993, p. 35).

10. However, from 1959 until 1971, the USA mainly ran current account surpluses. The absolute size of the surpluses began to decline in 1964. In 1968 and 1969, the USA had balance-of-payments surpluses, reflecting a tightening of Fed policy and ceilings on interest rates on deposits. See Bordo (1993).

11. See Yeager (1976, pp. 425–427) and Eichengreen (2007, Chapter 2; 2011, pp. 51–54).

12. Similarly, Yeager (1976, p. 575) argued that “with convertibility at an end, the world was on a de facto dollar standard rather than a genuine gold-exchange standard.”

13. Nixon announced that the suspension of convertibility would be temporary. At the Smithsonian Agreement of December 1971, gold was repriced at $38 per ounce but the dollar remained de facto inconvertible. Meltzer (1991, p. 80) observed that the action by the US government in August 1971 “formalised the restriction that had been in effect for more than three years by refusing to sell gold.”

14. Meltzer (1991, p. 82) noted that “discipline [on the Federal Reserve] was lacking once the de facto embargo on gold was in place after March 1968.” Meltzer also pointed out that some of the responsibility for the breakdown of the earlier Bretton-Woods regime lied with the periphery countries, which made few efforts to adjust their policies. Bordo (1993, p. 73) argued: “without gold convertibility, there was no commitment mechanism to constrain the USA to follow a stable monetary policy.

15. Reserves are net of gold. The data in the text are from the IMF’s International Financial Statistics.

16. As a percentage of GDP, the US current-account deficit rose steadily from about 3% in 1999 to 6% in 2006; it then fell to 5.3% and 4.6% in 2007 and 2008, respectively. Source, IMF World Economic Outlook (2009).

17. All other factors held the same; a rise in the supply of labour increases the marginal productivity of capital, causing real interest rates to rise.

18. The DFG thesis can lead to the view that the USA plays a special financial intermediary role for Asian economies that peg their currencies against the dollar, in part, because of the underdeveloped financial systems in those economies. While this argument may be true in the case of China, it does not apply to such economies as Hong Kong, South Korea and Singapore, which have highly-developed financial systems. We are grateful to a referee for this insight.

19. The study by Hall et al. (2011) departed from most other work comparing the two Bretton-Woods regimes in that it used formal empirical testing.

20. Bordo and Wheelock (2004, 2007) used statistical algorithms to identify stock market booms.

21. In contrast to the situation in the 2000s, the sharp rise in global liquidity during the late 1960s and early 1970s did not lead to price bubbles for assets such as equities and real estate. During the late 1960s and early 1970s, many developed countries, including the USA, maintained controls on cross-borders flows. These controls may have dampened the linkages between global liquidity and developments in domestic...
asset markets. In contrast to real estate and equities, commodity trading takes place on an international exchange (London).

22. Clearly, there is no precise definition of “excessive” liquidity creation. In what follows, “excessive liquidity creation is (loosely) taken to mean a rate of increase in global liquidity that exceeds the rate of growth of nominal world GDP.”

23. Obstfeld and Rogoff (2009, p. 38) made a similar argument to the one above: “During the closing years of the Bretton-Woods system, speculation against the overvalued dollar contributed to worldwide growth in international reserves and eventually to higher global inflation. In the 2000s up until the autumn of 2008, reserve growth similarly caused inflationary pressures outside the USA, also driving increases in commodity, housing and other asset prices”. Apart from that statement, Obstfeld and Rogoff (2009) did not develop the Bretton-Woods I and II analogy.

24. See, for example, Borio and White (2003) and Bordo and Wheelock (2007).

25. Since there is no official designation of a Bretton-Woods II regime in international law, there is no precise period that corresponds to the operation of the regime. This is no clear demarcation of either the latter stages of the earlier regime or the initial stages of the new regime.

26. The results of a time series model for structural breaks, proposed by Salkever (1976), confirms that the behaviour of reserves was different in the periods 1970–1974 and 2003–2007 than in the period 1975–2002. Letting $x_t$ equal the log of real reserves in period $t$, $D_1$ be a shift dummy equal to unity during 1970–1974, and $D_2$ equal a shift dummy equal to unity during 1970–1974, and $D_2$ equal a shift dummy equal to unity during 2003–2007, the following results were obtained:

$$x_t = 0.043 + 1.07x_{t-1} - 0.07x_{t-2} + 0.035D_1 + 0.036D_2$$

where t ratios are in parenthesis. Combining the dummies into a single dummy gives a coefficient of 0.035 with a t ratio of 3.99. Note that the log of reserves is essentially a unit-root process, so that the average (quarter-on-quarter) growth of real reserves is about 4%, while in the two subperiods, it is around 8%.

27. For a discussion of the possible role of speculation driving up commodity prices, see IMF (2008, Chapter 3).

28. $\text{CommP} / \text{CPI}$ can be viewed as the relative price of commodities.

29. More details on the data definitions and sources of data are provided in Table 1.

30. We ran another set of regressions using world real GDP (from the World Bank databank) as the demand variable. The results are similar to those reported above. The results are available from the authors.

31. Houthakker did not elaborate on what he meant by such characteristics. We provide such an elaboration in what follows. In addition, Houthakker did not draw a connection between the latter stages of the earlier Bretton-Woods system and global liquidity, a connection that forms a central theme of this paper.

32. In contrast to the 1970–1974 period, the 2003–2007 period was marked, in addition to commodity price bubbles, by bubbles in housing markets in a number of countries, including the USA, the UK, Spain and Ireland. A key reason for the absence of bubbles in housing markets in the earlier period reflects the imposition of capital controls and restrictions on domestic financial markets in the earlier period, which helped segment domestic markets from the effects of high global liquidity.

33. During the preceding 30 years US current-account deficits averaged 1.5% of GDP.

34. DFG (2004a) included Japan, which they identify as an economy that manages its exchange rate against the dollar, as a member of the Bretton-Woods II periphery. Inclusion of the Japanese economy in that group increases share to 60%.

35. Obstfeld and Rogoff (2008, p. 150) argued that although an increase in global saving contributed to low global interest rates in the 2000s, a large rise in saving did not take place until 2004.

36. Aizenmann and Jinjarak (2009) estimated that an increase in the US current-account deficit by 1% of GDP is associated with a 10% rise in real estate prices.

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37. Estimates by Krishnamurthy and Vissing-Jorgensen (2008) and Warnock and Warnock (2009) suggest that official demand for US sovereign debt decreased long-term rates on that debt by more than 50 basis points.

38. The qualifier “managed” is added to account for the fact that there were significant departures from floating. For example, prior to the adoption of the euro in 1999, the currencies of many European economies operated under a target zone arrangement.

39. As noted above, since there is no official designation of the Bretton-Woods II regime, there is no precise period that corresponds to the operation of that regime. During the period 1973–2002, US current-account deficits averaged 1.4% of GDP, compared with 5.4% in the five years ending in 2007.

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*Journal of Economic Surveys* (2013) Vol. 27, No. 2, pp. 340–363
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