ANGEL GARCÍA BANCHS AND LUIS MATA MOLLEJAS

International monetary asymmetries and the central bank

Abstract: *In this paper, we argue that the current international monetary system is fully asymmetric, as it divides the world among reserve issuing economies (RIEs) and reserve earning economies (REEs). Thus, monetary theory, we argue, should take into account whether or not the central bank issues an international reserve currency, as that would largely determine its balance sheet structure, interest rate–targeting procedure, and the elasticity of monetary policy and of the exchange rate regime. The reason is plain: as opposed to RIEs, the central bank in REEs must target a minimum stock of foreign currency assets, as the local currency does not circulate abroad.*

Key words: *central banks, international monetary asymmetries.*

The fact that all national states are able to circulate domestically their own currencies due to their capacity to collect taxes (Keynes, 1930; Knapp, 1905; Lerner, 1943; Wray, 2004) contrasts with the fact that not all of them are in the position to do so internationally. Based on this reasoning, and our findings regarding the strikingly different balance sheet structures of 15 central banks from North America, South America, Europe, and Asia, we argue that the current international monetary system is fully asymmetric, as it divides the world among a few reserve issuing economies (RIEs) and a larger group of reserve earning economies (REEs).

Further, we explain why the presence of such asymmetries is so relevant to monetary theory and policy, how different monetary practices can be observed, and finally, which economies tend to follow similar patterns

Angel García Banchs is a visiting scholar at the NSSR, New School University, New York City, and a professor at the Central University of Venezuela (UCV). Luis Mata Mollejas is a professor and coordinator of the Ph.D. Program in Economics at UCV, and a member of the Venezuelan National Academy of Economics. The authors thank Edward J. Nell, Ernesto Screpanti, and an anonymous referee for invaluable comments on earlier versions of this paper, as well as the University of Siena and the Central University of Venezuela for providing the financial support. The usual disclaimer applies.

© 2010 M.E. Sharpe, Inc.
0160–3477/2010 $9.50 + 0.00.
DOI 10.2753/PKE0160-3477320309

(or stereotypes), which we define in order to classify the behavior of central banks.

Recent developments in Post Keynesian theory

In view of the increasing interest in the new consensus approach to macroeconomics (see Fontana, 2007; Rochon and Setterfield, 2007; Weber, 2006; and Woodford, 2003, for a summary of the new consensus framework), the focus of the Post Keynesian debate has recently shifted toward proposing an interest rate operating procedure alternative to the Taylor rule (for a detailed criticism of the new consensus, see Arestis and Sawyer, 2008; Davidson, 2006; Lavoie, 2006; Monvoisin and Rochon, 2006; Rochon and Setterfield, 2007; Seccareccia, 1998; and Setterfield, 2004; for a summary of the Post Keynesian endogenous money approach, see Arestis, 1992; Davidson, 1972; Fontana, 2006; Fullwiler, 2006; Kaldor, 1982; Lavoie, 1992; Minsky, 1957; Moore, 1988; Nell, 1998; Rochon, 2001; Screpanti, 1997; Wray, 2004; among many others).[1]

In particular, the recent theoretical discussion among Post Keynesians is mainly concerned with how effective monetary policy is to stabilize the economy, the effects of monetary policy upon income distribution, and most important, how and at what level must the rate of interest be set.

For instance, Fontana and Palacio-Vera (2006), Moore (1988), and Palley (2006) argue in favor of an activist approach to interest rate targeting as a tool to stabilize the economy, whereas Gnos and Rochon (2007), Lavoie and Seccareccia (1999), Mosler and Forstater (2004), Smithin (2004), and Wray (2007) argue in favor of adopting long-run interest rate parking-it rules and abandoning short-run interest rate reaction functions (Rochon and Setterfield, 2007). Based on Smithin's (1994) rejection of the notion of the natural rate (e.g., Wicksell's natural rate), this second approach proposes fiscal policies and incomes policies to stabilize aggregate demand and inflation, instead of interest rate reaction functions which not only rely on causing unemployment to stabilize the economy but also perturb income distribution among net creditors and debtors.

Three suggestions have so far been put forward: (1) the Smithin rule, which implies setting the real rate of interest equal to zero; (2) the Kansas City rule advocated by Mosler and Forstater (2004) and Wray (2007), which entails setting instead the nominal rate of interest equal to zero—resulting, most likely, in a negative real rate; and (3) Pasinetti's fair rate

[1] See also the old contributions of Keynes (1930; 1936), Robertson (1948), and Wicksell (1934),

rule, defended by Gnos and Rochon (2007) and Lavoie and Seccareccia (1999), which implies setting the real rate equal to the rate of growth of labor productivity.

Note, however, that the above Post Keynesian analysis is not concerned with the complexities that characterize the open economy. Here, we take up the challenge of investigating such complexities and argue that the design of monetary policy largely depends on whether or not the central bank issues an international reserve currency. The next section explains why, and introduces the notion of REEs and RIEs.

Monetary asymmetries and the endogenous theory of money

New concepts for a new environment

First, we define a *reserve earning economy* as one whose transactions with the rest of the world are all settled through the use of a foreign currency, for the local currency (in case of existing one) is nowhere considered an international means of settlement (e.g., all economies except for the United States, the European Union, Japan, and the United Kingdom). In this case, the authorities exhibit a high degree of concern with the accumulation of foreign currency reserves (quantity effect) and the determination of the exchange rate (price effect).

These economies, characterized by a large foreign currency liquidity preference, must accumulate foreign reserves not only to guarantee their means of international payment but also to influence the exchange rate. This is not only because they must face the uncertainty caused by the unavailability of reliable international overdraft credit facilities but also because the price mechanism may not deliver the best possible outcome.

For instance, under a flexible exchange rate regime, it may lead to an appreciating currency and deflation in the presence of large foreign currency inflows and conditions of exports dependence (e.g., if the Marshall–Lerner condition holds); and, the opposite, it may lead to a depreciating currency and inflation in the presence of large foreign currency outflows and conditions of imports dependence (e.g., if the Marshall–Lerner condition does not hold). There are many other reasons such as currency mismatches and balance sheet problems. But what matters is that, in general, REEs are concerned with the accumulation of foreign currency reserves and the determination of the exchange rate.

Moreover, in the case in which foreign reserves are large and the economy faces net foreign currency inflows, the costs of accumulating

foreign reserves in terms of interest payments, sterilization, and reserve allocation are usually inferior to its benefits in terms of welfare and economic growth. This is because, in such a case, the authorities can always sterilize their interventions by increasing their reserve requirement rates and government deposits at the central bank, while reducing the need for new issues of treasury and central bank bills. In other words, REEs are able to resist currency appreciations indefinitely, but they are only in the position to resist depreciations inasmuch as they hold sufficient foreign currency assets, and some minimum stock flow norm of foreign reserve holdings has not yet been reached (e.g., imports/foreign reserves).

Second, we define a *first-order reserve issuing economy* (RIE-1°) as that unique economy whose transactions with the rest of the world are all settled through the use of its own currency, referred to hereafter as *the dominant reserve currency* (e.g., the United States). Here, the degree of concern with the accumulation of foreign currency reserves is null and, hence, no balance-of-payments restrictions in the monetary sense apply.

Third, we define a *second-order reserve issuing economy* (RIE-2°) as one whose transactions within a region of influence are all settled through the use of the domestic currency, but whose transactions elsewhere are usually settled through the use of *the dominant reserve currency.* Given their small volume of extra-regional trade, RIEs-2° need not hold large stocks of foreign currency assets and, hence, behave quite similar to (and usually get confused with) the RIE-1°. The unique example nowadays is the European Union.

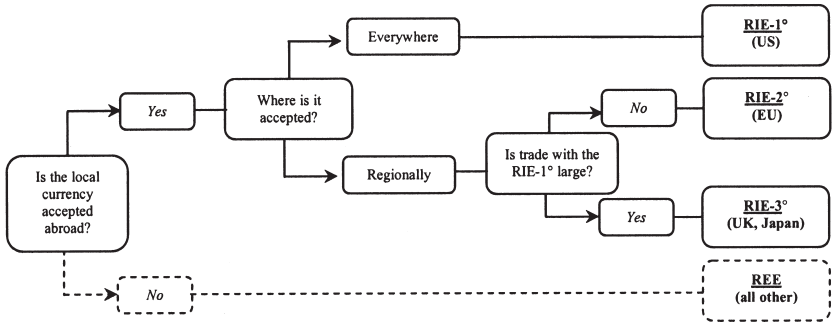
Finally, we define a *third-order reserve issuing economy* (RIE-3°) as that which, apart from being able to circulate its currency regionally, is also distinguished by its large volume of trade with the *first-order reserve issuing economy* (see Figure 1). There are two examples nowadays—Japan and the United Kingdom. Notice, the need for a larger stock of foreign currency assets in RIEs-3° implies they must hold larger reserves than RIEs-2°.

In short, from the highest to the lowest degree of concern for foreign currency accumulation, REEs rank first, followed by RIEs-3° and then by RIEs-2°. For simplicity, however, we refer only to RIEs and REEs.

Monetary asymmetries and the endogenous view

To a lesser or greater degree, the stability of the exchange rate, foreign capital flows, and net payments to the rest of the world represent a concern for both reserve issuing and reserve earning central banks. Thus,

Figure 1 Definitions: reserve earning economies and first, second, and third-order reserve issuing economies



interest rate–targeting policies in both economies must take into account the impact on these variables.

Nevertheless, international monetary asymmetries imply that (1) reserve earning central banks must accumulate a minimum stock of foreign currency reserves (asset side), and sterilize or compensate (endogenously) such accumulation through an increase in central bank securities, bank reserve requirements, and government deposits held at the central bank (liability side); (2) they must target interest rates to reach the minimum level of reserves, influencing indirectly capital flows and the expansion of domestic credit; and (3) once the minimum has been reached, they must decide whether in the future they want to limit the influence of interest rate changes upon the exchange rate by compensating for changes in foreign currency flows with fluctuations in foreign reserves.

Put differently, the other side of the coin of having to accumulate foreign reserves is counting on a policy instrument to influence directly the exchange rate. This is not the case of RIEs, where exchange rates can only be influenced indirectly through changes in interest rates. In REEs, as long as foreign reserves can vary sufficiently, an interest rate reduction (increase) leading to foreign currency outflows (inflows) may be compensated with a decrease (increase) in foreign reserves, limiting the impact on the exchange rate. This, along with the bias against appreciations, and the relatively small sterilization costs, explains why REEs are often willing to accumulate large stocks of foreign reserves.

The reason the authorities of RIEs cannot influence foreign exchange rates directly (but only indirectly through interest rate changes) is that they are not required to accumulate foreign currency assets in the first

place, as the external imbalances of those economies are financed through the expansion of domestic credit, and funded through counterpart local currency liabilities such as deposits, certificates of deposit, bills, securities, and the like.[2]

In other words, while the causality between the current, financial, and monetary accounts of the balance of payments is tridirectional in REEs, it is essentially unidirectional in RIEs, or more precisely in the RIE-1° (e.g., the United States), where the current account causes the financial account and not the opposite, as the local currency is an international reserve.

International monetary asymmetries thus imply two effects. The first is a *quantity effect* which arises from the fact that REEs must target a minimum stock of foreign reserves, namely because their own currencies do not circulate abroad. This effect, which is not market determined but policy determined, establishes a link between the short-term rate and the minimum target level of foreign reserves.

Particularly, the authorities may increase the interest rate to indirectly limit the expansion of domestic credit and induce capital inflows when the level of reserves is below the minimum target; and, the opposite, they may reduce it after such a minimum has been reached.

The second is the *price effect,* and derives from the fact that in REEs, central banks must deal with two forms of monetary reserves—local currency-base money reserves and foreign currency reserves. The price of the former is the interest rate and that of the latter is the exchange rate.

This effect implies that in REEs, the link between the exchange rate and the short-term interest rate depends largely on the availability of foreign reserves—for example, interest rate reductions (increases) impact the exchange rate when foreign reserves cannot/do not decrease (increase) as much as foreign currency outflows (inflows). That is, the link between the interest rate and the foreign exchange rate in REEs weakens as the stock of foreign reserves becomes larger (or is allowed to fluctuate more). The reason is that the larger the stock (or actually, the more it can fluctuate), the more the impact of interest rates on foreign currency flows can be compensated with fluctuations in the stock. This link, rather than demand determined, is policy determined because it is

[2] Instead, in REEs, net outflows of foreign currency, expectations of a fall in the stock of foreign reserves or an expected depreciation tend to lead to a loss of flexibility characterized by the setting of an interest rate above the level the central bank would set under different external conditions. This occurs when the stability of the foreign exchange rate and the level of foreign reserves are a concern for the central bank, as is the case of REEs.

the central bank not the market that is responsible for connecting and disconnecting the two prices.

The point is that at the time of fixing the short-term rate, the authorities of REEs must take into account the size of their stock of foreign reserves, as well as the expected fluctuation in foreign currency flows. Thus, the interest rate–exchange rate connection in REEs differs from that observed in RIEs in that the latter do not count on foreign reserves to limit the impact of capital flows on the exchange rate.

The international monetary system is asymmetric because RIEs do not need to preserve a minimum stock of foreign currency assets, implying their central banks can accommodate the demand for local currency reserves in the most elastic possible way. That is, reserve issuing central banks do not need to adjust interest rates to accumulate reserves, although they certainly need to take into account the impact on capital flows and exchange rate fluctuations when setting the short-term rate.

The latter is because the base money and private bank money of RIEs circulate abroad, implying the exchange rates between reserve currencies and the currencies of REEs are largely determined by the accumulation of foreign reserves on the part of the latter. This explains why often interest changes may not be sufficient to influence the foreign exchange rates between a reserve currency and the currencies of REEs and, hence, why RIEs must resort to political pressure to increase their influence upon them (e.g., the yuan/dollar exchange rate). Finally, notice that this is not the case of the exchange rates between reserve currencies (e.g., the dollar/euro rate), which instead are mostly endogenously determined by markets.

The above postulates regarding both RIEs and REEs are completely consistent with the endogenous theory of money, as in both economies, it is the central bank, not the market, that determines the short-term rate. Modern monetary theory must take into account, though, the role of *international monetary asymmetries,* as whether or not a country issues an international reserve currency affects the balance structure of central banks, the flexibility of the exchange rate regime, and the management of the short-term rate.

Our definition of *international monetary asymmetries* is complementary to *Thirlwall's law* (Thirlwall, 1979). Both notions are concerned with economic growth sustainability, although in that respect the latter is much more precise. Thirlwall's law tells us that international payments imbalances can have relevant implications for economic growth, but its focus is on the goods market (i.e., the real sphere), whereas ours is on the money market (i.e., the financial sphere). Hence, whether or not money is a real commodity in fixed supply is immaterial to Thirlwall's law.

But for our argument, the presence of international reserve currencies in elastic supply is fundamental. In this respect, our approach can explain certain phenomena that cannot be explained by Thirlwall's law, for instance, why only REEs must be concerned with the accumulation of foreign currency assets, and, hence, why monetary and fiscal policies depend on whether or not the economy issues an international reserve currency. In short, our notion explains why Thirlwall's law is mainly applicable to the case of REEs, as RIEs can always expand their supply of local currency in the face of payments imbalances with the rest of the world; put differently, why RIEs may experience credit crises but not currency crises, in the sense that there is always (at least) one exchange rate at which their currencies are accepted abroad. These differences are reflected in Figure 2.

Central bank balance sheets

Here, we argue that the structure of assets and liabilities of a central bank conveys lots of information. It reflects the asymmetries of the international monetary system, the structure and institutional framework of the domestic economy, and the exchange rate regime in place. But it also reflects the monetary policy decisions of central banks, the degree of injection and extraction of exogenous monetary components, and so forth.

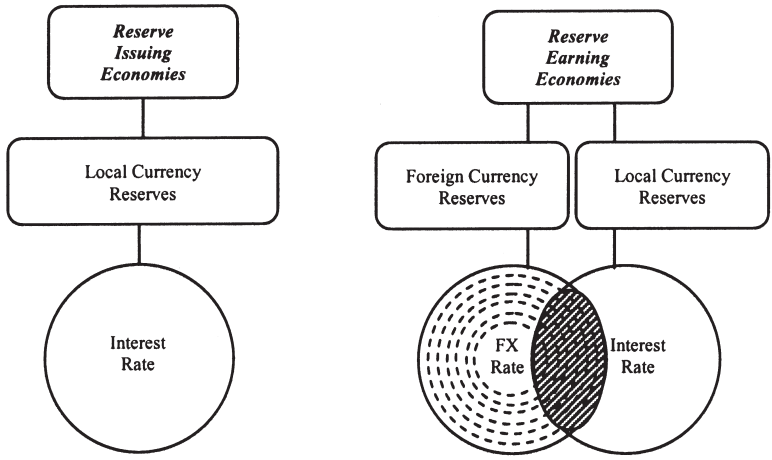
Central bank assets and liabilities

Table 1 proposes a simple classification of a central bank balance sheet. On one hand, an increase (decrease) in most asset components is recorded as an operation of injection (extraction) of *Base Money.*[3] On the other hand, the liability side reflects multiple operations; above all, it records variations in *Cash* and *Bank Reserves* as part of *Base Money,* although it also registers all operations that drain liquidity—that is, all extracting liability components, as well as all operations that affect the equity *Capital* of the central bank.

The extracting liability components are own *Debt Securities* issued by the central bank, *Government Deposits,* and (exogenous) adjustments of the rate of reserve requirements. The use of *Debt Securities* carries on a loss of seignorage, for it implies that the central bank must pay an interest

[3] For instance, the direct effect of an increase in the *Gross International Reserves* component is an equal increase in *Base Money,* which results from an increase either in the *Cash* subcomponent or the *Bank Reserves* subcomponent. The same occurs as a result of an increase in *Domestic Credit*—either through *Credit to the Government* or through *Credit to the Financial Sector.*

Figure 2 International monetary asymmetries and the link between the foreign exchange rate and the short-term interest rate



Notes: The shaded area represents the intersection of two spheres within the money market of REEs. It exists due to the coexistence of two forms of monetary reserves, although the size of the intersection depends on the structure of the domestic economy and, hence, on the intensity of the price effect (e.g., the trade-to-GDP ratio, the presence of currency mismatches, etc.). The smaller the central bank stock of foreign currency assets, the more flexible the exchange rate regime becomes, and, hence, the smaller is the shaded area. On the other hand, the larger is the shaded area, the larger the degree of control over the exchange rate, and the weaker is the link between the interest rate and the exchange rate. Foreign reserves thus act as a buffer stock compensating for the impact of interest rate changes upon foreign currency flows and, hence, upon the exchange rate.

rate in order to drain liquidity from the system; an exogenous increase in the rate of reserve requirements, however, implies that the central bank is using its coercive power in order to force a liquidity drain. Finally, *Government Deposits* within the central bank are also a mechanism to drain liquidity from commercial banks through tax collections and the placement of Treasury securities.

Table 2 summarizes the set of control variables for the central bank. First, under a flexible exchange rate regime, the central bank's stock of *Gross International Reserves* (GIR) is under the control of the monetary authority, precisely because it is relatively smaller than in the case of a fixed exchange rate regime, implying in the former case that the central bank need not accommodate the demand for foreign currency assets. Regardless of the foreign exchange rate regime, *International Reserve*

Table 1
Central banks' balance sheet

Assets, liabilities, and capital
Assets
Gross international reserves (GIR)
Gold and gold certificates
Foreign currency assets
Other international reserve assets
Domestic credit (DC = CG + CFS)
Credit to government (CG)
Credit to financial systems (CFS)
IMF (and other resources from other funds)
Subtotal other assets
Other assets in foreign currency not GIR
Other assets
Total assets
Liabilities
International reserve liabilities (IRL)
IMF and resources from other funds or bank reserves in foreign currency
Base money (BM = CASH + BRES)
Notes and coins in circulation (CASH)
Deposits from banking institutions (BRES)
Debt securities (DS)
Deposits public administration (GD)
Other liabilities
Total liabilities
Capital
Capital (K)

Liabilities (IRL) can only be controlled in the medium to long run, and *Domestic Credit* (DC) and *Base Money* (BM) are endogenously determined.

Further, the stock of *Debt Securities* (DS) is always under the control of the central bank, as the latter can always inject reserves through the asset side by purchasing T-Securities from banks and extract them back through the liability side, paying an interest rate above the one paid by the Treasury. Finally, the equity *Capital* (K) of the central bank works as a buffer stock, absorbing losses and profits from monetary policy, so that strong declines in *Capital* may be seen as a prelude to currency depreciation aimed at restoring flexibility.

In formal terms, after neglecting the conglomerate of *Other Assets* and *Other Liabilities,* assuming they cancel each other out, the balance of assets and liabilities of a central bank leads to the following identity equation:

Table 2
Central bank control variables

	Flexible exchange rate regime		Fixed exchange rate regime	
Variable	Very short run	Short, medium, and long run	Very short run	Short, medium, and long run
GIR	Exogenous	Exogenous	Endogenous	Endogenous
DC	Exogenous	Endogenous	Exogenous	Endogenous
IRL	Endogenous	Exogenous	Endogenous	Exogenous
BM	Exogenous	Endogenous	Exogenous	Endogenous
DS	Exogenous	Exogenous	Exogenous	Exogenous
GD	Endogenous	Endogenous	Endogenous	Endogenous
K	Endogenous	Endogenous	Endogenous	Endogenous

$$\mathrm{GIR} + \mathrm{DC} = \mathrm{IRL} + \mathrm{BM} + \mathrm{DS} + \mathrm{GD} + \mathrm{K}. \tag{1}$$

From Equation (1), the central bank's *Base Money* can then be expressed as[4]

$$\mathrm{BM} = \left[\left(\mathrm{GIR} - \mathrm{IRL}\right) + \left(\mathrm{DC} - \mathrm{DS} - \mathrm{GD}\right)\right] - \mathrm{K}. \tag{1'}$$

To avoid losses of seignorage (BM = DS), which may lead to pressures on the interest rate, the stock of *Base Money* should be larger than the stock of own *Debt Securities* issued by the central bank—recall that interest bearing securities imply a loss of seignorage.

Thus, the condition BM > DS implies

$$\mathrm{BM} > \left(\mathrm{GIR} - \mathrm{IRL}\right) + \left(\mathrm{DC} - \mathrm{BM} - \mathrm{GD}\right) - \mathrm{K}, \tag{2}$$

or equivalently, after some manipulation,

$$\mathrm{BM} > \frac{1}{2} * \left[\left(\mathrm{GIR} - \mathrm{IRL}\right) + \left(\mathrm{DC} - \mathrm{GD}\right) - \mathrm{K}\right]. \tag{2'}$$

Then, by combining Equations (1′) and (2′), and solving for *DS*, the following expression is obtained:

$$\mathrm{DS} < \frac{1}{2} * \left[\left(\mathrm{GIR} - \mathrm{IRL}\right) + \left(\mathrm{DC} - \mathrm{GD}\right) - \mathrm{K}\right]. \tag{3}$$

[4] Where [(GIR – IRL) + (DC – DS – GD)] refers to the central banks' *Net Stock of Credit* and (GIR – IRL) = NIR refers to *Net International Reserves.*

Equation (3) implies that a minimum degree of flexibility for monetary policy under balancing concerns regarding the stabilization of the interest rate, the exchange rate, and the level of foreign currency reserves requires the following condition to hold:

$$\mathrm{DS} \leq \frac{1}{2} * \left[\left(\mathrm{GIR} - \mathrm{IRL} \right) + \left(\mathrm{DC} - \mathrm{GD} \right) - \mathrm{K} \right] \leq \mathrm{BM}. \qquad (4)$$

Central bank stereotypes

Table 3 summarizes all possible theoretical stereotypes of central banks in accordance with their balance sheet structure—that is, 1, 2, ..., 6. Case 1 is that of RIEs and the rest are those of REEs. Clearly, the concerns faced by the central bank at the time of setting the short-term rate increase as one goes down the list. The rationale is that as one goes from case 1 to 2, the *quantity effect* becomes significant, as the authorities must target a minimum stock of foreign assets, a complexity not present in case (1). But, additionally, as one goes from case 2 to 6, it is the *price effect* that gains increasing significance. For, depending on the structure of the domestic economy, the central bank will have to pay closer and closer attention to exchange rate fluctuations.[5]

Fundamental findings

Central bank balance sheet data were collected for 48 months of observations during the January 2003–December 2006 period. These data were supplemented with overnight interbank interest rate and foreign exchange rate data, with an average of around 1,045 daily observations during the same period; additional monthly data include inflation rates, international reserves, fiscal data, and so forth (see Appendix Table A1).

The following cases were studied: Argentina, Brazil, Mexico, Peru, the United States, and Venezuela in Latin America and North America; the European Union, the United Kingdom, and Norway in Europe; and China, Japan, Kuwait, India, Saudi Arabia, and the United Arab Emirates in Asia. The empirical contrast is based on identity equations, and

[5] Moreover, under inflexible exchange rate regimes—cases 4 to 6—the degree of concern of the central bank diminishes with foreign currency inflows and increases with foreign currency outflows. This is because under the former situation, the central bank can always print additional *Base Money* pari passu with foreign currency inflows while still being able to control fully the short-term rate. But, in the latter situation, as the foreign currency cannot be printed domestically, the central bank would sooner or later lose control over the short-term rate if it is unwilling to forgo the stability of the exchange rate.

Table 3
Central bank stereotypes

		Diagnosis		Symptoms		
		Concern for foreign currency accumulation	Concern for exchange rate fluctuations			
Case	Is the local currency an international reserve currency?	Quantity effect	Price effect	Monetary policy and foreign exchange rate regime in place	Largest component of asset side	Largest component of liability side
1	Yes	Null	Weak	Fully flexible	Domestic credit	Cash
2	No	Adverse and slightly significant	Weak	Flexible	Domestic credit	Total base money
3	No	Adverse and significant	Intermediate	Flexible/fixed	Domestic credit	Debt securities and government deposits
4	No	Adverse and significant	Intermediate	Flexible/fixed	Gross international reserves	Total base money
5	No	Adverse and extremely significant	Strong	Fixed	Gross international reserves	Debt securities and government deposits
6	No	Adverse and extremely significant	Strong	“Fully” fixed	Gross international reserves	Cash

not on behavioral equations. Thus, the econometric analysis has been discarded, as that would only lead to the presence of R^2 values equal to the unit and the absence of statistical errors.

Rather than providing a detailed study of every individual case—a task out of the scope of this paper—this section presents the general empirical findings. First, the stability of overnight interbank interest rates in the sample (see Appendix Figures A1–A4) suggests that, during the period of study, most central banks tended to accommodate day after day the demand for local currency reserves (i.e., followed interest targeting procedures).[6] Yet the level and volatility of overnight interest rates was lower in RIEs and countries with more stable fixed exchange regimes (e.g., China, United Arab Emirates, and Saudi Arabia).

Regarding balance sheet structures (see Appendix Tables A2 and A3), all RIEs behaved as expected in line with stereotype 1. During the whole period from January 2003 to December 2006, *Domestic Credit* was the largest asset component, with an average of 93 percent, 49 percent, 69 percent, and 94 percent in the case of the United States, the European Union, the United Kingdom, and Japan, respectively. On the liability side, *Cash* was the largest component, reaching up to 92 percent, 55 percent, 49 percent, and 55 percent, respectively.

Notice, however, that while *Bank Reserves* are small in the case of the United States (3 percent), they are relatively large in the case of the European Union (17 percent), the United Kingdom (27 percent), and Japan (21 percent). Moreover, in the latter case, the amount of *Debt Securities* reached up to 17 percent, while in the case of the United States, the European Union, and the United Kingdom the amounts were insignificant.

Yet the overall results confirm that reserve-issuing central banks, such as the FED and the European Central Bank (ECB) and to a lesser extent the Bank of England and the Bank of Japan, need not, in general, be concerned with the accumulation of foreign currency assets. Indeed, foreign currency assets, which form part of all *Gross International Reserve* assets, represented 0 percent, 16 percent, 15 percent, and 4 percent, respectively.[7]

[6] The exception to the rule was the case of Venezuela, which exhibited (for every single year) the greatest interest rate volatility among all economies in the whole sample. Indeed, the country's average daily interest rate volatility during 2003 was around 12 percent, suggesting that the Central Bank of Venezuela is the only central bank in the whole sample that pretends to follow a policy based on monetary targeting.

[7] One should bear in mind, though, that in Japan, the United Kingdom, and the United States (and also at the national level within the European Union), treasury de-

Regarding REEs, the findings (as expected) are divided among those central banks that behaved as stereotype 4 and those that behaved as stereotype 5. The first group was composed of Argentina, China, India, Kuwait, Mexico, and Peru, and the second by almost all of the oil-exporting countries in the sample: Norway, United Arab Emirates, Saudi Arabia, and Venezuela. The largest asset component for both groups was, again as expected, the *Gross International Reserves* component, reaching, respectively, 61 percent, 56 percent, 86 percent, 98 percent, 74 percent, 89 percent, 95 percent, 92 percent, 98 percent, and 78 percent in the case of Argentina, China, India, Kuwait, Mexico, Peru, Norway, Saudi Arabia, United Arab Emirates, and Venezuela.[8]

Yet, in accordance with Table 3, the liability structure varied across groups. For instance, while *Base Money* was the largest liability component for the first group, the sum of *Government Deposits* and *Debt Securities* was the largest for the second. Indeed, for the first group, total *Base Money* reached up to 39 percent, 66 percent, 71 percent, 54 percent, 52 percent, and 70 percent in the case of Argentina, China, India, Kuwait, Mexico, and Peru, respectively, while for the second group, the sum of *Government Deposits* and *Debt Securities* represented 89 percent, 32 percent, 42 percent, and 42 percent in the case of Norway, Saudi Arabia, United Arab Emirates, and Venezuela, respectively.[9]

partments build a separate and usually larger stock of foreign currency assets than that built by their respective central banks (including the ECB). Indeed, the 2006 average of total U.S. reserve assets held by both the Treasury and the Federal Reserve Banks of the United States reached up to $66 billion, out of which only 14 were held by the latter. Equivalently, in the case of Japan, total reserve assets held by both the Ministry of Finance and the Bank of Japan reached up to $870 billion, out of which only 48 were held by the latter. And in the case of the United Kingdom, out of a total of $79 billion, only 30 were held by the Bank of England.

[8] In the case of Argentina, it is clear that the relevant value should correspond to the sum of *Gross International Reserves* (39 percent) and the *IMF* components (22 percent), as the latter represent as well foreign currency reserve assets that are recorded separately. This is confirmed by the evolution of the data, showed in Appendix Table A3, which reflects the increase in *Gross International Reserves* from 30 percent in 2003 to 50 percent in 2006. Yet the average of this last figure during the whole period was 39 percent.

Equivalently, in the case of Norway, the relevant value should correspond to the sum of *Gross International Reserves* (20 percent) and the value of the assets accumulated under the *Oil Fund* (75 percent), as the latter represents as well foreign currency reserve assets that, not being monetized, are recorded separately.

[9] For Peru, the relevant value is the sum of *Base Money* (25 percent) and *Bank Reserves in Foreign Currency* (45 percent). This is because the Peruvian economy is financially dollarized, implying a large component of *Base Money* is represented by foreign currency bank reserves that here are registered separately.

The case of Brazil represents an unexpected result, for the balance sheet structure of its central bank exhibits *Domestic Credit* as the largest asset component (65 percent) and the sum of *Government Deposits* and *Debt Securities* (53 percent) as the largest liability component. This may reflect a small price effect or a relatively low degree of concern with foreign exchange fluctuations (e.g., due to a low ratio of trade to gross domestic product [GDP]), but this leaves unexplained the basis for such large government deposits.

The results show strong evidence of high elasticity in the case of the monetary systems of RIEs and low flexibility in the case of reserve earning systems. Further, the data suggest that balance sheet structures are basically steady over the business cycle, in the sense that no economy can jump from one extreme position to the other. That is, no reserve earning central bank—stereotypes 2 to 6—can suddenly behave as a reserve issuing one—stereotype 1. Yet portfolio adjustments and exchange rate adjustments within a particular stereotype affect the flexibility of the monetary system in the short run.

Conclusions

Based on our findings of strikingly different central bank balance sheet structures worldwide, we argued that the current international monetary system is fully asymmetric, as it divides the world among a few RIEs and a larger group of REEs. Further, we argued that international monetary asymmetries are relevant to monetary theory and policy because they affect the behavior of central banks, their balance sheet structure,

---

With regard to Norway, this is after considering the liability counterpart of the assets held in the Norwegian Oil Fund as a form of *Government Deposit.*

In the case of Saudi Arabia, 44 percent of total liabilities during the period were composed of "Other Miscellaneous Liabilities." It would be interesting to know their composition, but no report from the Web site of the Saudi Arabian Monetary Agency (SAMA) mentions anything with respect to it; and by the time of writing, no department of the bank replied to our inquiries regarding this matter. One thing is for sure, though, such a concept must include the *Equity Capital* and what SAMA calls elsewhere "reverse repos" or, in our terminology, *Debt Securities.* So, it is very likely that the sum of the extracting liability components—*Debt Securities* and *Government Deposits*—exceeds 32 percent in the case of SAMA. For instance, if one assumes that half of the 44 percent mentioned above were *Debt Securities,* then the sum of the extracting components would be 54 percent rather than 32 percent and, hence, would represent the second greatest effort of extraction (sterilization) in the whole sample. Such a number is certainly consistent with the riyal peg against the U.S. dollar in place since May 1981.

the flexibility of the exchange rate regime, and the design of interest rate–targeting rules.

Both RIEs and REEs must be concerned with the exchange rate, foreign capital flows, and net payments to the rest of the world, but only REEs must be concerned with the accumulation of foreign currency assets, as their local currencies do not circulate abroad. International monetary asymmetries cause two effects. The first implies that in REEs, there is a strong policy-induced connection between the quantity of foreign reserve assets and the short-term rate of interest, as the fact that reserve earning central banks must target a minimum stock of foreign currency assets affects interest rate targeting.

The second effect derives from the first. That is, from the fact that in REEs, two forms of monetary reserves coexist: local currency base money reserves, which are elastic, and foreign currency reserves, which are not. The price of the former is the interest rate and that of the latter is the exchange rate. This effect means that in REEs, the connection between the foreign exchange rate and the short-term rate weakens as foreign currency reserves increase. This is because the larger such a stock is, the greater the capacity of the central bank to limit the impact of interest rate changes upon the exchange rate.

For instance, as long as foreign reserves can vary sufficiently, an interest rate reduction (increase) that leads to foreign currency outflows (inflows) may be compensated by an equivalent reduction (increase) in the stock of foreign reserves, limiting the impact on the exchange rate. This, along with the authorities' bias against currency appreciations, explains why REEs are often willing to accumulate large stocks of foreign reserves, provided (as it is the case) sterilization costs are relatively small.

RIEs need not accumulate or target a minimum stock of foreign currency reserves, as their local currencies circulate abroad. Further, notice this implies their exchange rates against the currencies of REEs largely depend on the accumulation of foreign reserves on the part of the latter (e.g., the yuan/dollar exchange rate).

Moreover, here it is argued that the dominant reserve issuing central bank (e.g., the Fed) cannot engineer a depreciation of its currency against the currencies of REEs through a reduction in its short-term rate because it does not hold sufficiently large foreign reserves (e.g., yuans) so as to impose a target price; rather, such an adjustment requires international coordination (or political pressure). But, notice, this is not the case of exchange rates between reserve currencies (e.g., the dollar/euro rate), which instead are largely determined by market forces and interest rate differentials.

Further, we argued that the differences among monetary practices are captured by the diverse structures of central bank assets and liabilities, and showed that RIEs and REEs follow entirely different patterns or stereotypes. For instance, while the former behave as stereotype 1 proposed in the fourth section, with *Domestic Credit* and *Cash* as the largest asset and liability components, the latter always behave as stereotype 4, with, respectively, *Gross International Reserves* and *Base Money* as the largest components. The exception to the rule is that of some oil-exporting countries that, due to their fixed exchange rate regimes (and sterilization needs), behave as stereotype 5. Yet, in general, one would expect stereotypes 1 and 4 to be the rule, respectively, for RIEs and REEs.

Moreover, it was shown that the efforts to stabilize the exchange rate in REEs lead to a substitution (sterilization or compensation) process whereby *Cash* is partially replaced with *Debt Securities, Government Deposits,* and larger *Bank Reserve* requirements.[10] Thus, one corollary of our analysis is that to distinguish whether or not a central bank makes an effort to stabilize the currency, one should focus on the structure of its balance sheet rather than on the evolution of the foreign exchange rate.

Finally, the results also suggest the presence of "sounder" monetary practices in REEs than in RIEs. But this, rather than being a merit, reflects a lower degree of monetary elasticity in the former case, where guaranteeing a large stock of foreign currency assets is crucial (Garcia et al., 2008).[11]

This explains why monetary policy is much more elastic in RIEs than in REEs. For, apart from targeting short-term interest rates to influence indirectly foreign currency flows and exchange rate fluctuations, reserve earning central banks must intervene directly in foreign exchange markets to accumulate reserves (asset side); hence, they must endogenously compensate such interventions reducing the proportion of cash, and increasing that of their own securities, bank reserves, and government deposits (liability side).

[10] Indeed, REEs are usually guided by criterions of "sound finance," including the preservation of large volumes of local currency *Bank Reserves.*

[11] Thus, apart from the case of Brazil, the results suggest a case for inflexible exchange rate regimes in REEs, a finding contrary to the orthodox principle of *price flexibility.* Moreover, the results also illustrate how two orthodox principles may be in contradiction, for *price flexibility* and policies of *sound finance* cannot coexist simultaneously, as no exchange rate regime can remain flexible under *sound practices* of central banking.

REFERENCES

Arestis, P. *The Post-Keynesian Approach to Economics: An Alternative Analysis of Economic Theory and Policy.* Aldershot, UK: Edward Elgar, 1992.

Arestis, P., and Sawyer, M. "A Critical Reconsideration of the Foundations of Monetary Policy in the New Consensus Macroeconomics Framework." *Cambridge Journal of Economics,* 2008, *32* (5), 761–779

Davidson, Paul. *Money and the Real World.* New York: Halstead Press, 1972.

———. "Can, or Should, a Central Bank Inflation Target?" *Journal of Post Keynesian Economics,* Summer 2006, *28* (4), 689–703.

Fontana, G. "The 'New Consensus' View of Monetary Policy: A New Wicksellian Connection?" Working Paper no. 476, Levy Economics Institute, Annandale-on-Hudson, 2006.

———. "Why Money Matters: Wicksell, Keynes, and the New Consensus View on Monetary Policy." *Journal of Post Keynesian Economics,* Fall 2007, *30* (1), 43–60.

Fontana, G., and Palacio-Vera, A. "Is There an Active Role for Monetary Policy in the Endogenous Money Approach?" In C. Gnos and L.-P. Rochon (eds.), *Post-Keynesian Principles of Economic Policy,* Cheltenham, UK: Edward Elgar, 2006, pp. 49–56.

Fullwiler, S.T. "Setting Interest Rates in the Modern Money Era." *Journal of Post Keynesian Economics,* Spring 2006, *28* (3), 495–525.

Garcia, A.G.; Nell, E.J.; and Mata, L. "Asimetrías monetarias internacionales y Banca Central" [International Monetary Assymetries and the Central Bank]. *Revista Investigación Económica,* 2008, *67* (265), 145–187.

Gnos, C., and Rochon, L.-P. "The New Consensus and Post-Keynesian Interest Rate Policy." *Review of Political Economy,* 2007, *17* (3), 369–386.

Kaldor, N. *The Scourge of Monetarism.* Oxford: Oxford University Press, 1982.

Keynes, J.M. *A Treatise on Money.* London: Macmillan, 1930.

———. *The General Theory of Employment, Interest and Money.* London: Macmillan, 1936.

Knapp, G.F. *Staatliche Theorie des Geldes* [State Theory of Money]. Leipzig: Duncker & Humblot, 1905.

Lavoie, M. *Foundations of Post Keynesian Economic Analysis.* Aldershot, UK: Edward Elgar, 1992.

———. "A Post-Keynesian Amendment to the New Consensus Model on Monetary Policy." *Metroeconomica,* 2006, *57* (2), 165–192.

Lavoie, M., and Seccareccia, M. "Interest Rate: Fair." In P. O'Hara (ed.), *Encyclopedia of Political Economy,* vol. 1. London: Routledge, 1999, pp. 543–545.

Lerner, A.P. "Functional Finance and the Federal Debt." *Social Research,* 1943, *10* (1), 38–51.

Minsky, H.P. "Central Banking and Money Market Changes." *Quarterly Journal of Economics,* May 1957, *71,* 171–187.

Monvoisin, V., and Rochon, L.-P. "The Post-Keynesian Consensus, the New Consensus, and Endogenous Money." In C. Gnos and L.-P. Rochon (eds.), *Post-Keynesian Principles of Economic Policy.* Cheltenham, UK: Edward Elgar, 2006, pp. 57–77.

Moore, B.J. *Horizontalists and Verticalists: The Macroeconomics of Credit–Money.* Cambridge: Cambridge University Press, 1988.

Mosler, W., and Forstater, M. "The Natural Rate of Interest Is Zero." Working Paper no. 37, University of Missouri, Kansas City, 2004.

Nell, E. *The General Theory of Transformational Growth: Keynes After Sraffa.* Cambridge: Cambridge University Press, 1998.

Palley, T.I. "A Post-Keynesian Framework for Monetary Policy: Why Interest Rate Operating Procedures Are Not Enough." In C. Gnos and L.-P. Rochon (eds.), *Post-Keynesian Principles of Economic Policy.* Cheltenham, UK: Edward Elgar, 2006, pp. 78–98.

Robertson, D.H. *Money.* New York: Pitman, 1948. [Originally published in 1922.]

Rochon, L.-P. "Cambridge's Contribution to Endogenous Money: Robinson and Kahn on Credit and Money." *Review of Political Economy,* July 2001, *13* (3), 287–307.

Rochon, L.-P., and Setterfield, M. "Interest Rates, Income Distribution, and Monetary Policy Dominance: Post Keynesians and the 'Fair Rate' of Interest." *Journal of Post Keynesian Economics,* Fall 2007, *30* (1), 13–42.

Screpanti, E. "Banks, Increasing Risk, and the Endogenous Money Supply." *Economic Notes by Banca Monte dei Paschi di Siena,* 1997, *26* (3), 567–588.

Seccareccia, M. "Wicksellian Norm, Central Bank Real Interest Rate Targeting and Macroeconomic Performance." In P. Arestis and M. Sawyer (eds.), *The Political Economy of Central Banking.* Cheltenham, UK: Edward Elgar, 1998, pp. 180–198.

Setterfield, M. "Central Banking, Stability and Macroeconomic Outcomes." In M. Lavoie and M. Seccareccia (eds.), *Central Banking in the Modern World: Alternative Perspectives.* Cheltenham, UK: Edward Elgar, 2004, pp. 35–56.

Smithin, J. *Controversies in Monetary Economics: Ideas, Issues, and Policy.* Aldershot, UK: Edward Elgar, 1994.

———. "Interest Rate Operating Procedures and Income Distribution." In M. Lavoie and M. Seccareccia (eds.), *Central Banking in the Modern World: Alternative Perspectives.* Aldershot, UK: Edward Elgar, 2004, pp. 57–69.

Thirlwall, A.P. "The Balance of Payments Constraint as an Explanation of International Growth Rate Differences." *Banca Nazionale del Lavoro Quarterly Review,* March 1979, *128,* 45–53.

Weber, A. "The Role of Interest Rates in Theory and Practice: How Useful Is the Concept of the Natural Real Rate of Interest for Monetary Policy?" Speech delivered as the Inaugural G.L.S. Shackle Biennial Memorial Lecture, St. Edmund's College, Cambridge, 2006.

Wicksell, K. *Interest and Prices,* London: Macmillan, 1934.

Woodford, M. *Interest and Prices: Foundations of a Theory of Monetary Policy.* Princeton: Princeton University Press, 2003.

Wray, R. "When Are Interest Rates Exogenous?" Center for Full Employment and Price Stability, Working Paper no. 30, University of Missouri, Kansas City, 2004.

———. "A Post Keynesian View of Central Bank Independence, Policy Targets, and the Rules Versus Discretion Debate." *Journal of Post Keynesian Economics,* Fall 2007, *30* (1), 119–141.

To order reprints, call 1-800-352-2210; outside the United States, call 717-632-3535.

Table A1
Description of the data, all countries—January 2003–December 2006

	Variable					
Country	Balance sheet data (48 months from January 2003 to December 2006)	Interest rate data (approximately 1,045 daily observations)	Spot foreign exchange rate data (approximately 1,045 daily observations)	Inflation rate data (48 months from January 2003 to December 2006)	Gross international reserves data (48 months from January 2003 to December 2006)	Observations
Argentina	Source: Central Bank of Argentina	Buenos Aires Interbank offered rate (BAIBOR), overnight annualized Source: Central Bank of Argentina	ARS/1 USD, daily Source: Central Bank of Argentina	Consumer price index (CPI) inflation rate (monthly) 1999 = 100 Source: National Institute of Statistics and Censuses	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Brazil	Source: Central Bank of Brazil	Special System of Clearance and Custody (SELIC), overnight annualized Source: Central Bank of Brazil	BRL/1 USD, daily Source: Central Bank of Brazil	CPI inflation rate (monthly) 1993 = 100 Source: Brazilian Institute of Geography and Statistics (IBGE)	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Mexico	Source: Bank of Mexico	Money market rate (TIIE), overnight annualized Source: Bank of Mexico	MXN/1 USD, daily Source: Bank of Mexico	CPI inflation rate INPC (monthly) 2002 = 100 Source: Bank of Mexico	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None

(continues)

Table A1
Continued

Country	Balance sheet data (48 months from January 2003 to December 2006)	Interest rate data (approximately 1,045 daily observations)	Spot foreign exchange rate data (approximately 1,045 daily observations)	Inflation rate data (48 months from January 2003 to December 2006)	Gross international reserves data (48 months from January 2003 to December 2006)	Observations
Peru	Source: Central Reserve Bank of Peru. Detailed version provided by the Statistics Department by e-mail.	Interbank offered rate, overnight annualized Source: Central Reserve Bank of Peru	PEN/1 USD, daily Source: Central Reserve Bank of Peru	CPI inflation rate IPC-Lima (monthly) 2001 = 100 Source: Central Reserve Bank of Peru	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	Detailed balance sheet data are available on the Web page only on a annual basis. Monthly data were provided on demand. Most of the economy's base money is dollarized in the form of dollar bank reserves.
United States	Source: Board of Governors of the Federal Reserve System	Federal funds rate, overnight annualized Source: Board of Governors of the Federal Reserve System	N/A	CPI inflation rate—all urban consumers (monthly) 1982–84 = 100 Source: U.S. Department of Labor	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Venezuela	Source: Central Bank of Venezuela	Interbank offered rate, overnight annualized Source: Central Bank of Venezuela	VEB/1 USD, daily Source: Central Bank of Venezuela	CPI inflation rate IPC–Caracas (monthly) 1997 = 100 Source: Central Bank of Venezuela	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
United Kingdom	Source: Bank of England	Daily sterling overnight interbank average (SONIA), overnight annualized Source: Bank of England	GBP/1 USD, daily Source: Bank of England	CPI inflation rate (monthly) 2005 = 100 Source: Office for National Statistics	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	The separation between the Issuing Department and the Banking Department within the Bank of England required consolidation of balance sheet data.

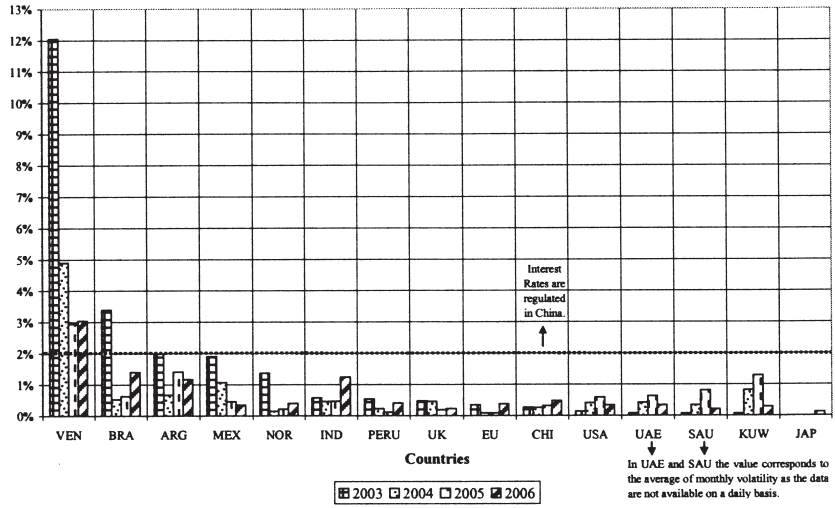
European Union	Source: European Central Bank	Euro overnight index average (EUONIA), overnight annualized Source: European Central Bank	EU/1 USD, daily Source: European Central Bank	Harmonized index of consumer prices (HICP)—overall index (monthly) 2005 = 100 Source: Eurostat	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Norway	Source: Central Bank of Norway	Norwegian InterBank Offered Rate (NIBOR-T), overnight annualized Source: Central Bank of Norway	NOK/1 USD, daily Source: Central Bank of Norway	The Norwegian consumer price index (monthly) 1998 = 100 Source: Statistics Norway	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
China	Source: The People's Bank of China	China Interbank Offer Rate (CHIBOR), overnight annualized Source: Bloomberg (CNIBR1D)	CNY/1 USD, daily Source: Bloomberg (CNY)	CPI inflation rate (monthly) 1996 = 100 Source: National Bureau of Statistics of China and Economist Intelligence Unit	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Japan	Source: Bank of Japan	Uncollateralized call rates, overnight annualized Source: Bank of Japan	JPY/1 USD, daily Source: Bank of Japan	CPI inflation rate (monthly) 2005 = 100 Source: Statistics Bureau (Ministry of Internal Affairs and Communications)	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None
Kuwait	Source: Central Bank of Kuwait	Kuwait Inter-Bank Offered Rate (KIBOR1M), one month annualized Source: Bloomberg (KIBOR1M)	KWD/1 USD, daily Source: Bloomberg (KWD)	CPI inflation rate (monthly) 2000 = 100 Source: Economist Intelligence Unit	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	None

(continues)

Table A1
Continued

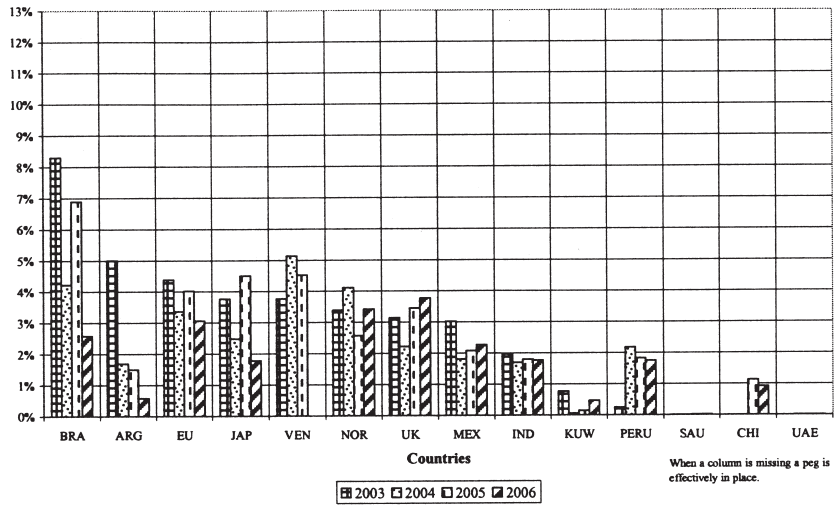
Country	Balance sheet data (48 months from January 2003 to December 2006)	Interest rate data (approximately 1,045 daily observations)	Spot foreign exchange rate data (approximately 1,045 daily observations)	Inflation rate data (48 months from January 2003 to December 2006)	Gross international reserves data (48 months from January 2003 to December 2006)	Observations
India	Source: Reserve Bank of India	Mumbai Interbank Offer Rate (MIBOR), overnight annualized Source: National Stock Exchange of India Ltd.	INR/1 USD, daily Source: Reserve Bank of India	Consumer price index numbers for urban nonmanual (monthly) 1984–85 = 100 Source: Reserve Bank of India	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	The "equity capital" of the Reserve Bank of India was not available on the Web page and hence is included under the concept of "Other Liabilities" of the bank's balance sheet.
Saudi Arabia	Source: Saudi Arabian Monetary Agency	Money market rates from January 2003 to February 2006 and from September 2006 to December 2006, overnight annualized Source: Saudi Arabian Monetary Agency (SAMA) and Overnight interbank deposit rate from March 2006 to August 2006, Source: Bloomberg (SRDR1T)	SAR/1 USD, daily Source: Bloomberg (SAR)	Cost of living Saudi Arabia (monthly) 1999 = 100 Source: Central Department of Statistics of Ministry of Economy and Planning	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	"Other Liabilities" correspond to "Other Miscellaneous Liabilities" in the original balance sheet. They represent around 40 percent of "Total Liabilities" and include components such as reverse repos, debt securities, and so forth, whose proportion is not published on SAMA's Web page.
United Arab Emirates	Source: Central Bank of United Arab Emirates	Interest rates on interbank deposits, one month annualized Source: Monetary and Banking Developments of the Central Bank of United Arab Emirates	AED/1 USD, daily Source: Bloomberg (AED)	CPI inflation rate (annually) 2000 = 100 Source: IMF	Taken from balance sheet data: foreign assets divided by the average foreign exchange rate, the latter being computed as the unweighted average of daily rates	CPI Index data are not available elsewhere but on the IMF's Web page.

Figure A1 Average daily interest rate volatility in the interbank market, all countries



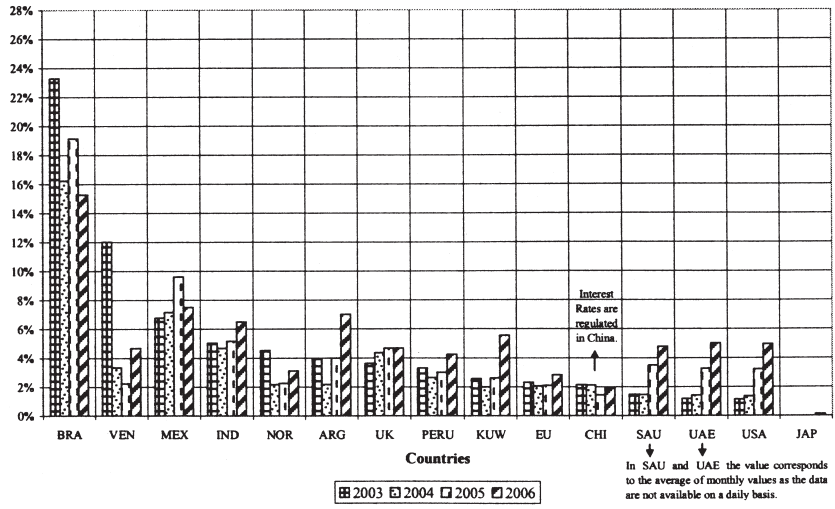
Notes: VEN = Venezuela; BRA = Brazil; ARG = Argentina; MEX = Mexico; IND = India; UK = United Kingdom; EU = European Union; CHI = China; USA = United States; UAE = United Arab Emirates; SAU = Saudi Arabia; KUW = Kuwait; JAP = Japan.

Figure A2 Average foreign exchange rate daily volatility over mean in the interbank market, all countries except the United States



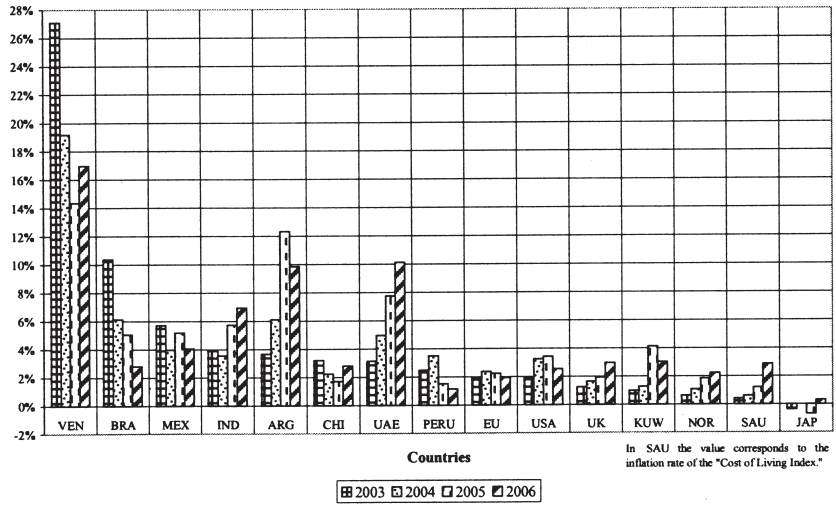
Notes: BRA = Brazil; ARG = Argentina; EU = European Union; JAP = Japan; VEN = Venezuela; NOR = Norway; UK = United Kingdom; MEX = Mexico; IND = India; KUW = Kuwait; SAU = Saudi Arabia; CHI = China; UAE = United Arab Emirates.

Figure A3 Average interest rate in the interbank market, all countries



Notes: BRA = Brazil; VEN = Venezuela; MEX = Mexico; IND = India; NOR = Norway; ARG = Argentina; UK = United Kingdom; KUW = Kuwait; EU = European Union; CHI = China; SAU = Saudi Arabia; UAE = United Arab Emirates; USA = United States; JAP = Japan.

Figure A4 Annualized consumer price index inflation rate, all countries



Notes: VEN = Venezuela; BRA = Brazil; MEX = Mexico; IND = India; ARG = Argentina; CHI = China; UAE = United Arab Emirates; EU = European Union; USA = United States; UK = United Kingdom; KUW = Kuwait; NOR = Norway; SAU = Saudi Arabia; JAP = Japan.

Table A2
Average structure of (central banks') monthly balance sheets, all countries—January 2003–December 2006 (in percent)

Assets, liabilities, and capital	Argentina	Brazil	Mexico	Peru	United States	Venezuela	United Kingdom	European Union
Assets								
Gross international reserves (GIR)	39	32	74	89	2	78	20	34
Gold and gold certificates	1	0	0	4	1	17	0	15
Foreign currency assets	38	32	73	83	0	60	15	16
Other international reserve assets	0	0	1	2	0	2	4	3
Domestic credit (DC = CG + CFS)	29	65	19	1	93	7	69	49
Credit to the government (CG)	17	61	11	0	92	7	22	5
Credit to the financial sector (CFS)	12	4	7	1	0	0	48	45
IMF (and other resources from other funds)	22	0	0	0	0	0	0	0
Subtotal other assets	9	3	7	10	6	16	11	17
Other assets in foreign currency not GRI	4	2	1	7	0	14	0	2
Other assets	6	1	6	3	6	2	11	15
Total assets								
Liabilities								
International reserve liabilities (IRL)	4	7	5	9	0	21	19	2
IMF and resources from other funds or bank reserves in foreign currency	28	10	0	45	0	0	0	0
Base money (BM = CASH + BRES)	39	29	52	25	95	34	76	72
Notes and coins in circulation (CASH)	28	11	30	18	92	14	49	55
Deposits of banking institutions (BRES)	11	18	22	6	3	19	27	17
Debt securities (DS)	17	19	23	13	3	27	1	0
Deposits public administration (GD)	1	34	15	2	1	15	1	7
Other liabilities	10	1	5	6	1	4	3	19
Total liabilities	88	99	103	99	97	77	100	93
Capital								
Capital (K)	12	1	–3	1	3	22	0	7
Central bank stereotype 1, 2, ..., 6	–4	–3	–4	–4	–1	–5	–1	–1

	Norway	China	Japan	Kuwait	India	Saudi Arabia	United Arab Emirates
Assets							
Gross international reserves (GIR)	20	56	4	98	86	92	98
Gold and gold certificates	0	0	0	1	3	0	0
Foreign currency assets	19	56	4	97	83	92	98
Other international reserve assets	0	0	0	0	0	0	0
Domestic credit (DC = CG + CFS)	2	31	94	0	3	0	1
Credit to the government (CG)	1	4	92	0	2	0	0
Credit to the financial sector (CFS)	1	27	2	0	1	0	1
IMF (and other resources from other funds)	75	0	0	0	0	0	0
Subtotal other assets	3	13	2	2	12	8	1
Other assets in foreign currency not GRI	0	1	0	0	0	0	0
Other assets	3	11	2	2	12	8	1
Total assets							
Liabilities							
International reserve liabilities (IRL)	5	1	0	2	0	0	0
IMF and resources from other funds or bank reserves in foreign currency	81	0	0	0	0	0	0
Base money (BM = CASH + BRES)	6	66	76	54	71	24	56
Notes and coins in circulation (CASH)	3	29	55	29	55	18	27
Deposits of banking institutions (BRES)	2	37	21	26	16	6	29
Debt securities (DS)	0	14	17	4	5	0	27
Deposits public administration (GD)	8	14	4	25	1	32	15
Other liabilities	0	5	3	15	23	44	3
Total liabilities	93	100	98	91	100	100	98
Capital							
Capital (K)	7	0	2	9	0	0	2
Central bank stereotype 1, 2, ..., 6	–5	–4	–1	–4	–4	–5	–4

Table A3
The evolution of some key variables from year average 2003 to year average 2006, all countries

Assets, liabilities, and capital	Argentina	Brazil	Mexico	Peru	United States	Venezuela	United Kingdom	European Union
Assets (in percent)								
Gross international reserves (GIR)	30–50	32–32	70–77	87–89	2–2	74–74	19–19	41–29
Domestic credit (DC = CG + CFS)	26–39	64–66	22–19	1–3	92–93	6–14	69–70	42–51
IMF (or Norway's oil fund)	37–0							
Liabilities (in percent)								
IMF (or Peru's foreign currency bank reserves and Norway's oil fund)	46–3	17–0		29–25				
Base money (BM = CASH + BRES)	36–49	24–35	51–54	18–30	95–95	34–36	80–67	68–72
Notes and coins in circulation (CASH)	22–38	8–14	29–30	16–21	92–93	17–13	54–42	51–56
Deposits of banking institutions (BRES)	13–11	16–22	22–24	2–10	3–2	17–23	26–25	18–16
Debt securities (DS)	6–30	22–19	27–18	8–11	3–3	18–42	0–4	0–0
Deposits public administration (GD)	1–2	27–40	14–17	26–20	1–1	14–7	1–1	8–6
Foreign exchange rate								
Foreign exchange rate variation (against the U.S. dollar)	2.95	3.07	10.79	3.48	N/A	1607.6	0.61	0.89
	3.07	2.18	10.9	3.28		2150	0.54	0.8
Foreign exchange rate variation (in percent)	4.07	–28.99	1.02	–5.75	N/A	33.74	–11.48	–10.11
Central bank stereotype 1, 2, ..., 6	–4	–3	–4	–4	–1	–5	(1)	–1

	Norway	China	Japan	Kuwait	India	Saudi Arabia	United Arab Emirates
Assets (in percent)							
Gross international reserves (GIR)	22–16	48–63	4–4	99–98	78–89	88–96	99–97
Domestic credit (DC = CG + CFS)	2–2	40–26	94–93	0–1	8–1	0–0	0–2
IMF (or Norway's oil fund)	68–82						
Liabilities (in percent)							
IMF (or Peru's foreign currency bank reserves and Norway's oil fund)	76–85						
Base money (BM = CASH + BRES)	8–4	67–56	79–75	66–50	73–72	34–14	55–55
Notes and coins in circulation (CASH)	4–3	35–23	55–62	27–25	58–55	27–10	29–24
Deposits of banking institutions (BRES)	4–1	32–33	23–13	38–26	15–17	7–5	26–30
Debt securities (DS)	0–0	4–24	14–19	0–10	0–4	0–0	24–32
Deposits public administration (GD)	8–6	25–11	5–4	21–22	0–2	29–42	19–11
Foreign exchange rate							
Foreign exchange rate variation (against the U.S. dollar)	7.08 6.42	8.28 7.97	115.93 116.29	0.3 0.29	46.56 45.42	3.75 3.75	3.67 3.67
Foreign exchange rate variation (in percent)	–9.32	–3.68	0.31	–2.63	–2.45	0	0
Central bank stereotype 1, 2, ..., 6	–5	–4	–1	–4	–4	–5	(4)

Copyright of Journal of Post Keynesian Economics is the property of M.E. Sharpe Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.