

LESSONS FROM MONETARY AND REAL EXCHANGE RATE ECONOMICS

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This article is intended to be a sort of flyover, examining certain key aspects of monetary and real exchange rate economics from a convenient distance. In it I try to avoid getting into technicalities that are interesting mainly to specialists. I focus instead on essentials that are critical to a proper understanding of the economic processes involved, and on a few real-world examples that show the usefulness and relevance of our fundamental theoretical constructs.

It pays to simplify by dividing our analysis into two parts: one concerned with the “real economy” dealing with quantities and relative prices, and the other dealing with the determination of the absolute level of prices. This is called the classical dichotomy; it has for years been a critical pillar of economic theory.

When we try to apply the classical dichotomy, we need to settle on a unit, in terms of which we express relative prices. While in theory this unit, called the *numeraire*, could be any price (e.g., that of oil, sugar, or copper), in practice it is greatly simplifying to use a general price level as the unit of analysis—either the GDP deflator, a general index of the prices of all the goods and services *produced* in the economy, or the consumer price index, a general index of the prices of all the goods and services *consumed* in the economy.

The Real Exchange Rate

When dealing with international trade, we must bear in mind the

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important distinction between tradable and nontradable goods. Tradable goods are those whose prices are fundamentally determined in the world market. These are the actual exports and imports of a country, plus some goods that might be importable or exportable. Tradables and nontradables are key categories, but many products can be seen as mixtures of the two (cars and gasoline are tradable, the services of bus and taxi drivers nontradable; food and equipment are tradable, the services of restaurant personnel nontradable).

Because of the complication of these mixed commodities, it is best not to seek a direct index of nontradables prices, but to use as much as possible one of the two general indexes, in which nontradables automatically receive their due weight. This consideration leads to the most practical definition of the real exchange rate: how many of a country's own consumer baskets (defined by the CPI) or producer baskets (defined by the GDP deflator) does it take to buy one basket of tradable goods? We have as yet no consensus measure of a standard basket of tradables, but best practice uses a weighted average of the wholesale price indexes of a number of countries. (Wholesale price indexes are known to have a heavy concentration of tradables.)

The real exchange rate is the principal equilibrator of a country's trade and payments. Broadly speaking, when foreign currency is very abundant (as a result of high export levels or large capital inflows or emigrant remittances or foreign aid), the market sets a low real price on foreign exchange. In the opposite case, when a country suffers from an export slump or has to make big debt repayments, the market sets a high real price for foreign exchange. When we speak of the real exchange rate as the equilibrator of the country's trade and payments, we count all sources of inflow of foreign currency and all types of outflow (including the central bank's accumulating international reserves).

Two Key Propositions of Monetary Economics

The first proposition of monetary theory is that people behave in regular and rational ways in determining their desired holdings of *real* monetary balances. These are usually defined as some concept of "broad money" (usually M2), deflated by either the CPI or the GDP deflator. Key variables in determining these holdings are the level of real income, the expected rate of inflation in the country, and

real interest rates (i.e., nominal interest rates corrected by the expected rate of inflation). Higher interest rates paid on monetary balances themselves lead to larger real balances; higher interest rates on treasury bills, bonds, etc., lead to smaller real balances.

The second proposition of monetary theory is that when people find themselves with monetary balances higher than they really want, they tend to spend more, thus bringing their balances closer to the desired level. Likewise, when their monetary balances are lower than their desired level, people tend to spend less than they otherwise would, bringing their real balances closer to the desired level.

This dynamic process of spending more when real cash balances exceed their desired level, and less when real cash balances fall short, is the principal way in which “too much money” leads to a higher price level and “too little money” to a lower price level.

A corollary to the second proposition, is that yes, the monetary authorities determine the *nominal* money supply (M^S), but as people adjust their spending, the price level (P) changes so as to bring M^S/P into equality with the people’s desired real monetary balances (M/P)^d. Thus, it is the people who determine the real money supply. The big inflations of the past all testify to the validity of this proposition. Since inflation is in effect a tax on real cash balances ($M2/P$), people hold much lower real balances under inflationary conditions than under more stable conditions. As an example, in Argentina $M2$ holdings fell to something like 5 percent of GDP during the super-high inflation of the 1980s, while in more normal times it averaged 15–20 percent of GDP. So when the central bank’s printing presses were going like crazy (meaning super-rapid growth of $M2$) the people responded by bringing real cash balances ($M2/P$) to historic low levels. This story is repeated in every major inflation I know of.

Real Exchange Rate Adjustment

The central bank (or the government itself) can set the nominal exchange rate, but it is the people that determine the real exchange rate (with perhaps some help from the central bank or the government). A government does not succeed in fixing the real exchange rate simply by choosing to have a fixed nominal exchange rate to, say, the dollar or the euro. Real exchange rate adjustment takes place just as much under fixed exchange rates as under flexible rates. Consider a case of fixed exchange rates in which the exchange rate is 10 pesos

per dollar. A big steady inflow of foreign currency (like an export boom) could lead to a new equilibrium in which the price level went from 100 to 150 with the exchange rate fixed. With a flexible exchange rate one could imagine the price level remaining stable while the price of the dollar fell to 6.7 pesos. Or alternatively, the result might be the price level rising to 120 while the nominal price of the dollar fell from 10 to 8 pesos. In all of these three cases the real exchange rate ends up being the same—that is, $10/150 = 8/120 = 6.7/100$. The same real equilibrium is generated, even though the nominal exchange rate and the general price level vary.

It is very important to realize that a rise in the price level as a consequence of a big inflow of foreign exchange under a fixed exchange rate system is a very different phenomenon from a price level rise coming from printing money (say to finance a large fiscal deficit). The response to the foreign exchange inflow is a *relative price adjustment* (the relative price in question being the real exchange rate), while the price rise stemming from a fiscal deficit is typically a straightforward inflation.

One way to understand this distinction is to think of the counterpart under a flexible exchange rate system. With a big inflow of foreign exchange we would always get a change in the real exchange rate. With a pure monetary expansion to finance a fiscal deficit, there is no reason to assume that the equilibrium real exchange rate would change. Indeed, it is almost impossible to “model” a serious inflation process without allowing the nominal exchange rate to adjust. A “standard” inflation that started from a nominal exchange rate of 10 and a price level of 100 would have a trajectory like $10/100 \rightarrow 15/150 \rightarrow 20/200 \rightarrow 30/300$, etc. That is, both the nominal exchange rate and the price level would rise, with the equilibrium real exchange rate remaining unchanged except insofar as the underlying real forces would be changing over the same time span.

One example of recent exchange rate adjustment is the case of Russia. Oil prices hit a low of about \$10 per barrel in 1998, and have been blasting upward ever since. The nominal exchange rate has remained pretty stable over this entire period, actually appreciating a bit between 2000 and 2007. What has happened is that the central bank has kept on buying huge amounts of dollars, spewing out rubles (base money) year after year. The authorities wanted to keep a stable exchange rate and a stable price level, but simply could not. They

tried every means of “sterilizing” the base money emitted by the central bank. The central bank stimulated increased deposits from the commercial banks. Later the central bank engaged in open monetary operations so as to absorb more base money. The government also helped the central bank absorb base money, buying dollars, some of which it left on deposit at the central bank and some of which it used to pay debts abroad (even in some cases ahead of schedule). Finally, the people of Russia made their own contribution by greatly expanding their holdings of real monetary balances (mainly as a consequence of their rising real income). Yet in spite of all of these forces of sterilization, Russia’s price level has about doubled—reflecting a high real exchange rate appreciation (i.e., a halving of the real price of foreign currency). In this scenario, the government together with the central bank determined the nominal exchange rate and the nominal money supply, but in the end the market determined both the real exchange rate and the real money supply.

To impact the equilibrium real exchange rate, the authorities must resort to real instruments, thus affecting the real equilibrium of the economy. I here recount three cases of such actions.

In Brazil between 1968 and 1979, the central bank targeted the real exchange rate, adjusting the nominal exchange rate to offset ongoing movements in the price level. But that meant that the real exchange rate could not perform its fundamental role of equilibrating the country’s trade and payments. The central bank ended up first having to buy large quantities of foreign currency, and later having to sell. This could unleash huge inflationary or deflationary forces. But the authorities had a real instrument that they could and did use. When they thought they were buying too much (emitting too many cruzeiros), they would gradually reduce or eliminate tariffs and other import restrictions, thus generating a greater private demand for dollars and an absorption of excess cruzeiros by the central bank. Later (after the 1974 oil price boom) the market tended to demand more dollars than the central bank wanted to sell. So it responded by reimposing import restrictions so as to bring about a balance-of-payments equilibrium. We economists liked the first phase of reducing restrictions, and objected to the later phase (of increasing them). But regardless of our tastes and judgments, Brazil’s use of trade restrictions in one direction or the other represented a real instrument aimed at a real objective (the real exchange rate), and it was successful in that particular sense.

Chile from 1985 to 1989 was similarly successful in targeting its real exchange rate. But once again a real instrument was used—the prepayment of foreign debt. The process was a complicated one that involved private speculators buying up the dollar-denominated bonds of Chilean banks, at prices that were well below par. It was these speculators who generated a new real demand for dollars for this purpose. Chile's central bank managed to control this process, by limiting the amounts of dollars that could be used for this purpose. This it did by auctioning off the rights to engage in this operation, at intervals of every couple of weeks. They thus were able to create whatever extra demand for foreign currency was required to bring about equilibrium at the targeted real exchange rate. They did this week in and week out, until finally the supply of discounted debt was exhausted.

Chile later (after 1990) tried to replicate the previous process by building up foreign assets instead of reducing foreign liabilities. Here the central bank went into debt at home and built up international reserves in New York. The problem was that they were paying something like a 7 percent real interest rate on the purchasing-power bonds they issued in Chile, while they were receiving a nominal-dollar rate of only something like 3 percent on their accumulated reserves abroad. As reserves accumulated to over \$18 billion under this scenario, central bank losses on this account approached \$500 million per year. It was the weight of these losses that caused the Chilean authorities to give up their firm target on the real exchange rate and to allow that variable ultimately to find its own market level.

A related type of intervention, also impacting the real exchange rate, consists of commodity funds. The showcase item here is Norway's Oil Fund, which operates on the principle that the oil in the ground is a capital asset, so that when that oil is sold it should be replaced by a capital asset. The Norway rule is therefore to keep the proceeds of oil sales abroad, to invest those proceeds in income-earning assets, and to repatriate only the earnings of the Fund. To follow this rule requires a great deal of discipline on the part of the government, something that most governments lack, but the Norwegian oil fund has been a shining example.

Contrast the Norwegian case with the experience of Mexico in the wake of the 1979 oil-price boom. Economists advised keeping the proceeds of that boom abroad, as Norway did later, and repatriating

them only gradually. The Mexicans tried to do this, but ultimately ended up doing just the opposite. Instead of keeping the oil proceeds abroad, they not only spent all of them, but actually spent 4–5 times their amount, borrowing the extra money by mortgaging their future oil proceeds. This caused a huge appreciation of Mexico's real exchange rate. Also, since the repatriated proceeds and the borrowed dollars were used for nonrevenue-generating projects (many of them white elephants), the end result of the whole episode was a deep depression, punctuated by a default on Mexico's foreign debt. The lesson is that one should worry about the real economic productivity of domestic investment. If one repatriates oil or copper proceeds, or borrows money abroad, one should try to ensure that the domestic projects thus financed have a real yield that exceeds what could have been earned had the assets been held abroad.

One way to mitigate the problem of central bank losses (as faced by Chile after 1990) is to try to get a respectable real rate of return on such assets. My advice on this subject has always been for central banks to label as "international reserves" only a certain fraction of their foreign assets—sufficient to meet the liquidity and precautionary motives for holding such reserves. (That might have been about \$6 billion to act as "reserves" in the Chilean case). For the rest I would advocate following Harvard and Yale and Stanford as they invest their endowments. These great universities have a fine record of returns over the years (some 7 percent or more in real terms), and they are not perceived as being imprudent so far as risk is concerned.

It is folly to try to pursue a real exchange rate target by simply using the nominal exchange rate as the instrument. Some "crawling peg" episodes were based on this idea but they are pretty much doomed to failure from the start. If the real exchange rate "wants" to appreciate, the central bank will be steadily accumulating foreign reserves and issuing ever-larger amounts of local currency in return. There is no end to the inflationary consequences of this policy. To rectify it, either the real exchange rate target must be changed, or some real instrument must be used—like selling bonds or increasing taxes to get the domestic currency to buy the foreign exchange.

In other cases one often finds certain economic interests (exporters and those whose products compete with imports), complaining that "the price of the dollar is too low" when the country faces a highly appreciated exchange rate. These interest groups tend

to think that solving this problem is simply a matter for the central bank (say in El Salvador in 1989) to raise the price of the dollar from 5 colones to, say, 8 or 10 colones. The problem is that nearly all the time the highly appreciated real exchange rate comes as a result of real economic forces. In El Salvador's case at that time, the dollar was cheap (in real terms) because the country was receiving foreign aid equal to some 5 percent of its GDP, and was getting remittances from Salvadorans abroad equal to a like amount or more. My message to the complainers was, "If you want a more expensive dollar (in real terms) you have to make the dollar less abundant. So tell your government to reject next year's offers of foreign aid, and tell your neighbors to write to their relatives in the United States, asking them to please stop sending those remittances."

If that advice were acted upon, devaluation from 5 to 8 colones per dollar would stand a good chance of being sustained in real terms. But without curtailing the superabundant flow of dollars, the predictable result of the exercise would be a general price level rise of some 60 percent, leaving the real exchange rate practically the same as before. Without a change in the underlying supply-and-demand conditions determining the real exchange rate, a nominal devaluation, raising the nominal price of the dollar, is like taking the elevator to a higher floor in a high-rise building. You end up in a higher floor (nominal exchange rate and the general price level both higher), but the floor plan (the real equilibrium) is basically the same as before.

Monetary Approach to the Balance of Payments

The adjustment of real cash balances toward their desired level was the key to an important advance known as the "monetary approach to the balance of payments" in the theory of international adjustment. Before that advance, students were taught that if, starting from equilibrium, one creates a major increase in a country's money supply, that increase (under fixed exchange rates) will ultimately disappear and the original money supply will be restored. Two mechanisms would work in this direction: (1) the extra money would cause prices to rise, leading people to import more and to export less; and (2) the extra liquidity would cause interest rates to fall, leading financial capital (owned by both nationals and foreigners) to seek higher returns abroad. Both these mechanisms lead to a

loss of international reserves by the country's central bank, reducing first the amount of base money (M_0) and through it the amount of broad money (M_2). If the underlying forces determining the economy's real equilibrium remain unchanged, the end result of the operation of mechanisms (1) and (2) will be the restoration of everything to its initial level (recall that we are positing a fixed exchange rate).

The monetary approach to the balance of payments introduces an additional adjustment mechanism: (3) with the arbitrary, exogenous expansion of the money supply, people will be left holding more real balances (M^S/P) than what they want to maintain (M/P)^d. Over time they will tend to spend the excess, working back to a point where $(M^S/P) = (M/P)$ ^d. This process can work to restore the old equilibrium before mechanisms (1) and (2) get much of a chance to operate. That is, one can get adjustment to an exogenous monetary shock without a major change in the price level or in interest rates.

The foregoing holds rigorously for an arbitrary increase in the money supply by the central bank. But it also holds pretty exactly for a one-time inflow of capital (or foreign aid) or for a transitory increase in the world price of a major export good. The big picture here is that after a few periods we will be back to the original real equilibrium, that given the fixed exchange rate this will also be the original nominal equilibrium, and that in the adjustment process a major role will have been played by the people spending in order to work off their excess (i.e., greater than desired) real cash balances. The trick is that at each step in this extra spending, some of it will go to buy tradable goods (or foreign assets), which will cause a reduction of the central bank's international reserves, and a consequent reduction in the nominal (and real) money supply, ultimately back to the original equilibrium level.

Sterilization by the People

To my mind, the phenomenon of "sterilization by the people" is a close relative of the monetary approach to the balance of payments. I was led to coin this phrase by my experiences in Russia and by observing what was happening in China. Both Russia and China have in recent years experienced huge increases in the inflow of foreign exchange. Russia's authorities spared no effort to try to sterilize this inflow, but the biggest contribution to the overall sterilization came from the Russian people's willingness to hold ever-greater real mon-

etary balances. With a roughly fixed exchange rate the central bank bought additional dollars (or euros) each period, augmenting M0 and M2. But the people willingly held most of the increase in M2. This amount of extra monetary balances, therefore, did not exercise any upward pressure on the price level. The roughly doubling of Russia's price level came about because the inflow of foreign exchange (bought by the central bank through emission of rubles) was greater than what could be offset by all the listed types of sterilization (including sterilization by the people).

China's case was different. For a major part of China's fixed exchange rate period (1995–2005), the central bank expanded base money to buy huge quantities of dollars (mainly from export proceeds). And on top of that it printed additional base money to finance further expansion of domestic credit. Yet the general price level barely moved and the real exchange rate remained almost constant. What little movement there was in the real exchange rate was accounted for by foreign rather than local price level changes. Over the whole period 1995–2005 it represented a tiny (4 percent total, net per year) real depreciation. This was instead of the huge appreciation that usually accompanies such a massive increase in foreign exchange receipts.

Many observers have accused China of currency manipulation and worse. I am skeptical of such accusations. I see China's central bank as following the standard "rules of the game" for a fixed exchange rate system. It stood ready to buy and sell dollars at 8.28 yuan per dollar. Of course, it ended up being a huge net buyer of dollars and generating a huge expansion in the local money supply. But that expansion led to no crisis, no significant inflationary pressures, no miseries or worries of any kind. So it makes a great deal of sense that China's central bank authorities would remain passive in such a situation—not attempting to sterilize, not worrying about inflation, just relaxing and deciding not to "rock the boat" as the Chinese economy chugged along, growing some 10 percent per year in real terms.

Starting in 2002 China's central bank began to engage in sterilizing open market operations, but this did not stop M2 from continuing to grow at 15–20 percent per year. Meanwhile, China's CPI went from 102 in 1997 to 100 in 1999–2002, then increasing slowly to 113 in 2006. I see the central bank's modest sterilizing actions as more likely to have been aimed at blunting the price-level rise per se,

rather than representing a sophisticated scheme of real exchange rate manipulation.

Between 1995 and 2006 the real exchange rate depreciated by 4 percent, the money supply (M2) increased by over 400 percent, while real GDP grew by some 150 percent. It is clear that the big change was in people's holdings of real monetary balances ("sterilization by the people"). Part of that change came simply as a consequence of the rise in real income, with an income elasticity of demand for real monetary balances probably greater than unity. But it is likely that forces other than the increase in real incomes were also at work—namely, the absence (for most of the period) of alternative financial assets (or markets) where people could place their savings, a greater desire to save so as to provide for a better standard of living during one's retirement years, and a weak national social security system.

Conclusion

The lessons discussed in this article deserve serious consideration. Too often today students of international economics learn sophisticated theory dressed in mathematical garb, but they fail to recall the fundamental propositions of monetary economics and the importance of real exchange rate adjustment in bringing about equilibrium in the balance of payments (see Harberger 1998). Focusing on fundamental principles will go a long way toward avoiding costly policy mistakes.

Reference

Harberger, A. C. (1998) "Letter to a Younger Generation." *Journal of Applied Economics* 1 (November): 1–33.