

***CURRENCY REFORM FOR A
MARKET-ORIENTED CUBA***

by
Steve H. Hanke and Kurt Schuler



**BLUE
RIBBON
COMMISSION**

**ON THE ECONOMIC
RECONSTRUCTION
OF CUBA**

CURRENCY REFORM FOR A MARKET-ORIENTED CUBA

by
Steve H. Hanke and Kurt Schuler

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BLUE RIBBON COMMISSION ON THE ECONOMIC RECONSTRUCTION OF CUBA

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This monograph is the first in a series of research reports presented by the Blue Ribbon Commission on the Economic Reconstruction of Cuba. The Blue Ribbon Commission, formed by the Cuban American National Foundation in May 1991, benefits from the participation of noted economists, diplomats, business and political leaders to assess the requirements for the reconstruction of key industry sectors in Cuba and to formulate growth strategies for the economic revival of a new, democratic Cuba.

This comprehensive research program has organized 20 industry sector working groups to compile a comprehensive database on available human, industrial and natural resources in Cuba. Specialists involved in the research program include analysts from: Lazard Freres & Co.; Bear; Stearns Inc.; Baker & McKenzie; Johns Hopkins University; the University of Florida; members of the Association of Cuban Engineers; and more than 100 engineers, scientists and other professionals who have arrived in the U.S. from Cuba during the past several years. A corporate board of sponsors serving on the Commission is comprised of multinational firms representing a wide cross-section of trade and investment activities.

How does one install and insure stable money in Cuba? In my view, the only sure-fire way is to establish a currency board. The Hanke-Schuler volume presents a sound blueprint for doing just that.

Sir Alan Walters

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1. MONETARY REFORM AND THE DEVELOPMENT OF A MARKET ECONOMY

Cuba is entering its final years under the stagnation of the Castro regime. When Castro passes from the scene, it is likely that Cuba will throw off the shackles of socialism and move towards capitalism, as Eastern Europe is now doing. To do so successfully, Cuba must make the peso a stable, convertible currency.

A sound currency, which is vital for a well-functioning market economy, serves as a satisfactory store of value, medium of exchange, and unit of account. An unsound currency does not fulfill any of those functions. An unsound currency is not a reliable store of value because inflation makes its value highly unpredictable. As a result, people save by hoarding bricks, timbers, food, and other commodities, which retain value better than money and other financial assets. Although commodity hoarding slows economic growth, it is rational for Cubans at present. U.S. dollars serve as a substitute store of value in Cuba because the peso is unsound. "Dollarization" is costly. It requires Cubans to give up real goods and services to obtain bits of paper that the U.S. government prints at almost no cost, generating a perverse form of foreign aid that flows from Cuba to the United States.

An unsound currency is not a good medium of exchange. The outside world refuses to accept it. That impedes foreign investment and trade, and hence competition and economic growth. Nor is an unsound currency a good unit of account. Inflation distorts prices and makes business calculation more difficult. Without a good unit of account, it is impossible to make meaningful accounting calculations or to write contracts. In sum, then, an unsound currency prevents important elements of a market economy from working.

Cuba has a primitive financial system that cannot intermediate efficiently between savers and investors because the peso is unstable and inconvertible. The peso's status also explains why Cuba has limited trade with the outside world.

A sound, convertible currency allows people to carry out decentralized plans, which are more efficient than central planning. In nations with so-called internally convertible currencies, all that is usually required to buy goods domestically is to have currency to pay a domestic seller. Internal convertibility implies that it is not necessary to obtain authorization from any central planner to buy or sell goods that are available inside the country. The exchange of goods is much more extensive, rapid, and efficient where internal convertibility exists, as in the United States, than where it does not, as in Cuba.

The foreign trade counterpart of internal convertibility is external convertibility—the ability to convert as much domestic currency into foreign currency as one wishes, at market rates rather than at much higher or lower official rates. External convertibility can be unlimited, as in the major Western countries, or it can be limited. Many countries allow most current account purchases, in which people buy foreign goods for import, but they prohibit many capital account transactions, in which people buy foreign financial assets. Current account convertibility exposes domestic producers to foreign competition and helps

introduce the structure of prices that prevails in world markets. That induces a nation to specialize in making the goods it is best at producing and then trade abroad for other goods, which increases wealth all around. Capital account convertibility helps attract foreign investment, because unless foreigners can repatriate profits they will be reluctant to invest. Foreign capital investment can offset a large current account deficit and speed the introduction of urgently needed foreign goods to modernize the economy.

The ability to purchase both domestic and foreign goods readily is what makes the dollar and Western currencies fully convertible "hard" currencies, and what makes them so highly prized in Cuba. To reap the full benefits of participating in world markets, post-Castro Cuba needs to make the peso fully convertible. Cuba's present monetary system, in particular its central bank (the Banco Nacional de Cuba), is an obstacle to a market economy. There are no reliable statistics of inflation, since almost all prices are controlled by the government, but the difference between the peso's official exchange rate and its black-market rate is a rough indicator of the Banco Nacional de Cuba's currency debasement over the long run. Officially, the peso is worth approximately 1.25 U.S. dollars; on the black market, it is worth 10 cents.

Cuba's experience with the bad effects of central banking is far from unique. For the 99 nations that the World Bank classifies as low- and middle-income, average annual inflation was 16.7 percent from 1965 to 1980 and 53.7 percent from 1980 to 1989. This poor performance explains why Paul Volcker, the former chairman of the U.S. Federal Reserve System, has indicated that he has little faith that central banks in formerly communist nations can achieve full convertibility. Addressing central bankers in Jackson Hole, Wyoming in 1990, Mr. Volcker noted that markets developed long before central banks, and stressed that Eastern Europe and the USSR might actually retard their transition to markets by relying on central banks¹. Central banks are essentially not market institutions, which is why Marx and Engels said in the *Communist Manifesto* that one of the steps for achieving communism was "Centralization of credit in the hands of the state, by means of a national bank with state capital and an exclusive monopoly."²

To gain credibility, the post-Castro Banco Nacional de Cuba must painstakingly establish a good track record. The lack of credibility of official promises has already led Cubans to conduct their own unofficial monetary reform by partly dollarizing Cuba's economy.

The problem of credibility will lock the central bank and the public into a game that has no winners. Central bank promises to maintain currency stability, even by means of a fixed exchange rate, will not be credible. Prices will continue to rise quickly because workers will base their wage demands on the Banco Nacional's dismal past performance. State-owned enterprises and government ministries will likewise continue their free-spending ways, because they will

¹Volcker 1990.

²Marx and Engels (1848) 1948, p. 30.

correctly expect that the government will rescue them by forcing the central bank to print money, as has so often happened before. Workers and enterprises will anticipate that this "soft budget constraint" will continue, and they will behave accordingly.

If the post-Castro Banco Nacional miraculously does establish and maintain currency stability, the consequences could almost be worse than under continued inflation. Because the Banco Nacional will lack credibility, people will remain skeptical of it for years. To gain credibility, the Banco Nacional will have to keep the peso overvalued and keep real (inflation-adjusted) interest rates high. That may plunge Cuba into a depression. In such a depression, the export sector will suffer more than other sectors. That is what has happened in Yugoslavia, whose December 1989 currency reform was not completely credible. People correctly anticipated that the National Bank of Yugoslavia would not maintain the original fixed exchange rate, so real interest rates exceeded 30 percent per year because the rates contained a large devaluation risk premium. Similarly, Argentina's April 1990 monetary reform installed a system somewhat like a currency board, but with no guarantee that the central bank will long maintain a pegged exchange rate with the U.S. dollar. As of this writing (December 1991), local currency interest rates in Argentina are about twice as high as dollar interest rates in Argentina. A credible monetary reform that has *no* devaluation risk can keep real interest rates in single digits (for the least risky loans), as they are in Western industrial nations, and hence can save Cuba much pain.

Cuba could make the peso convertible by maintaining a floating exchange rate rather than a fixed rate. But though a floating exchange rate would balance supply and demand for domestic currency against foreign currency, it would not restrain the Banco Nacional's power to create credit. Instead, it is likely to lead to a South American-style hyperinflation. Domestic political pressure groups representing the old order will favor renewed inflation rather than stable money and prices. As inflation mounts, prices will become increasingly unreliable indicators for guiding economic activity and the transition to a market economy will become even more difficult because a market economy needs fairly stable prices to work well.

To have a stable currency, post-Castro Cuba needs to remove monetary policy from political influence. It needs to give its monetary reform instant credibility, to avoid the dangers of continuing inflation on the one hand and depression on the other hand. The best way to do so is to strip the Banco Nacional de Cuba of currency issuing functions, and to establish a *currency board*, such as exists in Hong Kong and (in modified form) Singapore. The only job of the currency board would be to issue a convertible currency according to strictly defined rules. A currency board is explicitly designed to maintain a fixed exchange rate. A currency board is easy to establish and operate, and currency boards have *always* been able to maintain fixed-rate currency convertibility, even during the most trying times.

A currency board would quickly establish a hard domestic currency and instill monetary confidence. As a result, economic agents would alter their

expectations. If the U.S. dollar were the currency with which the currency board established a fixed exchange rate, Cuban workers could not raise wages and enterprises could not increase prices much beyond their rates of increase in the United States unless they achieved corresponding gains in productivity or quality. If the Cuban government established secure property rights and removed barriers to foreign investment, interest rates would also be close to their levels in the United States. Under the currency board system, the Cuban government would have to finance itself exclusively by taxation and borrowing, not by inflation, because a currency board cannot be an agent of government finance.

Linking the peso to the dollar would not subject Cuba to U.S. political domination, as some people may fear. Rather, it would restore an element of national dignity by giving Cuba the sound currency it now lacks. By making the peso as sound as the dollar, a currency board offers a way for the peso to become attractive as a store of value and to displace dollars from circulation. That would stop the perverse form of foreign aid that now flows from Cuba to the United States.

A currency board is essential to wider fiscal and economic reforms. With a stable monetary environment, Cuba would be able to successfully take the next steps towards a market economy.

This essay explains what a currency board is. It describes the difference between how money is supplied in a currency board system and in a central banking system. It demonstrates why the currency board system is superior to a central banking system. It also details how to establish and operate a currency board--including how to obtain the foreign currency for the board's reserves--and how to insulate the board from political pressure.

2. WHAT IS A CURRENCY BOARD?

A currency board is an institution that issues notes and coins convertible into a foreign "reserve" currency³ at a fixed rate and on demand. It does not accept deposits. As reserves, a currency board holds high-quality, interest-bearing securities denominated in the reserve currency. A currency board's reserves are equal to 100 percent or slightly more of its notes and coins in circulation, as set by law. (Commercial banks in a currency board system need not hold 100 percent reserves in reserve-currency assets, however.) The board generates profits (seigniorage) from the difference between the interest earned on the securities⁴ that it holds and the expense of maintaining its note and coin circulation. It remits to its owner (historically, the government) all profits beyond what it needs to cover its expenses and to maintain its reserves at the level set by law. The currency board has no discretion in monetary policy; market forces alone determine the money supply.

As an introduction, let us briefly examine the main characteristics of a currency board. We shall discuss them in more detail later.

Convertibility: The currency board system assures that the currency will be convertible at a fixed rate. No currency board has ever had problems maintaining fixed-rate convertibility. Currency boards in Burma and North Russia even maintained fixed-rate convertibility in the midst of civil war. The currency boards of British colonies maintained convertibility during the Great Depression and (where not overrun by enemy armies) during World War II.

Reserves: A currency board holds sufficient reserves to ensure that even if all holders of notes and coins want to convert them into the reserve currency, the board will be able to do so. Currency boards have usually held reserves of 105 or 110 percent of liabilities, so that they would have a margin of protection in case the interest-earning securities that they held lost value. If Cuba used the U.S. dollar as its reserve currency, for instance, the peso would remain as good as the dollar. Chapter 6 will discuss how to acquire the necessary reserves.

Seigniorage: Unlike securities or most bank deposits, notes and coins do not pay interest. Hence, notes and coins are like an interest-free loan from the people who hold them to the issuer. The issuer's profit equals the interest earned on reserves minus the expense of putting the notes and coins into circulation. In addition, if the notes and coins are destroyed, the issuer's net worth increases because his liabilities fall but his assets do not.

Under a currency board system, the domestic currency is as sound as the foreign reserve currency. The only economic difference between using a domestic

³It is also possible to use a basket of currencies or gold as the reserve asset, as a few currency boards have done.

⁴Or, for a currency board whose reserve asset is gold, interest on loans of physical gold. A well-organized market for such loans exists in London.

currency issued by a board as legal tender, instead of a foreign currency, is that the seigniorage generated by a currency board issue is captured domestically; whereas, if a foreign currency is used as legal tender, the foreign issuer captures the seigniorage. The domestic seigniorage generated by a currency board can be significant. Expenses incurred by currency boards are usually about 1 percent of assets per annum. Profit rates are equal, therefore, to the interest rate earned on assets minus 1 percent. Conservatively, that rate should be at least 4 percent per annum.

In addition to seigniorage, the use of a domestic currency board issue as legal tender, rather than a foreign currency, generates another domestic advantage: national pride is enhanced.

Monetary policy: By design, a currency board has no discretionary powers. Its monetary policy is completely automatic, consisting only in exchanging its notes and coins for the foreign reserve currency at a fixed rate. Since a currency board's role is strictly circumscribed, it is less likely than other monetary systems to suffer political pressures to engage in economically unsound policies.

* * * *

Over sixty countries have had currency boards during this century. Most of them have been British colonies or former colonies. Despite the success of currency boards, only a few currency board-style monetary systems exist today, most notably in Hong Kong and (in greatly modified form) in Singapore. Most other countries that once had currency boards replaced them with central banks. These changes were made for political, not economic, reasons. Politicians saw central banking as a way of manipulating the money supply to their own advantage. Since abandoning the currency board system, many of those countries have experienced inflation and economic stagnation. Hong Kong and Singapore, on the other hand, have been two of the world's most rapidly growing economies, despite their lack of natural resources. Moreover, they have realized relatively low rates of inflation.

3. HOW A CURRENCY BOARD WORKS

The currency board system relies entirely on market forces to determine the amount of notes and coins that the board supplies. Market forces also determine the amount of deposits and other components of the broader money supply that commercial banks and other financial institutions supply. The currency board has no independent role in determining the supply of commercial bank reserves in the financial system, because its 100 percent reserve requirement makes it simply a sort of warehouse for reserve-currency assets once it has been established. Since a currency board cannot independently influence the amount of reserves, it cannot influence the total supply of credit. A central bank, in contrast, can independently expand or contract the amount of reserves available to commercial banks, thus influencing the supply of bank credit. Contrary to what one might suspect, though, the supply of notes, coins and credit in a currency board system is quite responsive ("elastic") to changes in demand, because the reserves can be acquired from the reserve-currency country.

In a currency board system, the amount of credit that commercial banks can create, and hence the money supply measured broadly, is limited by their ability to maintain sufficient reserves to support that amount of credit. Real credit is as plentiful as in a central banking system; indeed, Hong Kong and Singapore are major centers of ample, low-cost finance. Currency board rules merely prevent the currency board from creating reserves in an inflationary manner, as a central bank can do. The currency board country stands in a somewhat similar relation to the reserve-currency country as, say, Florida does to the rest of the United States. The government of Florida cannot create bank reserves, nor can a currency board.

Commercial banks are middlemen between lenders (depositors) and borrowers (people who spend bank loans). A commercial bank cannot for long grant more credit to borrowers than depositors wish to grant to the bank. If a commercial bank grants excessive credit, the borrowers will spend it (for instance, by writing checks). More funds will flow out of the bank than flow into the bank from checks written on other banks. To prevent this sort of mistake from resulting in bankruptcy, a bank holds reserves. Reserves protect it from the consequences of its occasional mistakes.

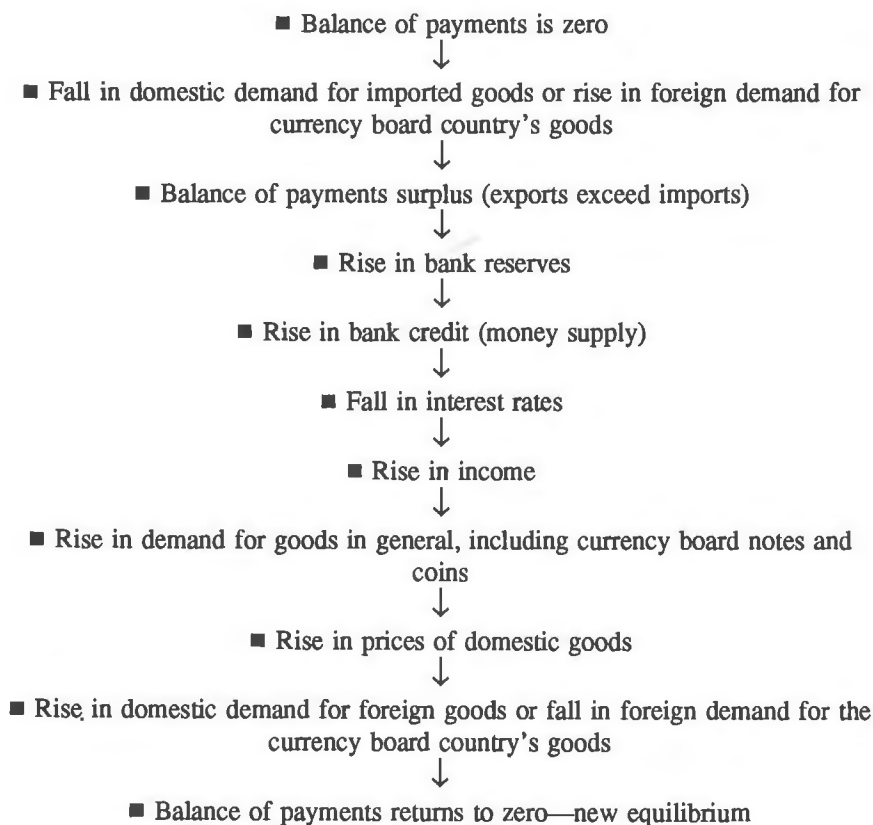
The ultimate reserves in a currency board system are holdings of the reserve currency and assets such as bonds that are denominated and payable in the reserve currency. The only way to acquire new reserves is to obtain them from the reserve-currency country. In its simplest form, this requires running a balance of payments surplus or receiving gifts, grants and loans from outside Cuba. Under certain simplifying assumptions (enumerated in Annex III), changes in the balance of payments change the supply of domestic money in the same direction. A surplus in the balance of payments increases the supply of domestic money. A deficit in the balance of payments, on the other hand, decreases the supply of domestic money. (The balance of payments is the value of exports minus the value of imports. The supply of domestic money taken in the broad sense comprises currency board notes and coins in circulation plus deposits at

commercial bank.)

The easiest way to illustrate the link between changes in the balance of payments and the domestic money supply under a currency board system is with flow diagrams. Readers who wish a more technical discussion should consult Annex III.

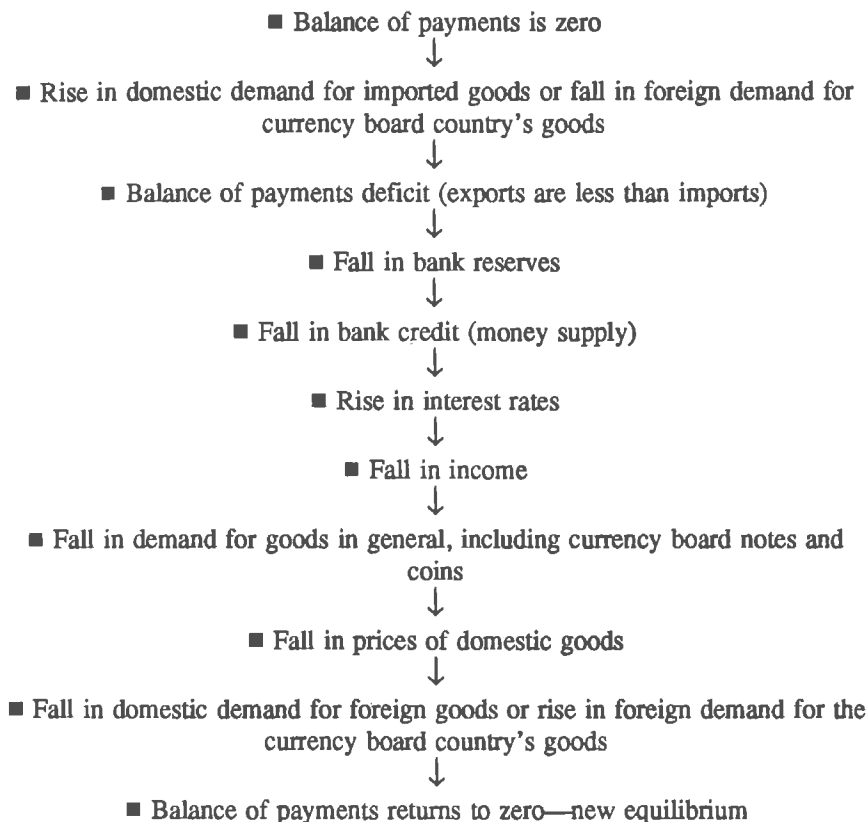
We begin our analysis with Figure 1. To start, the balance of payments is in balance and exports equal imports. We then put the system in motion by generating a balance of payments surplus. The surplus works its way through a currency board system in the sequence depicted in Figure 1. Notice that the currency board plays an explicit role in the chain of events depicted in Figure 1 only at the stage labeled "rise in demand for goods in general, including currency board notes and coins."

FIGURE 1



When there is a balance of payments *deficit*, the money supply process works as in Figure 2.

FIGURE 2



There are two important points to notice about the adjustment process in a currency board system. The first is that market forces rather than central bank action set it in motion; it is automatic, as far as the currency board is concerned. The second point is that because the exchange rate is fixed, arbitrage occurs entirely through changes in the quantity of money, interest rates, and the balance of payments, rather than through the exchange rate. In that respect, the currency board system is like the gold standard or the gold exchange standard. A fixed exchange rate between the currency board currency and the reserve currency should make arbitrage of goods very tight, if impediments to trade are small. Overall price changes, as reflected in wholesale price indexes, should not differ greatly between the two countries. Interest rates also should be roughly the same in both countries, unless taxes or perceived risks make lending costlier in one country. The experience of currency board systems bears this out. In Hong Kong, for instance, interest rates and the prices of exported goods have closely tracked their counterparts in the United States since Hong Kong linked its currency to the U.S. dollar in 1983, except for brief periods when people suspected that Hong Kong's balance of payments surpluses with the United States might tempt the Hong Kong government to revalue.

For the sake of clarity, our treatment of the mechanics of currency board money supply made some simplifying assumptions (enumerated in Annex III). Real conditions are rarely, if ever, so simple. It is possible, and in fact quite common in a currency board system, for changes in the money supply to move in the *opposite* direction from changes in the balance of payments. However, that is perfectly acceptable. There is no reason why the money supply in a modern fractional-reserve banking system should have a rigid relation with the balance of payments, if other factors simultaneously move the money supply in the other direction. Foreign investment is one of the important factors that can break the rigid relation of the money supply with the balance of payments. Hong Kong and Singapore have experienced deficits in their balances of payments for decades at a time, yet their domestic money supplies have steadily increased because they were attracting large inflows of foreign investment. This is a pattern that we would expect to occur in Cuba, too, if it established a currency board. It holds generally for fast-growing countries that adhere to fixed exchange rates.

4. CENTRAL BANKING

The essential difference between a currency board and a central bank is that a central bank does *not* work automatically. A central bank has discretionary power to influence the supply of money, and it is not necessarily guided by considerations of monetary profit and loss. A currency board system is by nature a fixed exchange rate monetary system, while central banking is not. As we shall explain in the next chapter, the nature of central banking tends to drive central banking systems off of fixed exchange rates to floating exchange rates. Consequently, in this chapter, we compare a currency board to a floating-rate central bank, not to a central bank that maintains a fixed rate.

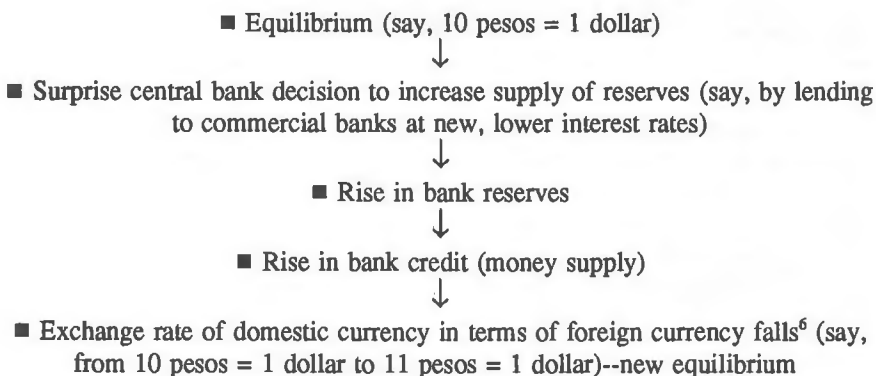
Central banks typically perform many other functions besides influencing the supply of money. They regulate commercial banks, serve as lenders of last resort to the banking system, give economic advice to the government, and clear checks. However, all these are secondary to their role in influencing the money supply. Only central banks control the supply of reserves in the banking system, whereas other government bodies can and do often perform the remaining central banking functions. For instance, in the United States, the Federal Reserve System shares regulatory powers with the Treasury Department, lender-of-last-resort powers with government deposit insurance agencies, economic advising powers with several other government bodies, and check clearing with commercial banks. We shall focus only on how central banks influence the money supply, so that we can contrast it with currency boards' role in the money supply process.

In a currency board system, the starting point in the chain of events in our example of a money supply *expansion* was a fall in the demand for imported goods in the currency board country. Changes in demand for imported goods originate in the market, as a result of changes in people's wants. In a central banking system, the starting point is a decision by the central bank to expand the supply of bank reserves. That is a *not* a decision that originates in the market. Indeed, the central bank can decide to act oppositely to what would happen under a currency board system.

Diagrammatically, the chain of events in the case of a surprise⁵ money supply expansion under central banking looks like this (see Figure 3):

⁵We consider only the case of a surprise to avoid complications concerning expectations.

Figure 3

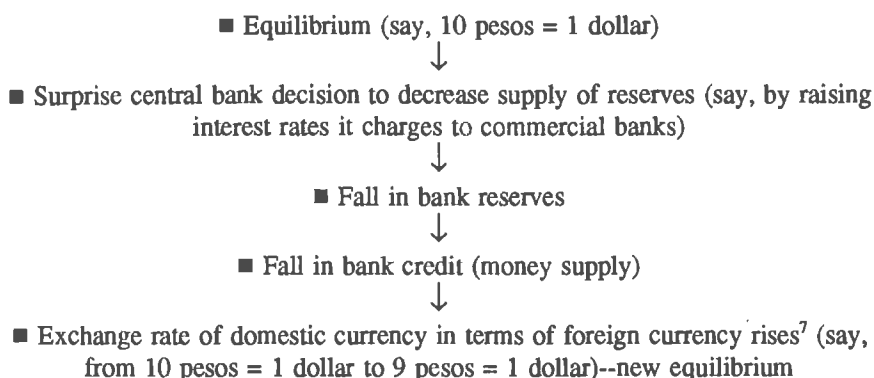


⁶This is American terminology. Standard European terminology considers this a rise.

To bring out more clearly the contrast with a currency board system, the diagram omits consideration of the effects of various lags. It assumes that nominal prices adjust very quickly, leaving real prices unchanged. The only effect of the central bank's decision is a fall in the exchange rate. Under the more realistic assumption that some nominal prices are somewhat "sticky" and do not change quickly, the central bank's action has real effects on the economy. Indeed, that is the purpose of discretionary central bank policy under floating exchange rates. In the sequence above, the likely effect of the central bank's action would be to lower the prices of domestic goods compared to foreign goods, causing a temporary export boom.

The chain of events in the case of a money supply contraction under central banking looks like this (see Figure 4):

Figure 4



Again, the diagram omits consideration of lags, and assumes that nominal prices adjust very quickly, leaving real prices unchanged. The only effect of the central bank's decision is a rise in the exchange rate. If some nominal prices do not change quickly, the likely effect of the central bank's actions will be a rise in the prices of domestic goods compared to foreign goods, causing a drop in exports.

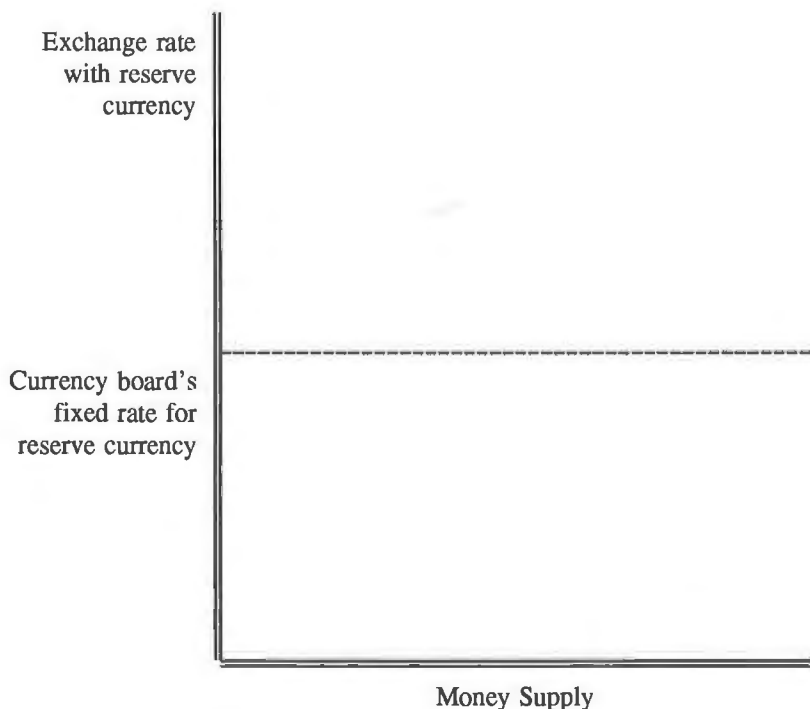
⁷Standard European terminology considers this a fall.

5. ADVANTAGES OF A CURRENCY BOARD OVER A CENTRAL BANK

The key difference between a currency board system and a central banking system is that a currency board has no power to carry out a discretionary monetary policy. Two forces "pin down" the board's action: a fixed exchange rate with a foreign reserve currency and a fixed (100 percent or more) reserve ratio. The board does not vary the exchange rate, nor does it alter the supply of bank reserves independently of changes in the balance of payments or in other market forces.

Diagrammatically, the range of values that the supply of reserves (and hence the broader money supply) can have in a currency board system is as in Figure 5. Note that a board's supply function for its domestic currency issue is totally elastic at the fixed exchange rate. Hence, the quantity of the domestic currency in circulation will depend strictly on the demand for that currency.

Figure 5



The money supply picture also is as in Figure 5 when a central bank adheres to a fixed exchange rate. However, as we shall explain below, the nature of central banking tends to make central banks abandon fixed exchange rates in favor of floating exchange rates, so we shall consider only a central banking system with a floating exchange. In such a system, *any* combination of the nominal exchange rate and the nominal quantity of money is theoretically possible, because the central bank's liabilities count as reserves for commercial banks. Commercial bank deposit credit expands or contracts as reserves expand or contract. The central bank does not pledge itself to maintain any particular exchange rate between a foreign currency (or gold) and its own currency. Potentially, the central bank can make the supply of commercial bank reserves whatever it wishes. Therefore, if the public wishes to hold a constant amount of bank deposits and central bank notes and coins, when adjusted for inflation or deflation, the exchange rate must adjust to keep the real supply of money constant. In a currency board system, in contrast, the exchange rate is fixed.

* * * *

In our judgment and in the judgment of many other economists who have studied the question, a fixed exchange rate is better than a floating exchange rate for a developing country, such as Cuba. A fixed exchange rate costlessly eliminates exchange rate risk with the reserve currency. Trade between the currency board country and the reserve-currency country becomes easier than under floating rates because there is no need to allow for a risk premium in goods prices. People can make more exact price calculations for internationally traded goods. That enhances economic efficiency by making the lowest-cost producers within the common currency area those with the greatest natural advantages, not those temporarily benefiting from the distortions to the international price structure that large, sudden exchange rate fluctuations cause. A fixed exchange rate also enables entrepreneurs to apply to other problems talent that, in a floating rate system, they would apply to currency speculation.

Eliminating exchange rate risk also encourages foreign investment, particularly from the reserve-currency country. Investors know with certainty what exchange rate they will receive in terms of the reserve currency if they should want to repatriate profits in the future. By making it easy for them to exit the market, a fixed exchange rate is more likely than a floating rate to encourage them to enter the market. Under the currency board system, British colonies were very successful at attracting British capital to foster their economic development. Fixed exchange rates with the pound sterling and laws resembling those of Britain made investments in Kenya as secure as investments in the English county of Kent. British colonial banks aided the transfer of capital by linking London financial markets to their branch banking networks in the colonies. The colonial banks also helped speed economic growth by transferring the sophisticated banking techniques developed in Britain to areas where it otherwise would have taken generations to develop local banking expertise to such a pitch without outside help. Today many

former British colonies, having discarded the currency board system, nationalized British banks, and reduced property rights, find themselves shut out of international capital markets. Similarly, Cuba enjoyed high economic growth and prosperity relative to other Latin American nations during the period that it used U.S. dollars directly (1899-1951) and during the pre-Castro period when the peso had a fixed exchange rate with the dollar without capital controls. (The peso's present fixed exchange rate of about 1 peso = 1.25 dollars does not qualify as a true fixed rate because it is not a market rate. The true, black-market rate is approximately 1 peso = 10 cents.)

Another advantage of a fixed exchange rate is that it would enable Cuba to "piggyback" on the reserve country's financial markets. The peso would become essentially a denomination of the reserve country's currency. Accordingly, Cuban entrepreneurs could take their cues from the highly liquid, well-established markets in the reserve-currency country. Entering the reserve currency country's markets directly becomes extremely easy. Financial markets in the United States offer facilities for interest-rate hedging, foreign exchange swaps, and many other transactions that will not be available on a similar scale in Cuba for many years, if ever. Ready access to large foreign financial markets, with no foreign-exchange risk, speeds economic growth. Hong Kong, for instance, attracted enormous investment first from Britain and then from the United States because the Hong Kong dollar was linked to the pound sterling (and, under the Bretton Woods system, to the U.S. dollar indirectly), and since 1983 to the U.S. dollar.

Finally, a fixed exchange rate, if credible, becomes a feature of the economic landscape and ceases to be a subject of political contention. In particular, it enables the economy to avoid the vicious cycle of inflationary wage and price increases causing pressure on the central bank to depreciate the currency as a way of keeping wages internationally competitive. The cycle leads to a new round of wage increases as workers demand more money to keep pace with the price increases for imported goods, which depreciation was to blame for in the first place. In many developing nations today, the knowledge that the central bank will bow to pressure to depreciate the currency induces the vicious cycle of hyperinflation. A fixed exchange rate enforced by a currency board, on the other hand, is supremely credible. No currency board has ever abandoned its fixed exchange rate unless actually overrun by an enemy army. Even then, since currency boards held their assets abroad, they were able to shelter their assets; the problem was with their notes and coins, which invading armies usually tried to replace with inflationary occupation currency. A currency board stops hyperinflation cold because workers and employers know that if they want to stay in business, wages and prices must be competitive from the start. Since a currency board always has reserves of at least 100 percent in assets that it can readily liquidate, it is always able to defend the fixed exchange rate.⁸

⁸Commercial banks can go bankrupt if they fail to keep appropriately liquid assets. Commercial banks have sole responsibility for keeping their deposits convertible at a fixed rate into currency board notes and coins (1 peso of deposits = 1 peso of currency board

It is, of course, possible to *have* a central bank that offers a fixed exchange rate with a foreign currency. However, historical experience shows that it is not easy to *maintain* a fixed exchange rate in a central banking system. Central banks have a strong tendency to break their promises to maintain fixed exchange rates. Central bank incentives are such that, at least in the short run, central banks benefit more by breaking promises than by keeping them. There is an inherent conflict between a central bank's power to create or withdraw commercial bank reserves at will and a fixed-exchange-rate rule.⁹ There is no such thing as a completely rule-bound central bank.¹⁰ In the end, discretionary power has almost always overcome attempts to confine central bank policies with monetary rules.

The only central bank we are aware of that did not devalue its currency against gold or impose capital controls during the Great Depression was that of Albania. More recently, the Bretton Woods system collapsed because the U.S. Federal Reserve and other central banks followed excessively expansionary monetary policies. Currency boards, in contrast, have never devalued.

The history of former currency board countries also offers evidence of the natural tendency of central banks to break fixed exchange rates. For instance, the countries that formerly belonged to the East African and West African currency boards--Kenya, Uganda, Tanzania, Somalia, Yemen, Nigeria, Ghana, Gambia, and Sierra Leone--have all broken their fixed exchange rates, imposed capital controls, and had higher average rates of inflation than Britain (their former reserve-currency country) since they left the currency board system. From 1974 to 1983, Hong Kong abandoned the currency board system and experimented with a "free issue" system, an unusual arrangement that had neither a fixed exchange rate nor a monetary authority. Hong Kong returned to the currency board system in 1983 and since has experienced much more stable monetary growth rates and lower inflation than during the free issue period.

In short, then, a currency board cannot act as an independent disturbing element in the economy. Market forces call the currency board's tune. In contrast, a central bank has the power to de-stabilize the economy, and the history of central banks shows that they have often used that power, sometimes intentionally, but other times by mistake. A central bank run by saints, as long as

notes). If commercial banks fail, the currency board has no responsibility for their deposits. The board is responsible for redeeming its own notes and coins, not for redeeming the deposits of commercial banks.

⁹Economists call this problem "time consistency." See Kydland and Prescott 1977.

¹⁰A central bank that maintains a fixed exchange rate with gold or a foreign currency and that keeps 100 percent gold or foreign-exchange reserve requirement for its note issue is not like a currency board, because it retains discretionary control of its deposit liabilities.

they were not all-knowing saints, would still not work as well as a currency board system.

6. HOW TO ESTABLISH A CURRENCY BOARD

As past experience with currency boards in places as diverse as North Russia, Palestine, Danzig, and the Philippines indicates, it is fairly simple to replace a central bank with a currency board. Central bank functions that do not directly concern influencing the supply of money can be delegated to other government departments or to commercial banks. The central bank's deposit-creating powers can be abolished, its deposit liabilities can be separated from its note and coin liabilities, and then it can be converted into a currency board, issuing only notes and coins. We now present two step-by-step plans for establishing a currency board. The first assumes that Cuba replaces its the Banco Nacional de Cuba with a currency board. The second assumes that the Banco Nacional will continue to exist, and that the currency board will issue a parallel currency that has equivalent legal tender status with the central bank currency. The two currencies will not have a fixed exchange rate, though, unless the central bank also decides to peg its currency to the same reserve currency that the currency board uses.

If Cuba replaces the Banco Nacional de Cuba with a currency board, the steps are:

(1) Delegate to other bodies all central banking functions that do not directly concern influencing the supply of money. For instance, the finance ministry can take over the job of regulating bank practices and giving advice on monetary affairs. Commercial banks themselves can take over the check clearing system, as they do in Canada, where clearing is more efficient than in the largely government-run American clearing system. Commercial banks can also provide mutual deposit insurance protection, as they do in Germany and Switzerland.

(2) Abolish the Banco Nacional's power to create credit. This involves freezing the Banco Nacional's overall deposit credits (although not necessarily each individual credit) at existing levels. It is possible for a government to run a budget deficit under a currency board system; the North Russian government did so, for instance. However, in a currency board system, the government cannot finance itself by inflation. If it runs a deficit, it must cut spending, borrow from the public, or raise taxes to close the gap. Government-owned banks or other enterprises that make losses must be sold, declared bankrupt, or subsidized out of tax revenue. Hence, a currency board system imposes a "hard budget constraint" on government finances.

(3) Separate the Banco Nacional's commercial banking functions from its currency issue functions. In the United States and other free-market nations, there is a sharp distinction between central banking and commercial banking. Central banks do not generally take deposits from or lend directly to the public. Corresponding to the distinction between central banking and commercial banking is a distinction between central bank-issued currency (which count as reserve assets for banks) and loans (which are assets, but are not reserves). In Cuba, there is no real distinction between reserves and other assets, because the Banco Nacional both

issues currency and handles commercial banking functions. The commercial banking functions should be spun off into one or two commercial banks independent of the Banco Nacional's currency issue department. The Banco Popular de Ahorra, the existing consumer savings bank, should likewise be spun off. All the resulting banks should be privatized. (Privatization will probably not happen until after the currency reform.)

(4) Make sure that commercial banks have adequate reserves. Since Cuba's banking system lacks the distinction between currency and other commercial bank assets, it will be necessary to give adequate reserves to the commercial banks created out of the central bank. Banks hold these reserves to guard against deficits in clearing with other banks, a need that exists whether or not legal reserve requirements exist. Once this step is completed, the commercial banks created out of the central bank should no longer be allowed to borrow from the central bank.

None of the British colonies and few of the other currency board systems of the past required banks to hold any particular minimum legal reserve. They let the banks decide what reserve level was most prudent. A currency board system does not need legal reserve requirements to work, and it would be unwise to impose such requirements.

After subtracting for legally required reserves, average reserves in free-market banking systems rarely exceed 5 percent of deposit liabilities. In Cuba, higher reserves will probably be necessary because the condition of banking technology is primitive. We suggest 10 percent reserves as a rough guideline. The banking systems of many communist nations are in effect bankrupt because of years of mismanagement. The same may well be true of Cuba's banking system; if so, it will be necessary to restructure the banking system. In the meantime, it is vital to commerce that the government not completely freeze bank deposits, because that would deprive firms of the most ready means for paying each other. Giving banks 10 percent reserves would allow them to allow deposit holders partial use of deposits.

An opposite type of problem can arise if the newly created commercial banks are in fact solvent. If legal reserve requirements are abolished in connection with instituting a currency board system, and all central bank notes and deposits are converted into currency board notes, there will be a one-time jump in bank credit. The jump may be quite large and may cause a big rise in prices. For instance, if the legal reserve requirement is 10 percent of liabilities, and commercial banks hold 20 percent reserves, their usable reserves are only 10 percent of liabilities. Assuming that 10 percent is their desired level of reserves, abolishing the reserve requirements would allow banks to grant twice as much credit as before ($20\%/10\% = 2$), other things being equal. To avoid such problems, the government can neutralize ("sterilize") the legal reserves or some of the central bank notes; in other words, convert them into something other than reserves. They could be converted into government bonds, or even extinguished altogether.

(5) Convert all remaining reserves that commercial banks hold with the central bank into currency board notes and coins or into foreign assets,

as the commercial banks prefer. With this step, the deposit liabilities of the Banco Nacional will cease to exist.

(6) **Fix an exchange rate.** After the deposit liabilities of the Banco Nacional cease to exist, all that will remain will be its note and coins issue and net worth (as liabilities), and its foreign exchange holdings (as its main assets). Its other assets and liabilities will have been given to commercial banks or the government, or will have been extinguished. The central bank should be given all government-owned foreign exchange that is not distributed to commercial banks in step (4).

To convert what remains of the central bank into a currency board, the government must now fix an exchange rate with a reserve currency and, simultaneously, make sure that the foreign currency reserves for the note and coins issue equal 100 percent.

The exchange rate between the foreign reserve currency and the domestic currency must be appropriate. A rate that is too high will price exports out of world markets. A rate that is too low will make imports very expensive, inhibiting the ability of domestic industry to buy foreign capital goods for modernization. The best indication of an appropriate exchange rate is the free-market rate, which reflects unconstrained forces of supply and demand. Accordingly, if the economic situation permits some breathing room, the first step in *fixing* an exchange rate for the peso is to let the exchange rate *float* for a time. At present, it is impossible to determine the equilibrium level of exchange rates because there are laws constraining supply and (especially) demand. To reveal the true supply and demand, foreign exchange rates should be unified and all foreign-exchange restrictions, including capital controls, should be removed. Market forces will most accurately reveal themselves if foreign trade is also liberalized when exchange restrictions are removed. Interest-rate ceilings should also be abolished by this point.

At the time that exchange rates are allowed to float, the government should announce which foreign currency it intends to establish as the reserve currency and on what date it will fix the exchange rate. The logical choices for a reserve currency is the U.S. dollar, the most widely used unofficial currencies and the most widely used currency in international trade.

During the period of floating, the government can continue to deal in the foreign-exchange market, but it should not try to influence the market, which would defeat the float's purpose of revealing the free-market exchange rate. It could deal in foreign exchange passively at some suitable spread around the market rate. When the date to fix the exchange rate arrives, the government should fix the rate somewhere within the range of recent trading rates. Rate fixing is an art rather than a science, and it is best to err by making the rate too low (too cheap in terms of the reserve currency) rather than too high. It is better to start with a rate that produces a high balance-of-payments surplus than one that produces a balance-of-payments deficit crisis. (Of course, there is nothing wrong with running a balance-of-payments deficit if it is the result of a surge in foreign investment. What Cuba wants to avoid is a situation where it not obtaining enough foreign

exchange to pay its foreign-currency debts.) There is some latitude in setting an exchange rate, though, as other countries' experience with exchange-rate fixing shows. As long as the rate is approximately correct and people are confident that the government is committed to it, the economy will make minor adjustments towards equilibrium quickly.

Where drastic currency reform is necessary today rather than a few days or weeks from now, the exchange rate can be set at the existing black-market rate, or an average of commodity exchange rates, if the commodity rates are even less favorable to the domestic currency.

(7) Ensure that foreign currency reserves equal 100 percent of note and coin circulation. The currency board should begin with foreign currency reserves equal to 100 percent of its note and coin circulation. Allowing the board to operate with fractional reserves opens the way to discretionary monetary policy, like a central bank. The purpose of a currency board is to make monetary policy completely rule-bound. Having 100 percent reserves from the start is vital to ensuring the currency board's credibility as a politically independent body with no discretionary monetary policy.

The first source of foreign currency reserves are the existing reserves of the Banco Nacional de Cuba and the government. They are estimated to be no more than 50 million dollars at present. The government could increase the reserve ratio by selling state property for domestic currency and not reissuing the currency or, equivalently, selling the property for foreign currency. If reserves are still less than 100 percent, it will be necessary to borrow the difference. It should be easy to borrow from international agencies, foreign central banks, or foreign commercial banks, because the board will be able to repay loans as long as it can either lend at higher interest rates than it borrows or has large enough unborrowed reserves. Even if the currency board has to pay a higher interest rate than it receives on its reserve assets, its unborrowed reserves will yield interest that it can use to pay the interest on its borrowed reserves. For instance, if the board has to borrow 50 percent of its reserves, has to pay interest of 8 percent, receives interest of only 7 percent, and has expenses of 1 percent of total reserves (borrowed plus unborrowed), its profits will be $7\% - (50\% \times 8\%) - 1\% = 2\%$, which leaves funds to pay the principal on the borrowed reserves.

Cuba does not publish statistics that would enable us to estimate the peso money supply accurately. Accordingly, we shall calculate the amount of reserves that a Cuban currency board might require by resorting to a rule of thumb rather than an exact procedure. The rule of thumb is that for less developed countries, currency per person usually equals about 4 percent of gross domestic product. Cuba's gross domestic product per person, calculated realistically rather than by Cuban government standards, is probably around 1,000 U.S. dollars. There are approximately 10.7 million Cubans. Total gross domestic product is therefore around 10.7 billion dollars, and 4 percent of that is 428 million dollars. Say that currency is 40 percent of the money supply and deposits are 60 percent. To provide 10 percent reserves against deposits, a ratio we discussed earlier, would require approximately 64 million dollars. The total amount of foreign-currency reserves necessary for the currency board system would be 428 million dollars +

64 million dollars = 492 million dollars.

(8) Transfer the central bank's remaining assets and liabilities to the new currency board and open the board for business. At the moment that the government fixes the exchange rate with the reserve currency, the Banco Nacional should officially become a currency board. By then the Banco Nacional will have none of its other former functions, so all that remains is to bring into force a statute detailing its functions and responsibilities. Annex I below is a model statute based on typical features of past currency boards in Hong Kong, British West Africa, Burma, Libya, and elsewhere.

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The alternative to replacing the central bank with a currency board is to establish a currency board as the issuer of a parallel currency. It may be more politically feasible to establish a parallel currency than to directly threaten the entrenched interests that favor keeping the Banco Nacional. In a parallel-currency system, the Banco Nacional can continue to function with its existing staff and its existing assets; nothing need be taken away from it to give to the currency board. The two currencies will not have a fixed exchange rate, though, unless the central bank also decides to peg its currency to the same reserve currency that the currency board uses. The currency board's notes and coins should be given equivalent legal tender status with those of the central bank. A parallel currency will give the central bank the choice of ceasing to depreciate its currency or withering away as people switch to using the currency board's currency. Contrary to what one might expect, government revenue from seigniorage under a parallel currency system might well *increase*. A currency board would give Cuba the chance to capture some seigniorage that it is now losing to the United States government.

How can the currency board get started in such circumstances, though? There must be an incentive for people to exchange their foreign currency for the board's currency. The solution is to offer a small premium on foreign currency for a short period during which the board exchanges its currency for foreign currency, but not the reverse. For instance, after announcing a choice of reserve currency and an exchange rate with that currency, during a one-week period the board can offer to pay a premium of 2 percent on all hard currency offered to it by citizens of that country. (It could accept other hard currencies besides the reserve currency, then exchange them for reserve-currency assets.) To prevent arbitragers from using its offer for pure speculative gain, the board could announce that it retains the right to revoke the premium at its discretion. After the offer expires, the board would cease paying a premium and would also be open to make exchanges from its currency into the reserve currency. As long as there is some confidence in the board, it will easily be able to recoup the expense of the premium within a short time, from the interest it earns on reserve-currency assets. The board should secure a loan starts to make sure that its reserves are 100 percent of liabilities from the start, but soon its interest income will enable it to repay the

loan. Because the board is a separate body from the State Bank, and because it keeps 100 percent reserve-currency assets, it should enjoy greater public confidence than typical past parallel-currency reforms, where the central bank has issued both currencies. The next two chapters offer suggestions for further measures to ensure that the board remains worthy of public confidence.

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We should add a few words on Cuba's foreign debt, which is in default. Official figures placed the foreign debt at approximately 6 billion dollars in 1989; unofficial estimates are that the foreign debt is now about 11 billion dollars. There is no necessary connection between how post-Castro Cuba establishes a new monetary system and how it settles its inherited foreign debt. Even so, the currency board system could well make it easier for the post-Castro regime to repay at least part of the foreign debt. By guaranteeing that the peso is convertible, a currency board will attract foreign investment, which will spur economic growth and thereby generate more government revenue than a monetary system with an inconvertible peso.

7. HOW TO OPERATE A CURRENCY BOARD

A currency board is simple to operate. Past currency boards have usually had staffs of 10 or fewer people. They have been able to achieve economies of staff by contracting some clerical and investment functions to outside parties. We now describe how to run a currency board.

Exchange policy: The currency board's business is to stand ready to exchange its notes and coins on demand at a fixed rate into or from the reserve currency. It need not actually accept or pay reserve currency notes and coins. Indeed, to hold a large stock of reserve currency notes and coins would reduce its profits, because the board would not be able to invest those funds in interest-bearing securities. Hence, the currency board should not serve as a supplier of reserve currency notes to the public. It should leave that to the commercial banks. It should accept and pay in the reserve currency only by check or by electronic funds transfer.

Clientele: The public as well as banks should be able to deal directly with the currency board. Some British colonial currency boards dealt only with banks, as a way of reducing their need for staff. However, it seems unnecessary and unjust to discriminate against the public in that way. Most people will exchange currency through banks in any case. That was the experience of the West African Currency Board when it switched from dealing with banks only to dealing with the public also. Accepting transactions from the public introduces a form of competition with banks, and ensures that their fees for exchanging into the reserve currency will be low, thus making the link between the two currencies tighter.

Lower and upper limits to exchanges: To reduce their handling costs, many currency boards did not exchange sums below a certain minimum. For British colonial currency boards, the limit was usually £1,000 for small boards such as those of Jamaica and Barbados or £10,000 for larger ones such as the West African Currency Board. The minimums prevented most members of the public from doing business with the currency board individually, which reduced the boards' need for clerks to handle transactions. However, the minimums were low enough not to be a significant barrier to banks that wanted to do business with the currency board, or to private foreign-exchange dealers. The public was still able to exchange small sums of currency board notes and coins for foreign currency through the banks.

There should be no upper limit to the amount of the reserve currency or of its own notes and coins in circulation that the currency board accepts for exchange. No past currency board has ever had an upper limit to exchanges, because that would defeat the full convertibility into and out of the reserve currency that is the purpose of the currency board system.

Commissions: Some currency boards have charged commissions of 1/8 percent to 1 percent for every transaction. (The North Russian board, for instance, charged a fee of 1 percent.) Other boards had a scale of commissions, and charged lower commissions or even zero commissions for large transactions. If, as we suggested, the board has a minimum for transactions, it should not charge any commission. Commissions would bring little income to the board.

Furthermore, commissions loosen the link to the reserve currency, especially for swaps with short maturities, and they introduce the effects of floating rates, though only within a narrow range. A few boards, most notably the East African Currency Board towards the end of its existence, deliberately manipulated commission rates to influence exchange flows. Since the purpose of a currency board is to maintain a fixed exchange rate, thereby costlessly eliminating exchange-rate risk, there is no point in erecting barriers to switching between its currency and the reserve currency. The social benefits of not having commissions far outweigh the benefits to the board of having commissions.

Offices: The currency board should have a main office in Havana, and perhaps branch offices or agents in other large cities. The main office will do most of the business, because Havana banks will do the greatest volume of clearing. The role of the branch offices or agents will be mainly to serve as places for safekeeping currency. It is not necessary to have actual branches. Instead, a commercial bank could act as the currency board's agent, as the Bank of British West Africa did for the West African Currency Board.

Management: The currency board should have a small board of directors--a typical size for past currency boards was five directors--to oversee the board's managers. The powers of the board of directors and of the managers will be quite limited; they will have no influence over monetary policy like that of central bankers. To make the board of directors as independent from political pressures as it can be, directors should have staggered terms. Furthermore, a majority of directors should be foreign nationals, appointed by foreign private financial institutions. We shall return to this proposal later.

Staff: The board's staff will perform two functions: exchanging notes and coins for the reserve currency, and investing its assets in high-grade securities denominated in the reserve currency. The exchange work will require only a small staff of bank tellers. The investment work will require some expert financial traders, but since the board will follow rather routine, conservative investment practices, its expenses should be smaller than those of commercial banks with portfolios of similar size. Where local expertise to manage the portfolio is lacking, the board could entrust the investment work to one or more suitable foreign banks, for instance, a major Swiss bank.

Reserves—composition: The board should hold its reserves in high-quality assets denominated in the reserve currency only.¹¹ It should not hold assets denominated in local currency, because that would open the way to central banking-type operations. Specifically, bank reserves could be changed by changing the proportion of local currency assets to foreign currency assets held by the board. Allowing the board to hold assets denominated in local currency was one of the steps that pushed the East African and Southern Rhodesia currency boards, among others, along the road to becoming full-fledged central banks.

Besides opening the way for central banking, holding local-currency assets

¹¹We discuss a possible exception to this rule in the next section.

can also be dangerous, as the experience of the North Russian currency board shows. The North Russian board had a policy of holding 25 percent of its reserves in local government bonds. When Bolshevik armies routed the North Russian government, it of course defaulted on its bonds. The British government, the main holder of notes, lost about 15.5 million rubles as a result. That all the board's assets should be denominated in the reserve currency does not mean that the board can only buy securities issued in the reserve-currency country. The huge growth in Eurocurrency markets in recent years has led many governments and companies to issue securities denominated in foreign currencies. To prevent the currency board from becoming entangled in the politics of domestic government finance, though, a board should not be allowed to hold domestic government securities.

Reserves—maturities: It may be desirable to specify in the currency board's charter or by-laws what types of assets it may invest in and what the maximum maturity may be. Likely candidates are the reserve country's government bonds, high-quality corporate commercial paper, and Eurocurrency loans. The average maturity of the board's investment portfolio should be short. Long-term fixed-rate bonds swing widely in value as interest rates change. Some of the British colonial currency boards that invested heavily in long-term bonds suffered large losses when pound sterling interest rates rose sharply during times of high inflation or speculation that Britain would devalue the pound.

British colonial currency boards often divided their investments into a "liquid reserve" and an "investment reserve." The liquid reserve, consisting of securities that had maturities of less than two years, was typically about 30 percent of total reserves. The investment reserve, consisting of securities with longer maturities, was the rest of the total reserves, equivalent to an estimate of the public's minimum, "hard-core" demand for a board's notes and coins. Because interest rates and hence security values are more volatile today than they were during the heyday of currency boards in the first half of the century, the liquid reserves should probably be at least 30 percent today. Past currency boards had to hold securities with long maturities to obtain high interest rates. But since the collapse of the Bretton Woods monetary system, short-term securities also have paid high rates.

Expenses: Judging from the experience of past currency boards, expenses, excluding any loan repayments the board may have to make, should average no more than 1 percent of total assets, and may be as low on average as 0.5 percent of total assets. The main expense will be printing notes and minting coins. Salaries will be the next greatest expense, and rent, utilities, and remaining costs will be small.

Profits: The board's profits will be the difference between the interest it earns on its foreign currency reserve assets and its expenses, including repaying any loans it initially received. After the board repays any initial loans, it should accumulate a reserve of 10 percent to protect it against capital losses on securities holdings, as most British colonial boards did. It should pay all profits into the reserve until the reserve is full, and in the future do likewise should the reserve ever fall below 10 percent. All profits beyond that should revert to the board's owner.

8. HOW TO PROTECT THE CURRENCY BOARD

Although the currency board system was a great economic success earlier in this century, currency boards exist today only in a few of the more than sixty places that once had them. The most notable examples of currency board systems today are Hong Kong and Singapore. The reason that boards elsewhere disappeared was that they lacked the political independence to prevent them from being changed into central banks. Suspicion that a new currency board might be reconverted into a central bank would undermine foreign willingness to invest in the country, defeating one of the main advantages of convertibility. Therefore, in this section we propose ways of preventing new currency boards from suffering the fate that befell most old boards. Our proposals can be summarized as *commitment*, *credibility*, and *competition*. They are complementary; any one could be implemented separately or along with the others.

The board can *commit* itself to buy and sell forward exchange at the fixed rate. The currency boards of Hong Kong and Singapore have made forward markets of up to six months to increase the attractiveness of their own currencies relative to their reserve currencies. (The board should limit its forward exchange transactions if inflation in the reserve currency country becomes high and a switch of reserve currencies becomes desirable, as we discuss below.)

The government can improve the board's *credibility* by insulating it from any possible attempts at government manipulation. One way to do so would be to have some of the currency board's board of directors be foreign nationals, chosen by institutions in their home countries, as we suggested above. For example, only three of the eight directors of the Libyan Currency Board were Libyan nationals; the rest were British, French, Italian, and Egyptian nationals chosen by their respective governments. A majority of directors for an East European currency board could be, for instance, top managers from large West European, American, or Japanese banks.

Another way of improving the board's credibility would be to incorporate it in a safe-haven country such as Switzerland, and to make clear that the board's assets belong to the board itself. The East African and West African currency boards actually had their headquarters in London for much of their existence.¹²

Competition will improve the currency board's incentive to maintain the fixed exchange rate. Forced-tender laws, which compel people to accept payment in local currency, should be abolished. People should be able to make contracts in and to use any currency that they find mutually agreeable. In particular, reserve currency notes and coins should be allowed to circulate alongside the currency

¹²The currency board could even be auctioned to the private sector, either for a fixed term or permanently. As Harold Demsetz (1968) has argued with respect to utilities, private sector bidders should be willing to pay just enough to exhaust any monopoly profits that the board might accumulate.

board's notes and coins. The board's currency could be made interchangeable with the reserve currency by re-denominating (*not* revaluing) the local currency so that the exchange rate is 1-to-1.

To subject the currency board itself to direct competition, banks could be allowed to issue circulating notes to compete with the board's notes. Like the board's notes, bank notes would be convertible into the reserve currency at the fixed exchange rate. Hence, the board's notes and bank notes would be like different brands of traveller's checks circulating alongside one another. What brands were most widely used would depend on what brands best satisfied consumers' needs, as is now the case with traveller's checks.¹³ There are many historical precedents for such an arrangement. In the British Caribbean colonies, banks issued notes not subject to any special reserve requirements. Bank notes competed with currency board notes until the 1950's, when local governments outlawed bank note issue to gain more seigniorage revenue for themselves. In Hong Kong today, the currency board itself issues no notes. Rather, it holds the 105 percent U.S. dollar reserves that the two note-issuing banks must deposit against their Hong Kong dollar note issues. In Scotland, three local banks issue notes against 100 percent reserves that they hold at the Bank of England. Further back in time, over sixty countries had competitive note issue in the nineteenth and early twentieth centuries, with generally good results.¹⁴

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Besides their lack of complete political independence, past currency boards also had one other widespread flaw, which however did not first become apparent until the late 1940's. The flaw was that they had no systematic procedure for untying their own currency from the foreign reserve currency when the foreign reserve currency became unsatisfactory. British colonies devalued their currencies with the pound sterling in 1949, 1967, and 1972, because their currency board systems were dedicated to maintaining fixed exchange rates with sterling. Devaluation hurt them by raising the cost of the foreign goods that they needed for their economic development, such as the food that Hong Kong imported from China. The chronic weakness of sterling led Hong Kong, Singapore, Brunei, and the East Caribbean Currency Board to switch from sterling to the U.S. dollar as their reserve currency in the 1970's.

There is nothing objectionable in itself about switching reserve currencies. In fact, it is a necessity if the reserve currency becomes too unstable, because otherwise the currency board country will suffer the reserve-currency country's monetary problems. If the board has the power to switch reserve currencies,

¹³For an explanation of the economic forces that govern competitive note issue, see Selgin 1988b.

¹⁴Dowd 1992.

though, the procedure should be carefully specified, rather than being a somewhat arbitrary government decision as was the case with the Hong Kong and other currency boards.

We suggest that, for example, the board not be allowed to change the reserve currency unless annualized inflation in the reserve-currency country, as measured by the wholesale price index, falls outside the range -5 percent to 25 percent for more than two years, or -10 percent to 50 percent for more than six months. If inflation exceeds that range, the board must either devalue or revalue its currency in terms of the reserve currency by no more than the amount of the reserve country inflation rate for the period just specified (two years or six months), or choose a new, less volatile reserve currency and fix the exchange rate at the rate then prevailing between that currency and the original reserve currency. The board's profits and the 10 percent reserve that we have proposed it hold in addition to its 100 percent reserves will help cushion any losses from switching reserve currencies.

It may also be advisable to write a similar provision into the currency board's constitution allowing it to reset the exchange rate with the reserve currency if the reserve currency appreciates or depreciates too rapidly against a basket of foreign currencies representing other countries important in the currency board country's foreign trade, even if inflation rates in the reserve-currency country stay within acceptable limits. The general point we wish to stress here it is best to have predetermined procedures, known to the public, for handling such difficulties, rather than to respond to them in the rather capricious way that some past currency boards have done.

9. SUMMARY AND CONCLUSION

Currency boards are a tried and true method of ensuring convertibility into a foreign currency at a fixed rate. They have worked well in a wide range of countries, sometimes under conditions even more difficult than those that developing countries face today. They are simple to establish and to operate. They offer a shortcut through the problems that face a central bank trying to establish convertibility. Currency boards exist today in Hong Kong and Singapore, two of the highest-growth economies in the world since World War II. Developing nations would do well to introduce currency boards as part of their own strategy for achieving rapid economic growth.

To summarize our earlier discussion of the steps for replacing a central bank with a currency board, they are:

- (1) Delegate to other bodies all central banking functions that do not directly concern influencing the supply of money.
- (2) Abolish the Banco Nacional de Cuba's power to create credit.
- (3) Separate the Banco Nacional's commercial banking functions from its currency issue functions.
- (4) Make sure that commercial banks' existing reserves are adequate.
- (5) Convert all remaining reserves that commercial banks hold with the central bank into currency board notes and coins or into foreign assets, as the commercial banks prefer.
- (6) Fix an exchange rate.
- (7) Ensure that foreign currency reserves equal 100 percent of note and coin circulation.
- (8) Transfer the Banco Nacional's remaining assets and liabilities to the new currency board and open the board for business.

If instead the currency board comes into existence as a parallel issuer alongside the central bank, the steps are even simpler, to wit:

- (1) Announce a choice of reserve currency and exchange rate.
- (2) Offer a small premium for all foreign hard currency for a short period, during which the board only makes exchanges from foreign currency into its currency.
- (3) Cease offering the premium and begin two-way exchange with the

reserve currency only, at the fixed rate.

In addition to those procedures that are detailed in the model currency board law in Annex I, some important rules of thumb for operating a currency board are:

- (1) Expenses should average no more than 1 percent of total assets.
- (2) Liquid reserves (securities with maturities of two years or less) should be 30 percent or more of the total.
- (3) It may be necessary for the board to have branch offices or agents.

ANNEX I: A MODEL CURRENCY BOARD LAW

The following model currency board law has many features that existed in the laws of boards in West Africa, Hong Kong, the British Caribbean, Libya, Burma, and elsewhere.

CURRENCY BOARD LAW

1. The Cuban Currency Board is hereby created. The Currency Board's purpose is to issue notes and coins, and to maintain them at a fixed exchange rate as specified in paragraph 6.
2. The Currency Board shall have its legal seat in Switzerland.
3.
 - a. The Currency Board shall be governed by a board of five directors. Two directors, including the chairman, shall be persons chosen by the government of Cuba. One director shall be a German national chosen by the Deutsche Bank, one director shall be a United States national chosen by the Morgan Guaranty Trust, and one director shall be a Japanese national chosen by the Dai-Ichi Kangyo Bank.
 - b. A quorum shall consist of four members of the board of directors, including the two chosen by the government of Cuba. The board of directors may meet at the board's legal seat and such other locations as it designates. Decisions shall be by majority vote, except as specified in paragraph 15.
 - c. The first chairman and the first other member of the board of directors chosen by the government of Cuba shall serve terms of five years and one year, respectively. The first German national shall serve a term of two years. The first United States national shall serve a term of three years. The first Japanese national shall serve a term of four years. Later members of the board of directors shall serve terms of five years. They may not be re-elected. Should a director resign or die, the appropriate organization as specified in paragraph 1(a) shall choose a successor to fill the remainder of the term.
4. The board of directors shall have the power to hire and dismiss the Currency Board's staff, and to fix salaries for itself and for the staff.
5. The Currency Board shall assume responsibility for the notes and coins formerly issued by the Banco Nacional de Cuba.
6. The currency with which the fixed exchange rate is maintained is hereafter called the reserve currency. Initially, the reserve currency shall be the U.S. dollar, and the fixed exchange rate shall be [1 dollar = 10 pesos, for instance].

7. The Currency Board may set a minimum size for transactions, not to exceed 100,000 units of the reserve currency. It may adjust this size upwards in the same proportion as increases in the wholesale price index of the reserve-currency country. The Currency Board may not charge any commission for transactions of the minimum size or larger.

8. The Currency Board shall begin business with assets equal to at least 100 percent of its notes and coins in circulation. It shall hold these assets in investment-grade securities payable only in the reserve currency. The Currency Board shall not hold any securities issued by the national or local governments of Cuba, or in enterprises owned by those governments.

9. The Currency Board shall pay all net profits into a reserve fund until its unborrowed reserves equal 110 percent of its notes and coins in circulation. It shall remit all net profits beyond those necessary to maintain 110 percent reserves to the government of Cuba. The distribution of profits shall occur annually.

10. The Currency Board's head office shall be at Havana. The Currency Board may establish branches or appoint agents in such other cities as it sees fit.

11. The Currency Board shall publish a financial statement, attested by the directors, quarterly or more often. The statement shall appraise the Currency Board's securities holdings at their market value.

12. The Currency Board may issue notes and coins in such denominations as it sees fit.

13. Should the change in the wholesale price index in the reserve-currency country fall outside the range -5 percent to 25 percent for more than two years, or -10 percent to 50 percent for more than six months, within 60 days the Currency Board must either:

a. Devalue (if the index's change is negative) or revalue (if the index's change is positive) its currency in terms of the reserve currency by no more than the amount of index's change over the period specified above, or

b. choose a new reserve currency and fix the exchange rate at the rate then prevailing between that currency and the original reserve currency.

14. If the Currency Board chooses to do 13(b), within one year it must convert all its reserve assets into securities payable in the new reserve currency.

15. The Currency Board may not be dissolved or its assets transferred to a successor organization except by unanimous vote of the board of directors.

ANNEX II: ALLEGED DISADVANTAGES OF CURRENCY BOARDS

A. General criticisms

In the 1950's and 1960's, certain economists claimed that currency boards had disadvantages compared to central banking. More recent theories have refuted or diminished the significance of their criticisms, but since no recent published refutation exists, we briefly consider the criticisms here.¹⁵

Critics claimed that the currency board system leaves no room for discretionary monetary policy, that it makes the money supply operate in a deflationary manner in a growing economy, and that the 100 percent foreign-currency reserve requirement deprives a currency board economy of real resources that are available in a system with a fractional-reserve central bank.

The short reply to the claim a currency board allows no room for discretionary monetary policy is that it is true. The purpose of a currency board is to have an automatic monetary policy rather than a discretionary one. Economists are far more skeptical than they were in the 1950's and 1960's about the ability of discretionary monetary policy to influence economic growth favorably. The "rational expectations" school has alerted economists to the insight that whatever systematic policy central bankers can carry out, other people can anticipate and, by their profit-seeking activity, try to offset.

A related criticism of discretionary monetary policy, associated mainly with the "Austrian" school of economic thought, is that it is a form of central planning, subject to the same difficulties as, say, central planning of agricultural output. Central planning suppresses certain price signals that, in an unhampered market, would reveal information to those who know how to interpret them correctly. In the monetary system, the most important of such signals are changes to banks' reserves. Changes in the balance of payments or in the public's holdings of notes and coins set in motion the changes to bank reserves and, through them, to the money supply, interest rates, and income that we explained in the previous section. Discretionary policy, to be worthy of the name, must try to fight the economy's adjustment towards a new equilibrium. By doing so, however, it merely makes adjustment more prolonged and costly.¹⁶

The claim that the money supply operate in a deflationary manner in a growing currency board economy is correct under certain stringent assumptions, but has little practical significance. Under the assumptions about a currency board system that we discussed in section 3 (see footnote 5), a rise in the demand to hold notes and coins requires a balance-of-payments surplus to produce the additional reserves to exchange with the currency board. As an economy grows, then, it must

¹⁵The best statements of the criticisms are Analyst 1953, Hazlewood 1954, Nevin 1961, and Basu 1971. For refutations, see Greaves 1953 and especially Ow 1985.

¹⁶Selgin 1988b makes this argument.

generate continual balance-of-payments surpluses for the supply of notes and coin to expand as quickly as the demand. Continual surpluses are unlikely, implying that in periods of balance or deficit, the supply of notes and coins grows more slowly than the demand, resulting in a fall in prices. The fall would not occur if the notes and coins were liabilities of a central bank committed to a fixed exchange rate, because it holds only fractional reserves. (The converse, which critics of currency boards never stated, is that in a declining currency board economy, money supply is inflationary.)

The simplifying assumptions rarely, if ever, hold. A growing economy in a poor country, such as most currency board countries have been, generally has large capital inflows that balance its current account deficits. Furthermore, with international branch banking, banks are able to pool their reserves between the reserve-currency country and the currency board country, so that they may be able to offset much of the effect of balance-of-payments changes between the two countries (and, by extension, among all the countries where they have branches). An international bank's overall reserves are the same whether a given deposit is held by a customer in the reserve-currency country or by a customer in the currency board country.

Currency board economies seem to have had little experience of deflation caused by increases in the demand for notes and coins. The only example that we are aware of occurred in Hong Kong in early 1984. A few months before, Hong Kong had reintroduced the currency board system. During the Chinese New Year, the demand for notes increases because it is customary to give gifts of money. The increased demand for notes affected bank reserves and interest rates for about two weeks, after which they settled back to their previous levels. The banks learned their lesson: during subsequent Chinese New Years, they have kept higher than usual reserves on hand, and interest rates have been little affected.¹⁷ The final major criticism of the currency board system is that the 100 percent foreign-currency reserve requirement deprives a currency board economy of real resources that are available in a fractional-reserve system. Economists who investigated the matter in the 1950's claimed that 30 percent to 50 percent of currency boards' reserves were surplus, since there was an irreducible minimum of notes and coins that people held, which would never return to the boards for redemption. Surplus reserves, then, are a cost of the currency board system, since they could be used to buy imports, increasing the real goods available in the economy.

There is, first, a question whether these estimates are accurate.¹⁸ Leaving that aside, though, let us consider the nature of the alleged cost. Once spent, surplus reserves are gone, and they yield no interest. Currency board reserves, on the other hand, pay interest because the board invests them in foreign-

¹⁷Selgin 1988a.

¹⁸Bimbaum 1957.

currency assets. The stream of future interest payments has a present-value equivalent. It is the difference between the surplus reserves and the present-value equivalent of the interest payments on them that is the true cost of a currency board system as compared to a fractional-reserve system. Alternatively, it is possible to calculate the interest on the surplus reserves that would be paid if they were lent domestically, and to compare that with the currency board's interest from foreign-currency assets. Only if the present value of the goods that could be imported is markedly greater than the present value of the currency board's interest income (that is, domestic interest rates are markedly higher than foreign interest rates for comparable loans) is the currency board system costlier than a fractional-reserve system.

Even so, the currency board system may well be less costly than fractional-reserve central banking if we take a broader view. The currency board system offers a degree of credibility and predictability that central banking has difficulty matching. Consequently, the currency board system is more likely than central banking to encourage investment, especially foreign investment, and to result in sustained economic growth.

Finally, there is the criticism that a currency board system has no central bank to act as a lender of last resort. Contrary to conventional wisdom, we suspect that on balance lack of a lender of last resort is beneficial. The existence of a lender of last resort unavoidably encourages riskier actions by commercial banks than they would otherwise undertake. This is called the problem of "moral hazard." The American savings and loan crisis is a lesson on moral hazard run amuck.

Commercial banks in a currency board system have a number of means at their disposal to provide liquidity without recourse to a lender of last resort. Historically, bank failures have been rare in currency board systems. Perhaps the most important source of stability for banks in currency board systems is their international branch networks. The currency board system promotes bank branching not just nationally but also internationally, which enables banks to diversify risks. By offering banks easy access to the financial markets of the reserve-currency country, the currency board system enables them to tap a wider range of financial resources than if they were confined to domestic financial markets.

A measure that does not seem to have been tried in currency board systems, but that worked well in certain other systems without a lender of last resort, is for banks to include an option clause in their contracts with depositors. The option clause would allow a bank to delay for a set period depositors' requests for withdrawals. In return, the bank would pay a penalty rate of interest, for instance 3 percent above the rate prevailing before it exercised the option clause. Banks would be free to offer an option clause or not, and depositors would be free to deposit with such banks or not.

B. Practical objections specific to Cuba

Besides the general theoretical objections to a currency board system, there are also practical objections specific to Cuba that we have not addressed in the main text.

One objection is that the currency board system may create a colonial relationship between Cuba and the United States, since under our proposal the peso would probably be linked to the dollar. Cubans are understandably anxious not to be a colony of the United States, of Spain, or of any other country.

In reply, we point out that the currency board system itself creates no colonial relationship. Historically, most currency boards have existed in British colonies, but currency boards have also existed in independent nations, including Kuwait, Burma, Danzig, and North Russia. The purpose of the currency board system is not to create a colonial relationship, but to promote more credibility than a domestic central bank could achieve. That is why the Hong Kong dollar is linked to the U.S. dollar, even though Hong Kong is a *British* colony. The Bank of England has more credibility than a Hong Kong central bank would have, but the U.S. Federal Reserve has more credibility still.

Another objection to a currency board system for Cuba is that unlike a central bank, a currency board will deprive Cuba of the opportunity to impose an inflation tax of its own choosing. We see this as an advantage rather than a disadvantage. Cuba is now suffering from the effects of a high, though suppressed, inflation tax. Linking the peso to the dollar would prevent the post-Castro regime from de-stabilizing the economy as the Castro regime has done. It would enforce a "hard budget constraint" on Cuban politicians. A government can run a budget deficit under a currency board system; the North Russian government did so, for instance. However, in a currency board system, the government cannot finance itself by inflation, which is a hidden, undemocratically imposed, terribly destructive tax. Taxes therefore must be imposed in a more open manner with broad popular consent. That would make Cuba a more democratic society. Furthermore, the currency board would generate seigniorage profits, which would be substantial if Cuba enjoys rapid economic growth. The currency board system merely prevents the pursuit of seigniorage from overriding the most important objective of monetary policy, which is ensuring a stable, convertible currency.

ANNEX III: MONEY SUPPLY: A TECHNICAL ANALYSIS

This appendix goes into more detail than Chapters 2 and 3 to illustrate the linkage between changes in the balance of payments and the domestic money supply under a currency board system and under central banking. We use "T account" diagrams to supplement the flow diagrams in the Chapter 2. The flow diagrams depict a chain of events, whereas the T accounts depict simplified balance sheets for the relevant agents under a currency board system (see Figures 6, 7 and 8).¹⁹

A. Currency board system

Figure 6 is a T account for a typical currency board.

Figure 6
CURRENCY BOARD

Assets	Liabilities
Foreign-currency securities	Notes and coins Net worth

Figure 7 is a T account for a typical commercial bank in a currency board system.

Figure 7
COMMERCIAL BANKS

Assets	Liabilities
Currency board notes & coins (reserves) Loans and investments	Public's deposits Stockholder's equity

Figure 8 is the T account of the public as a whole (meaning the entire financial sector except the currency board and the commercial banks).

Figure 8
PUBLIC

Assets	Liabilities
Deposits at banks Currency board notes and coins	Bank loans Net worth

¹⁹The account that follows draws heavily on Greenwood (1981, 1983a).

The total money supply is the left-hand (asset) side of the public's T account. Refer back to Figure 1, the flow diagram in Chapter 3 that shows what happens when a balance of payments surplus occurs in a currency board system. To make the analysis concrete and simple, we adopt certain assumptions, namely:

1. Bank deposits are convertible into currency board notes at a fixed rate.
2. The ratio of notes and coins to the broader money supply (the currency-deposit ratio) is constant.
3. Income and money holdings move in the same direction.
4. There is no international branch banking between the currency board country and the reserve-currency country.
5. All balance-of-payments changes occur in the current account; the capital account does not change.
6. No binding minimum reserve ratios or other special bank regulations exist.
7. People do not hold stocks of the foreign reserve currency nor do they use the reserve currency in domestic transactions.²⁰

To clarify the relationship between commercial banks and the currency board in the chain of events, we use T accounts (see Figures 9, 10, and 11). We use some hypothetical numbers to illustrate what happens. Let Stage 1 (the starting point) be a situation where the balance of payments is zero—an equilibrium. For the sake of simplicity, we assume that net worth in the T account of the currency board and stockholders' equity in the T accounts of commercial banks are zero. We assume further that the banks have a desired deposit-to-reserve ratio of 50:1, and that the public has a desired deposit-to-currency (notes and coins) ratio of 10:1 (see Figure 9). The currency of the currency board country is the peso. Initially 600 pesos of currency are in circulation.

Only assumption 1 is necessary for the analysis of currency boards; the rest can be dropped. The analysis becomes more complicated then. See Ow (1985) and Walters (1987) for more discussion.

Figure 9

CURRENCY BOARD: STAGE 1

Assets		Liabilities	
Foreign currency securities	600	Notes and coins	600

COMMERCIAL BANKS: STAGE 1

Assets		Liabilities	
Currency board notes & coins (reserves)	100	Public's deposits	5000
Loans and investments	4900		

PUBLIC: STAGE 1

Assets		Liabilities	
Deposits at banks	5000	Bank loans	4900
Currency board notes & coins	500	Net worth	600

MONEY SUPPLY = 5500

BANKS' DEPOSIT-TO-RESERVE RATIO = 5000:100 = 50:1 (equilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = 5000:500 = 10:1 (equilibrium)

Now let there be a balance of payments surplus of 12 pesos, in the form of foreign currency that the public deposits in local banks. Since we assume, for the sake of simplicity, that banks hold all reserves in the form of currency board notes and coins, the banks exchange the foreign currency at the currency board for domestic currency. (They exchange the reserve currency at the fixed exchange rate, and other currencies at prevailing market rates.) The board's assets and liabilities become 12 pesos more than in Stage 1. Bank reserves become 12 pesos more than in Stage 1, and the deposit holdings of the public become 12 pesos more than in Stage 1. In addition, the money supply is 12 pesos more than in Stage 1. This is Stage 2 (Figure 10).

Figure 10

CURRENCY BOARD: STAGE 2

Assets		Liabilities	
Foreign-currency securities	612	Notes and coins	612

COMMERCIAL BANKS: STAGE 2

Assets		Liabilities	
Currency board notes & coins (reserves)	112	Public's deposits	5012
Loans and investments	4900		

PUBLIC: STAGE 2

Assets		Liabilities	
Deposits at banks	5012	Bank loans	4900
Currency board notes and coins	500	Net worth	612

MONEY SUPPLY = 5512 (expansion = 12)

BANKS' DEPOSIT-TO-RESERVE RATIO = 5012:112 = 44.75:1 (disequilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = 5012:500 = 10.024:1 (disequilibrium)

Notice that the banks have a deposit-to-reserve ratio of 44.75:1 (Stage 2), which is less than their desired (Stage 1) ratio of 50:1. Notice also that the public has a deposit-to-currency ratio of 10.024:1 (Stage 2), which is more than its desired (Stage 1) ratio of 10:1. Banks will expand their loans, and the public will expand its holdings of currency, to restore the original Stage 1 ratios. In Stage 3, they do so, achieving a new equilibrium, with the money supply now 110 pesos greater than it was in Stage 1 (see Figure 11).

Figure 11

CURRENCY BOARD: STAGE 3

Assets		Liabilities	
Foreign-currency securities	612	Notes and coins	612

COMMERCIAL BANKS: STAGE 3

Assets		Liabilities	
Currency board notes and coins (reserves)	102	Public's deposits	5100
Loans and investments	4998		

PUBLIC: STAGE 3

Assets		Liabilities	
Deposits at banks	5100	Bank loans	4998
Currency board notes & coins	510	Net worth	612

MONEY SUPPLY = 5610 (expansion = 110)

BANKS' DEPOSIT-TO-RESERVE RATIO = 5100:102 = 50:1 (equilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = 5100:510 = 10:1 (equilibrium)

As the T accounts illustrate, efforts by banks to reattain their desired deposit-to-reserve ratio, and by the public to reattain its desired deposit-to-currency ratio, increase the broad money supply. That generates movements in interest rates, prices, and incomes that move the currency board system back to equilibrium when a balance of payments surplus occurs. The foregoing example in a sense collapses the effects of these relationships into the deposit-to-reserve and deposit-to-currency ratios. The currency board responds to their actions automatically by virtue of its 100 percent reserve ratio and its fixed exchange rate with the foreign reserve currency.

When a balance-of-payments *deficit* occurs in a currency board system, the money supply process works as in Figure 2 of Chapter 3.

Starting from an equilibrium in Stage 1 again, the T accounts in this case are as in Figure 12.

Figure 12

CURRENCY BOARD: STAGE 1

Assets		Liabilities	
Foreign-currency securities	600	Notes and coins	600

COMMERCIAL BANKS: STAGE 1

Assets		Liabilities	
Currency board notes & coins (reserves)	100	Public's deposits	5000

PUBLIC: STAGE 1

Assets		Liabilities	
Deposits at banks	5000	Bank deposits	4900
Currency board notes & coins	500	Net worth	600

MONEY SUPPLY = 5500

BANKS' DEPOSIT-TO-RESERVE RATIO = 5000:100 = 50:1 (equilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = 5000:500 = 10:1 (equilibrium)

Now let there be a balance-of-payments deficit of 12 pesos. The public pays foreigners 12 pesos more for goods than foreigners pay the public. Foreigners will only accept payment in foreign currency, and the currency board has all the foreign currency in the financial system, so people convert 12 pesos of its notes and coins into foreign currency. They do so by withdrawing 12 pesos from their bank deposit accounts as currency board notes. Consequently, bank reserves become 12 pesos less than in Stage 1. People exchange the notes for foreign currency at the currency board's fixed rate, so the board's assets and liabilities become 12 pesos less than in Stage 1. This is Stage 2 (see Figure 13):

Figure 13**CURRENCY BOARD: STAGE 2**

Assets		Liabilities	
Foreign-currency securities	588	Notes and coins	588

COMMERCIAL BANKS: STAGE 2

Assets		Liabilities	
Currency board notes & coins (reserves)	88	Public's deposits	4988
Loans and investments	4900		

PUBLIC: STAGE 2

Assets		Liabilities	
Deposits at banks	4988	Bank loans	4900
Currency board notes and coins	500	Net worth	588

MONEY SUPPLY = 5488 (contraction = 12)

BANKS' DEPOSIT-TO-RESERVE RATIO = $4988:88 = 56.68:1$ (disequilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = $5988:500 = 9.976:1$ (disequilibrium)

Notice that banks have a deposit-to-reserve ratio of 56.68:1 (Stage 2), which is more than their desired (Stage 1) ratio of 50:1. Notice also that the public has a deposit-to-currency ratio of 9.976:1 (Stage 2), which is less than its desired (Stage 1) ratio of 10:1. Banks will contract their loans, and the public will contract its holdings of currency, to restore the original Stage 1 ratios. In Stage 1, they do so, achieving a new equilibrium, with the money supply now 110 pesos smaller than it was in Stage 1 (see Figure 14):

Figure 14

CURRENCY BOARD: STAGE 3

Assets		Liabilities	
Foreign-currency securities	588	Notes and coins	588

COMMERCIAL BANKS: STAGE 3

Assets		Liabilities	
Currency board notes & coins (reserves)	98	Public's deposits	98
Loans and investments	4802		

PUBLIC: STAGE 3

Assets		Liabilities	
Deposits at banks	4900	Bank loans	4802
Currency board notes and coins	490	Net worth	588

MONEY SUPPLY = 5390 (contraction = 110)

BANKS' DEPOSIT-TO-RESERVE RATIO = 4900:98 = 50:1 (equilibrium)

PUBLIC'S DEPOSIT-TO-CURRENCY RATIO = 4900:490 = 10:1 (equilibrium)

As in the case of a balance of payments surplus, attempts by banks to attain their desired deposit-to-reserve ratio, and by the public to reattain its desired deposit-to-currency ratio, move the currency board system back to equilibrium when a balance of payments deficit occurs.

We made a number of simplifying assumptions earlier. If we drop them, the picture becomes too complex to analyze easily. However, the many additional factors that can complicate the analysis should not obscure the important point: market forces of profit and loss determine and limit money supply expansion in the currency board country. As long as it is more profitable to invest funds in the currency board country than elsewhere (after taking into account inflation, exchange-rate risk, and transactions fees), banks in the currency board country will expand their loans. They will be able to do so because foreign investment will be flowing in, bringing additional reserves to the banking system. Eventually banks will expand their loans in the currency board country to such an extent that making further loans there would be less profitable than investing the funds abroad. At that point will hold the volume of loans constant in the currency board country, and so the money supply will cease expanding. If it becomes more profitable to invest funds abroad than in the currency board country, the currency board country will use reserves, banks will reduce their loans to preserve their solvency, and so the money supply will fall. The currency board's role in all this is passive: all it does is to convert notes and coins into and out of the reserve currency as the public and banks demand.

B. Central banking system

The T account of the public is the same in a central banking system as in a currency board system. However, the T account of the currency board (Figure 15) differs from the T account of the central bank (Figure 16).

Figure 15
CURRENCY BOARD

Assets	Liabilities
Foreign-currency securities	Notes and coins Net worth

Figure 16
CENTRAL BANK

Assets	Liabilities
Foreign-currency securities Domestic securities	Notes and coins Deposits of commercial banks Net worth

In addition to holding securities denominated in foreign currencies as assets, as a currency board does, a central bank can also hold securities denominated in domestic currency. Many central banks, including those of the United States, Japan, and Germany, hold far more domestic securities than foreign securities. It is hypothetically possible for a central bank that does not intervene in foreign exchange markets to hold no foreign securities at all. Besides notes and coins and net worth, a central bank's liabilities also include deposits that commercial banks hold with it. Unlike a currency board, a central bank accepts deposits, which count as *reserves* for commercial banks.

Figure 17 shows the T accounts of commercial banks in a currency board system.

Figure 17
COMMERCIAL BANKS: CURRENCY BOARD SYSTEM

Assets	Liabilities
Currency board notes & coins (reserves)	Public's deposits
Loans and investments	Stockholders' equity

Figure 18 shows T accounts of commercial banks in a central banking system.

Figure 18
COMMERCIAL BANKS: CENTRAL BANKING SYSTEM

Assets	Liabilities
Central bank notes & coins (reserves)	Public's deposits
Deposits at central bank (reserves)	Stockholder's equity
Loans and investments	

Compared to the currency board system, there is the additional element of deposits at the central bank. However, in terms of T accounts, there is no important difference between a balance of payments surplus for a fixed-exchange-rate, currency board system and an increase in the supply of central bank credit for floating-exchange-rate central banking system. (To understand why there is no important difference, imagine that the central bank does not have any commercial bank deposits, and that commercial banks hold all their reserves in the form of central bank notes and coins.) The wider implications for the economy, however, are extremely significant, as Chapters 4 and 5 explained.

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