

# Currency Boards: Once and Future Monetary Regimes?

A currency board can allow a developing economy to establish its domestic currency relatively promptly and efficiently by fixing the value of its currency to that of another country and guaranteeing that its currency is backed by sufficient foreign exchange reserves. Currency boards not only provide a foundation that encourages traders and investors to accept new currencies, they also do not require sophisticated money markets and central banking operations in order to be effective. Because of these attributes, currency boards have attracted more attention, particularly in the wake of recent global financial crises, from developing countries in Asia, Latin America, and Europe that have either introduced new currencies or want to restore confidence in their currencies.

Despite their merits, currency boards alone cannot ensure success. Although they guarantee that their base money is backed by appropriate foreign exchange reserves, confidence in the value of the deposits, loans, assets, and resources that are denominated in their currencies is limited by confidence in the performance of their economies. A healthy financial system and an acceptable balance between government receipts and expenditures support both the economy and the currency. Captive capital markets, poor investments, or substantial government deficits can diminish an economy's prospects, foster capital outflows, and ultimately undermine the value of its assets and currency.

Although currency boards can give new currencies a quick start, they do not necessarily provide a lasting foundation. As an economy develops, its changing technology and industrial structure often require its prices and the values of its assets to shift relative to those of its trading partners. The correlations between the returns on its resources and those of developed countries also tend to change. In these circumstances, a currency board might aggravate the volatility of prices, incomes, and values of assets in the developing economy, especially when its prices are not sufficiently flexible and its factors of production are not sufficiently

*Richard W. Kopcke*

*Vice President and Economist, Federal Reserve Bank of Boston. Kopcke is also serving currently as Intermittent Advisor to the Bank of Lithuania for the U.S. Department of the Treasury, Office of Technical Assistance. The author thanks Richard Brauman for valuable research assistance.*

mobile. Furthermore, as a currency board's economy grows, the size and needs of its financial system can expand beyond the resources of its board, thereby diminishing its ability to protect its currency should the value of its marketable assets fall in terms of other currencies, precipitating capital outflows.

Currency boards likely represent a beginning rather than an end in the evolution of monetary regimes for emerging economies. To benefit most from a currency board, an economy should use the temporary shield of this regime to prepare for its potential departure. It should develop its monetary authority's capacity for undertaking policy analysis in order to support the eventual conduct of monetary policy. It also should develop its money markets and its financial institutions' ability to manage currency risks. Confidence in its currency is most likely to remain high when it departs on its own terms at a time when economic conditions are most favorable and its institutions are ready to manage the transition. Ironically, a successful currency board does not encourage, or in some respects even allow, its monetary authority and financial institutions to prepare for other regimes.

---

*Currency boards likely represent a beginning rather than an end in the evolution of monetary regimes for emerging economies.*

---

As maturing economies abandon currency boards, they can simply fix their exchange rates. Although fixed exchange rate regimes allow monetary authorities somewhat more freedom, they otherwise share many of the characteristics of currency boards. With a fixed exchange rate, a monetary authority can undertake limited open market operations and lend, within limits, to commercial banks. But it cannot set goals for monetary policy, such as objectives for inflation, employment, interest rates, or the growth of credit, unless these goals are consistent with the maintenance of the exchange rate.

Ultimately, maturing economies might be drawn to floating exchange rates or to economic unions in order to achieve the most stable economic performance. In each case, confidence in a currency continues to depend on confidence in the economy that issues the currency. Floating exchange rates relieve

domestic prices and incomes from the full burden of adjusting to changing conditions in world markets. Floating rates also grant their monetary authorities the most latitude for setting their own policies, but even in this regime their powers are limited. Economic unions that include a common fiscal authority take a different course. By pooling the resources of their constituents, thereby building more diversified economies, they might diminish the volatility of their domestic incomes and prices.

### *I. Design of Currency Boards<sup>1</sup>*

A currency board issues a domestic currency whose value is fixed in terms of a currency issued by another country—its reserve currency—and is backed by assets denominated in foreign currencies. The rate of exchange between a board's currency and its reserve currency is fixed by law and enforced by the board's obligation to trade its currency for the reserve currency at the prescribed rate of exchange. A currency board guarantees its commitment to maintain its fixed rate of exchange by backing its liabilities with a prescribed amount of foreign exchange assets, mostly denominated in its reserve currency. As a result of these characteristics, a currency board can issue new currency only in exchange for the requisite amount of foreign exchange, and the total amount of its domestic base money (currency in circulation plus banks' monetary reserves) corresponds to the value of the board's holdings of reserve assets. Currency boards, therefore, typically acquire most of the reserves that back their currencies from those who exchange foreign currencies for their own. The quantity of base money, therefore, principally varies with the net flow of foreign exchange into the economy at its fixed exchange rate.

Earlier in the nineteenth and twentieth centuries more than 70 economies, mostly colonies in the British Empire, maintained currency boards (Schwartz 1993). These boards, which operated under the auspices of European powers, bound the value of their currencies to those of European governments. Following the two world wars, the Allied powers also established currency boards in some of their protectorates. Through these boards, the powers provided for currency in their colonies and protectorates without drawing

---

<sup>1</sup> See also International Monetary Fund (1997) and the citations therein for a survey of the theory and practice for exchange rate regimes, including currency boards.

Table 1  
*Characteristics of Existing Currency Boards*

Economy	Length of Operation	Reserve Currency	Reserve Assets	Minimum Cover	Actual Cover	Deposits in Foreign Currency
Argentina	7 years	U.S. dollar	2/3 foreign assets and gold; 1/3 Argentina's government bonds denominated in U.S.\$	100% of base money	139% of base money 27% of M2	53%
Brunei-Darussalam	31 years	Singapore dollar	Liquid foreign assets and securities	70% of the central bank's current liabilities	About 80% of the central bank's demand liabilities	n.a.
Bosnia	1.25 years	Deutsche mark	DM assets, except for 1/2 of the central bank's capital	100% of the central bank's monetary liabilities	100% of base money 66% of M2	86%
Bulgaria	1.5 years	Deutsche mark	Foreign assets and gold	100% of base money plus some excess coverage	105% of base money 84% of M2	56%
Djibouti	49 years	U.S. dollar	Foreign assets	100% of circulating currency	125% of base money 22.5% of M2	n.a.
Estonia	6.5 years	Deutsche mark	Foreign assets and gold	100% of base money, excluding the central bank's certificates	145% of base money 41% of M2	41%
Hong Kong, China	15 years	U.S. dollar	Foreign assets	105% of currency	109% of base money 7% of M2	44%
Lithuania	4.5 years	U.S. dollar	Foreign assets and gold	100% of base money and the central bank's liquid liabilities	105% of base money 63% of M2	61%
Eastern Caribbean Central Bank: Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines	33 years	U.S. dollar	Foreign assets and gold	60% of base money	82-99% of base money 12-20% of deposits	n.a.

n.a. = not available

Source: Ghosh, Gulde, and Wolf (1998, p. 9); individual countries' Web pages.

against the reserves of precious metals that backed their own currencies. This leverage cost the powers the interest they paid on the assets held by these boards. In turn, this interest provided the boards income, or seigniorage, for issuing their own currency.

Currency boards currently operate in 14 countries under the auspices of their own governments (Table 1).<sup>2</sup> These modern boards have adopted many of the features of the earlier colonial boards, adapting them to today's customs, in order to promote the use of their currencies in commercial and financial transactions. In

many of these cases the country installed its board in order to improve the reputation of its currency after a crisis.

Outside of the Caribbean, the existing currency boards generally require that their foreign reserve

<sup>2</sup> Currency boards also exist in some of the remaining dependencies of the United Kingdom. For more discussion of the currency boards in the table, see Zarazaga (1995), Caprio et al. (1996), Bennett (1992), Camard (1996), Williamson (1995), the papers in Perry (1997), and Kwan and Lui (1996). Also Honohan (1994) discusses the experience of the Irish currency board, which dissolved in 1979.

assets back at least 100 percent of their base money. Those that hold more than full backing for their base money are less likely to suffer deficient reserves if the value of their foreign exchange investments should fall in terms of their reserve currency. This excess backing most often represents capital invested by the government that sponsors the board or, in some cases, loans from donors or international agencies. Currency boards also accumulate excess reserves when they may retain a share of their seigniorage. When a currency board replaces an inconvertible or very weak domestic currency with a new currency, the board's capital can cover its risk of losses as it converts the old currency into the reserve currency. This capital also can provide useful insurance if its economy's net flows of foreign exchange are potentially highly variable at its fixed rate of exchange.

reductions in these requirements, that prevent money and banks' credit from increasing more rapidly than the boards' stock of reserve assets for very long. These regulations also can specify minimum values for reserve requirements that prevent the money multiplier from rising very high. This linking of banks' credit to reserve assets is most important when a currency board is supposed to limit a monetary authority's capacity to create too much money and credit in order to finance excessive domestic spending. Nevertheless, currency board arrangements generally allow some flexibility in setting reserve requirements. During banking crises, when deposits and credit were shrinking rather than expanding, currency boards in Argentina and Lithuania provided liquidity for their banking systems by reducing reserve requirements, thereby discouraging bank runs and supporting their currencies (Santiprabhob 1997).<sup>3</sup>

---

*A currency board issues a domestic currency whose value is fixed in terms of a currency issued by another country—its reserve currency—and is backed by assets denominated in foreign currencies.*

---

#### *The Target for the Exchange Rate*

The two most important decisions for a currency board are its choice of reserve currency and its exchange rate. The reputation of the reserve currency in foreign exchange markets should be sufficiently strong to lend considerable confidence to the board's own currency. For this reason, the U.S. dollar and the deutsche mark are the most popular choices for reserve currencies. Moreover, the value of its reserve currency should tend to vary with respect to the currencies of its trading partners in ways that conform well with the needs of its economy. The value of the reserve currency, for instance, should not often rise relative to those of the board's trading partners at times when its economy is likely to need a lower exchange rate. This suggests that many of the conditions for an optimal currency area should influence an emerging economy's choice of a reserve currency. But, with its choice of reserve currency an economy also can shape the course of its development. By linking its currency to the U.S. dollar or the deutsche mark, the economy begins to connect itself to the network of markets, laws, conventions, and financial institutions

Although currency boards provide for the full backing of their base money, their reserves are only a fraction of the value of the marketable financial assets that are denominated in their currencies. For example, reserve assets in existing currency boards ordinarily back less than one-half of broader measures of their money—such as M2 (currency, demand deposits, plus time and savings deposits)—a share that falls with the development of their banking systems and the attendant increase in their money multipliers. A large share of banks' deposits, even in economies with currency boards, is backed by domestic assets.

By controlling the reserve requirements for its banking system, a currency board can limit the degree to which domestic assets back its stock of money. Currency boards can limit the tax these requirements impose on banks by paying interest on reserve balances. The regulations governing currency boards can restrict changes in reserve requirements, particularly

---

<sup>3</sup> The monetary authority might supplement reserve requirements with liquidity requirements. In a crisis, the authority could relax its liquidity requirement instead of changing its reserve requirements. For this approach to stabilize money markets best, however, foreign exchange assets should account for a substantial share of this liquidity requirement. In this case, liquidity requirements would be similar to the currency board's maintaining excess foreign exchange reserves in order to lend to the banking system during crises. See also Honohan (1994) regarding the role of banks' holding foreign exchange reserves under the Irish currency board.

for those countries whose currencies or economies are linked closely to the United States or Germany.

Consequently, it is not surprising that the Latin American currency boards use the dollar for their reserve currency and all but one of the European boards use the deutsche mark. Lithuania chose the dollar at a time when it looked to the United States for much of its capital inflow and when much of its trade with Russia, its predominant trading partner, settled in dollars. Lithuania's current monetary program anticipates a future shift of its reserve currency to the newly created euro. Although all these boards have fixed their currency to only one foreign currency, in principle a board could use a specific weighted average, or basket, of several currencies. Lithuania, for example, is considering a shift to a blend of the dollar and the euro before adopting the euro alone.<sup>4</sup>

---

*The two most important decisions for a currency board are its choice of reserve currency and its exchange rate.*

---

Setting the appropriate exchange rate for an emerging economy's currency is difficult because estimates of its equilibrium value often are especially uncertain. Moreover, a value that seems appropriate for the first few years might be regarded very differently thereafter. An emerging economy, for example, might attract substantial and unsustainable capital inflows from investors who see opportunity from an early foothold in new markets. Although an overvalued currency, or high exchange rate, in these circumstances might better balance the supply and demand for the domestic currency initially, a lower exchange rate might better serve the economy afterward.

Often the initial exchange rate for the currency board is set somewhat below estimates of its equilibrium value in order to give its economy a competitive advantage at its inception. A lower value also allows the fiscal authority some leeway for improving its fiscal balance—generous capital inflows and investment tend to raise the government's receipts while

---

<sup>4</sup> Poland, the Czech Republic, the Slovak Republic, and Hungary have fixed the value of their currencies to baskets of dollars, marks, and the currencies of other more developed countries.

reducing pressure for its spending. A very low exchange rate, however, would initially impose a high price for imported goods and services, including capital, and impart an inflationary bias to the economy at its currency's inception, which can threaten the subsequent success of the board.<sup>5</sup>

An exchange rate that fairly calibrates a currency board's terms of trade does not necessarily foster a broad acceptance of its currency. When confidence in a domestic regime is sufficiently low, a currency board might diminish, but not eliminate the threat of a potential devaluation. Indeed, currency boards generally owe their existence to this lack of confidence. In several of the currency boards of Europe and in Argentina, the dollar and the mark settle many transactions, and foreign currencies represent a substantial share of their banks' deposits (Table 1, above). Domestic interest rates in countries with currency boards also generally exceed interest rates on securities that are denominated in their reserve currencies (Figure 1). These differences, to a degree, reflect imperfections in international capital markets; they also reflect the risk that the values of the boards' currencies might fall relative to their reserve currencies. During the international financial crises in the second half of 1998, these differences increased significantly, indicating that currency boards cannot necessarily ensure confidence in their currencies.<sup>6</sup>

### *Currency Boards and Monetary Policy*

A currency board fixes the value of the exchange rate for its currency. Its operations are confined to the exchange of its currency for foreign currencies at the prescribed rate of exchange. As a result, a currency board cannot assume the role of a full-service central bank. Its holdings of excess foreign exchange reserves limit its capacity to serve as a lender of last resort or to conduct open market operations, deposit auctions, or other actions that alter the supply of base money,

---

<sup>5</sup> Rising prices erode the thrust imparted by a low exchange rate. If, as is common, inflation's momentum persists too long, the exchange rate can become overvalued too greatly, too soon after its board's inception, entailing a drag (Bruno et al. 1991). This volatility in competitiveness and growth can undermine investors' confidence.

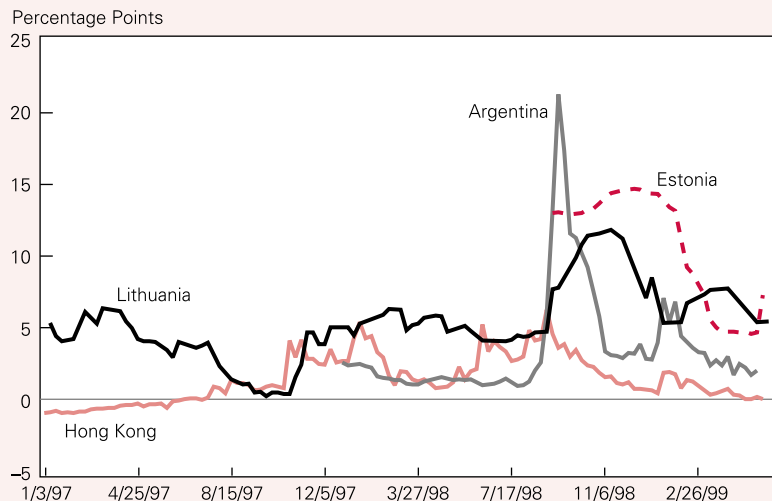
<sup>6</sup> The rise in domestic yields was limited to a degree as governments postponed borrowing or shifted to debt denominated in foreign currencies. The interest rates on the few longer-term securities of these countries generally increased more than the short-term rates shown in the chart. The yield on Argentina's bonds remains more than 6 percentage points above those on comparable U.S. securities.



Figure 1

*Yields on Short-Term Government Securities in Selected Countries with Currency Boards*

Spreads over Comparable U.S. and German Interest Rates



Source: Bloomberg L.P.

except through the acquisition of its reserve currency. By design, it cannot independently influence employment, prices, and interest rates in its economy or the volume of money, credit, and capital flows.

Currency boards essentially enforce modern versions of the venerable specie-flow standard, which in the past commonly took the form of a gold standard. In theory, a country that varies its supply of base money according to its holdings of specie or reserve currencies adopts a monetary regime that automatically regulates the level of its prices and the growth of its economic activity. For example, when the prices of the country's factors of production, goods, and services in world markets rise more rapidly than the prices for other countries, its balance of trade deteriorates, causing its holdings of reserve currencies and base money to grow more slowly. Its domestic supplies of money and credit also decelerate, which raises its domestic interest rates and reduces the demand for its factors and products, thereby depressing its prices relative to those of other countries. Conversely, when its prices fall relative to those for other countries because of a lack of demand for its products, then its supplies of reserve currencies, money, and credit accelerate, causing its interest rates to fall and demand

for its products to rise. The success of a currency board, therefore, principally depends on the prompt and complete adjustment of its prices, including those in financial contracts, to match the demands for its factors and products with their supplies.

A currency board cannot anticipate and offset economic disturbances until they affect the demand for its currency, and even then, its actions are dictated by its need to maintain the exchange rate (Honohan 1994). For example, should improving prospects attract capital to a currency board's economy as investors require a lower risk premium for holding the economy's assets, then the board supplies more of its currency as it purchases foreign exchange in order to prevent the value of its currency

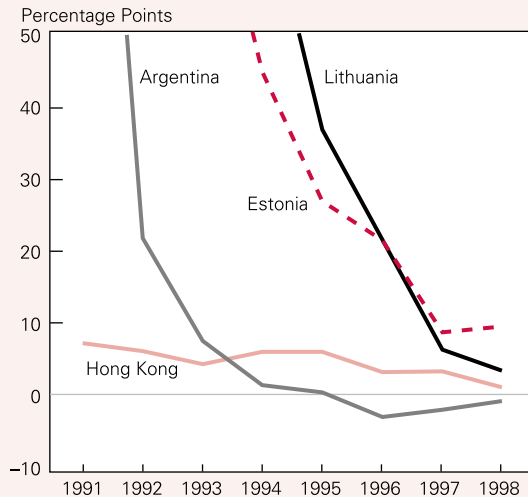
from rising. Domestic base money expands, interest rates fall, the banking system expands, and domestic activity grows more rapidly. If the currency board attempts to accomplish the same results without the benefit of the initial capital inflows and lower risk premium, its attempts to reduce the domestic rate of interest mainly encourage investors to shift toward assets denominated in foreign currencies. As investors demand foreign exchange, the board buys its domestic currency in order to support the exchange rate. Other things equal, the capital outflow continues until the board buys back much of the currency that it created and domestic interest rates return to their former equilibrium. The principal consequence of the open-market operation is the exchange of the currency board's excess foreign assets for domestic assets.

Although a currency board can limit the rate of inflation in its economy, it cannot guarantee a low rate of inflation or even a rate of inflation as low as that in the economy that issues its reserve currency (Bruno et al. 1991; Schwartz 1993, p. 176; Williamson 1995, pp. 8-9). (See Figure 2.) The rate of inflation in Hong Kong from 1983 to the mid 1990s, for example, averaged more than twice that in the United States. Although a fixed exchange rate might tie the prices of a develop-

Figure 2

### Recent Inflation in Selected Countries with Currency Boards

Rate of Change in Country's Consumer Price Index  
Less Rate of Change in Consumer Price Index  
of Reserve-Currency Country



Note: For Estonia, reserve-currency country is Germany.  
For others, reserve-currency country is the United States.

Source: IMF, *International Financial Statistics*.

ing economy's products to the prices of competing goods and services that are produced by the country issuing its reserve currency, the prices of products that do not compete can differ. When the mix of goods and services that the developing economy produces and consumes is not the same as that for the developed country, the price indexes for the two economies can change at different rates. This potential for divergence increases as more of the two economies' products are priced in different markets. Differences in the growth of productivity between the two economies also can cause their rates of inflation to differ (Balassa 1964, esp. pp. 593–95). Productivity in a developed country might not increase as rapidly as in a developing economy that gradually absorbs the best available technology. In these circumstances, when the exchange rate between the two economies' currencies is fixed, the prices of the developing economy's outputs that do not compete closely with those of the developed country will tend to inflate more rapidly.

Currency boards that hold excess foreign ex-

change reserves can conduct limited market operations in order to insulate their money markets from disturbances arising from temporary shifts in the demand for and supply of base money. For example, an unexpected, temporary increase in the public's demand for currency or in the government's balances held at the monetary authority can reduce the supply of reserves to the banking system without reducing banks' demand for reserves commensurately, especially when their required reserves are set according to the amount of their deposits in previous weeks. In these circumstances, banks bid up money market interest rates until investors are willing to incur the round-trip transactions costs for converting foreign assets to domestic currency for a short time. A currency board that holds sufficient excess reserve assets could reduce the additional volatility of money market interest rates in these cases by issuing the extra base money that the banking system requires. The need for such limited market operations quickly diminishes, however, as a currency board's banks forge close ties with financial institutions abroad, thereby enabling them to manage their reserves at little cost. Even without these ties, the grounds for the monetary authority's operations often might not be compelling, because in practice the timing and magnitude of banks' temporary need for reserves are not clear. A monetary authority's intervention also can raise questions about its motives or raise expectations that it can take more control of its interest rates (Honohan 1994; Camard 1996).

## II. The Role of Currency Boards

Currency boards allow emerging economies to establish sound currencies without adopting the currencies of other countries as their own. By binding their supply of base money closely to their holdings of reserve assets, currency boards can reduce inflation and foster investment in economies whose monetary authorities might otherwise create too much base money in order to finance excessive or uneconomical domestic spending. Although currency boards, by design, circumscribe the powers of their monetary authorities, thereby shifting the responsibility for macroeconomic policy to their fiscal authorities, these boards also promote a greater degree of fiscal rectitude by denying their governments a ready supply of credit from their central banks.

In the longer run, currency boards give developing economies a degree of shelter that allows them to

cultivate responsible monetary authorities and reputable financial institutions. Because currency boards exact a price that developing economies are likely to find increasingly costly as they mature, these boards likely represent an early stage, rather than a destination, in the evolution of their monetary authorities.

### *A Sound Currency*

Partly because monetary authorities of emerging economies too often have financed too much domestic spending in the past, these economies frequently cannot establish new currencies that command confidence at favorable rates of exchange. The governments of developing economies typically face great demands for public spending, ranging from building military

---

*Currency boards promote confidence in an emerging economy's currency and assets by establishing a monetary authority that is independent of the government and is committed to a conservative monetary policy.*

---

forces to installing basic infrastructure and educating its citizens, from subsidies for nascent enterprises to claims for pensions, welfare, and health care. In addition, these governments often require funds to maintain or create their own enterprises. Because these needs exceed their tax receipts, potentially large deficits confront these governments. When domestic saving and lending from abroad fail to cover these deficits, the monetary authorities can buy the debt directly or supply new base money so that the banking system can make the necessary loans. A government's control of the central bank, its ownership of larger banks, and its influence over the flow of business through privately owned banks facilitate its access to these funds (Goldstein and Turner 1996). In these circumstances the banking system becomes an instrument of fiscal policy, and bankers can view themselves as servants of the public interest.

This provision of apparently ready, cheap funding from the banking system can harm an economy in at least four ways. First, inasmuch as the expansion of

the stock of money and credit exceeds the growth of resources available to the economy, this financing diminishes the value of the currency by increasing prices. It is precisely this "inflation tax" that transfers purchasing power to the government to support its spending. Second, if public spending and investment do not meet market tests and are directed to enterprises with inadequate returns, then this creation of money also facilitates the misallocation of resources and harms its economy's development. Third, this inflation and the government's influence over capital markets diminishes investors' faith in the value of an economy's currency, securities, and real assets, which tends to reduce its net capital inflows. Finally, the economy's goods become less competitive if it attempts to maintain the value of its currency.

Currency boards promote confidence in an emerging economy's currency and assets by establishing a monetary authority that is independent of the government and is committed to a conservative monetary policy. The supply of base money grows only as rapidly as net foreign trade and capital flows allow, thereby reducing the banking system's capacity to create money and credit in order to finance spending that exceeds its economy's resources.<sup>7</sup>

In time, a currency board's control of money and credit weakens as its financial system develops substitutes for deposits and banks' loans that are not bound to the supply of base money through reserve requirements. This control also weakens if the economy's public and private enterprises can manage capital flows from abroad in a manner that offsets, to a degree, the consequences of its current account balance. A currency board, for instance, does not neces-

---

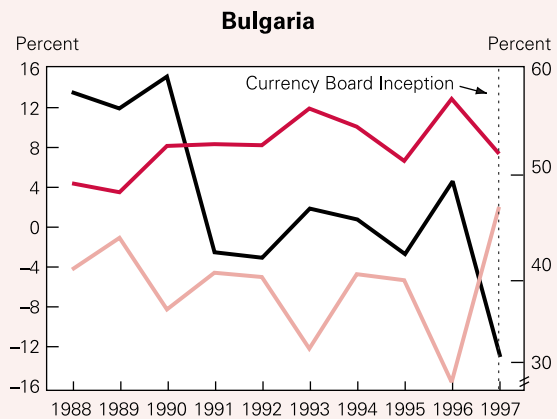
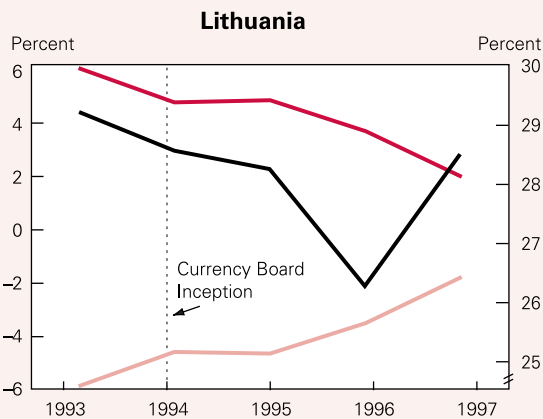
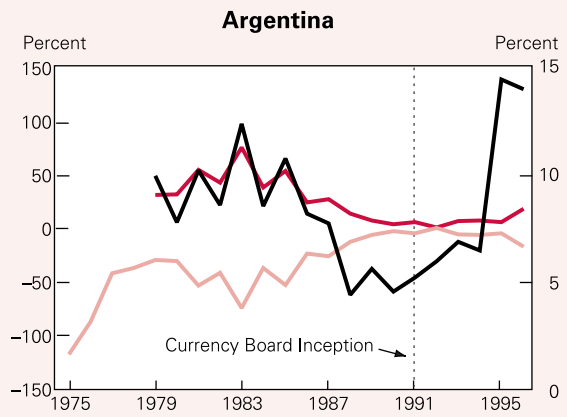
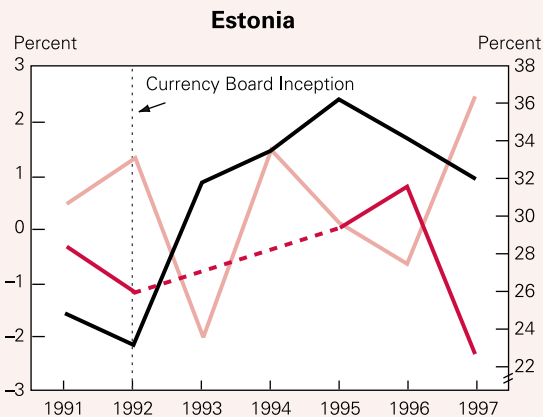
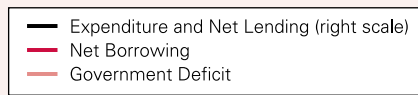
<sup>7</sup> Ghosh, Gulde, and Wolf (1998, Table 2, p. 11) show that countries with currency boards, especially those without capital controls, have had lower government deficits relative to GDP than their peers. The stock of money in currency boards also has tended to grow more slowly than that in other countries. For lower- and middle-income countries, those with currency boards experienced a lower average rate of inflation, less volatile inflation, and a greater average rate of growth than those without boards. The authors conclude that currency boards instill sufficient confidence in future monetary policy to account for their more favorable economic performance. The relatively high shares of foreign exchange deposits in their banks (Table 1 above), their yield spreads (Figure 1 above), and the few longer-term unsecured bonds that are denominated in their currencies suggest, however, that this confidence might not be sufficiently great to support this conclusion. While a currency board can accompany policies that improve an economy's performance, the currency board is neither necessary nor sufficient for these policies to be effective (Fieleke 1992). A currency board might be "a poison pill," but it is a pill that need not be swallowed if "failure to stick to the commitment amounts to a catastrophic outcome" (Dornbusch and Giavazzi 1999, p. 3). Indeed, discarding the pill would be the rational decision in these circumstances.



Figure 3

*Government Outlays and Deficits in Selected Countries with Currency Boards*

Percent of GDP



Note: For Estonia and Bulgaria, reserve currency is the deutsche mark. For Argentina and Lithuania, reserve currency is the U.S. dollar.

Source: IMF, *International Financial Statistics*.

sarily constrain its government's spending or ensure small deficits (Figure 3), especially when its government can sell assets to finance its spending or can conduct fiscal policy through its influence over businesses and financial institutions. Hong Kong, for example, has raised revenues by selling land. Estonia, Lithuania, and Argentina either have sold state-owned enterprises or have pledged their assets for loans. When an economy postpones its suppression of excessive aggregate demand long enough, its prices

and the values of its assets can rise too far, thereby increasing the risk of a serious recession, a financial collapse, or a currency crisis (Goldstein and Turner 1996; Gavin and Perotti 1997).

*Seigniorage*

Currency boards allow emerging nations to establish a currency and monetary authority even though they might lack developed financial markets and

experienced central banks.<sup>8</sup> A less passive monetary authority must measure, monitor, and analyze properly much international and domestic data for it to choose its monetary policy. It also requires reasonably efficient financial markets in order to execute its policy with sufficient confidence and consistent results. A currency board's commitment to alter its supply of base money only as the net demand for its currency changes can reduce the price for establishing a monetary authority.

Many emerging economies have not adopted another country's currency because they wished to establish their own currency and capture the seigniorage for doing so.<sup>9</sup> Seigniorage, measured by the net income that a country earns on the assets that back its currency, is greatest when its domestic currency represents a substantial share of its economy's total financial assets. An economy that establishes a currency board often lacks the reputation to realize its

Even as faith in their currency grows, currency boards are not necessarily very great profit centers for emerging economies, because the opportunity cost of their investment in foreign assets can absorb much if not all of their net return on their reserve assets. Initially, when confidence in an economy's policies, assets, and currency is lacking, this opportunity cost is relatively low, inasmuch as the apparently high risk on its domestic securities, including those issued by its government, make these securities a weak foundation for a new currency. But later, this cost rises as the reputations of its currency, industries, and fiscal authority grow. Its investment in foreign assets displaces its potential investment in domestic securities as these securities become suitable substitutes. The cost of a currency board's not investing a portion of its assets in its government's securities can be highest when informed estimates of the risk-adjusted rate of return on these securities are high relative to those for other securities because of imperfections in world capital markets.

The principal seigniorage offered by a currency board is the option it gives to its economy to create its own central bank. A currency board reflects a commitment to install a sound currency more than a commitment to remain bound to another country's currency.<sup>11</sup> An emerging economy that adopted another country's currency as its own must establish both a new currency and a central bank should it wish to install an alternative monetary authority. An economy that adopted a currency board has already established its currency and has had an opportunity to cultivate some elementary central banking operations, which can reduce the cost of expanding the responsibility of its monetary authority.

### *The Challenges Posed by Currency Boards*

The success of a currency depends on the promise of its economy and the stability of its financial system. When traders and investors are wary of the return on the economy's capital investments, are concerned that its banking system is not healthy, or fear that the government's debt is growing too rapidly compared to its national income, they can question the economy's competitiveness and therefore the value of assets that are denominated in its currency. A currency board might sustain the foreign exchange value of its currency in these circumstances, but it cannot sustain

---

*The principal seigniorage offered by a currency board is the option it gives to its economy to create its own central bank.*

---

potential seigniorage fully, because foreign currencies account for a large share of its circulating money or deposits (Table 1, above). Although an economy's reputation improves as it develops, its seigniorage often diminishes as its financial assets and GDP grow more rapidly than its base money. For existing currency boards, base money ranges from about 7 percent of GDP in Argentina to about 30 percent of GDP in Bulgaria, implying that net earnings on their foreign exchange assets generally do not exceed 1 percent of GDP.<sup>10</sup>

---

<sup>8</sup> Nonetheless, establishing a currency board is not a simple matter. See Enoch and Gulde (1997).

<sup>9</sup> Calvo (1999a and 1999b) notes that an economy can incur significant costs (in addition to creating harmful externalities) by issuing its own currency. For example, the persistence of high longer-term interest rates in Argentina after last year's international financial crisis reduces its seigniorage.

<sup>10</sup> Broader measures of seigniorage that also include the increase in the economy's stock of money might be as high as 4 percent of GDP in Lithuania and 10 percent of GDP in Bulgaria and Estonia (International Monetary Fund 1997, p. 116; Dornbusch and Giavazzi 1999).

<sup>11</sup> See also footnote 7.

the domestic prices of its goods, services, and assets. Consequently, the successful introduction and maintenance of a currency board requires a sound financial system, a responsible fiscal authority, and reasonably efficient capital markets that allow resources to flow to the most promising applications.

A currency board requires a sound financial system because its ability to conduct open market operations or to act as lender of last resort is, at best, limited (Santiprabhob 1997; Caprio et al. 1996). The banking system, therefore, should be able to manage the volatility of interest rates, assets' values, and financing that can result from the monetary authority's maintaining a fixed exchange rate.<sup>12</sup> To avoid undermining confidence in its currency, the discipline of a currency board requires banks' supervisors to encourage and managers to maintain adequate capital, proper reserves for losses, full disclosure of their financial conditions, and access to credit abroad when necessary. Similarly, to foster investors' confidence in the valuation of its assets, output, and money, an emerging economy should cultivate open capital markets, and its banking system and supervisory authorities should operate independently of the influence of the government.

To the extent that currency boards' banking systems require lenders of last resort in order to confront the threat of a financial crisis, the obligation to meet this commitment rests with their governments, perhaps by investing their currency boards with excess capital.<sup>13</sup> When crises become sufficiently great, as they were in the mid 1990s in both Argentina and Lithuania, international lending institutions also might assume this commitment by providing loans to currency boards and their governments.<sup>14</sup>

Just as a currency board limits its monetary authority's influence on economic activity, it increases that of its fiscal authority. While monetary authority is

dedicated to maintaining the exchange rate, the fiscal authority's programs for taxes and spending can influence the growth of national income and the net flows of foreign exchange. For example, when the government increases its spending or reduces taxes, its economy's demand for goods and services tends to rise, while the resulting drop in net exports tends to reduce its stock of base money and raise its domestic interest rates.

When fiscal policy reacts responsibly to changes in domestic business conditions, its actions can help stabilize economic activity and the values of assets. Less responsible policy, on the other hand, can undermine a currency board's fixed exchange rate.<sup>15</sup> The less promptly and completely an economy's prices adjust to imbalances in the supply and demand for its factors

---

*The successful introduction and maintenance of a currency board requires a sound financial system, a responsible fiscal authority, and reasonably efficient capital markets that allow resources to flow to the most promising applications.*

---

and products, the greater is its potential need for fiscal policy to regulate its economic activity. The government's ability to fulfill this promise is limited, however, by its access to credit, particularly when its domestic business conditions are deteriorating. In these circumstances, the government typically must rely on credit supplied by investors abroad, international financial institutions, and credit agencies, instead of its own monetary authority.

A currency board's guarantee of a fixed exchange rate can give its currency a good start, but this guarantee can become too costly with time. Suppose the returns on a developing country's assets and resources—derived from the value of their outputs in

---

<sup>12</sup> Ironically, currency boards that are established in the wake of financial crises tend to inherit weak banking systems that eventually threaten these boards with banking crises.

<sup>13</sup> Caprio et al. (1996, p. 11) note that a lender of last resort "is a logical necessity for the maintenance of a unified fixed exchange rate. . . . The commitment of a currency board to convert its own liabilities into foreign exchange may be of little practical importance in the face of declines in the market value of banks' assets." This concern might be extended to the value of all marketable assets.

<sup>14</sup> Hong Kong survived the devaluation of many Asian currencies in the fall of 1998 partly because traders and investors regarded the substantial foreign exchange reserves of the People's Republic of China as potential backing for the Hong Kong dollar. Hong Kong's government and banks also employed their reserves to support both the value of the HK dollar and the value of marketable assets in Hong Kong.

---

<sup>15</sup> For example, Gavin and Perotti (1997) note that fixed exchange-rate regimes in Latin America seem not to have bred greater fiscal discipline. Despite the responsibility that these regimes placed upon their fiscal authorities, their fiscal policy was more volatile and procyclical than is common in industrial countries. ". . . Latin American fiscal expansions have been significantly associated with exchange-rate collapses" (p. 13).

world and domestic markets—are correlated with market factors in the same way as the returns on the assets of the developed country that issues its reserve currency. Then, the value of the developing economy's portfolio should tend to vary with that of the developed country. To the degree the monetary policy of the developed country stabilizes the value of its assets and maintains the competitiveness of its resources, its policy will tend to do the same for the developing economy. As the emerging economy develops, its endowments, its factors of production, its technology, and the growth of its various industries are likely to diverge substantially from that of the

---

*Not surprisingly, a currency board does not encourage the development of the institutions that its economy would require should it cease operation.*

---

economy that issues its reserve currency. If the correlations among the returns on the two economies' portfolios deviate sufficiently, then the monetary policy of the developed country could become less suitable for the developing country. Different patterns of trade, capital flows, and macroeconomic stresses likely warrant different optimal macroeconomic policies for the two economies. Unless prices and wages are sufficiently flexible in the developing economy and factors of production, technology, and capital flow fairly freely between it and its trading partners, its maintenance of a currency board can increase the necessary adjustments in its prices, wages, and output when demands for its products change in global markets.

A currency board's reliance on a healthy financial system and a suitable fiscal policy does not necessarily diminish with time. A successful board often fosters an expansion of domestic capital markets as its banks and other financial intermediaries offer new types of accounts and its businesses issue more bonds and equities, all denominated in the domestic currency. When this "inside money" finances an increasing share of domestic capital formation and economic activity, the volume of marketable or liquid financial assets in the board's economy grows more rapidly than its holdings of foreign assets. Success, therefore,

can entail greater leverage of a currency board's reserves, exposing its economy to a greater risk of a financial collapse should investors become sufficiently wary of the prospective returns on its economy's assets and seek more attractive investments elsewhere.

Not surprisingly, a currency board does not encourage the development of the institutions that its economy would require, should it cease operation. Under the discipline of a currency board, the art of conducting monetary policy can atrophy for lack of application, and credit markets can remain thin as banks become accustomed to dealing with the currency board and to holding many of their marketable financial assets abroad. Ironically, the authority should prepare to assume the functions of a central bank, as insurance against its economy's needing to leave its currency board, even though it cannot practice central banking. A currency board's commercial banking system and other financial institutions should cultivate their ability to manage potential currency risk even though the board might shelter them from much of this risk.

Although a currency board relieves its monetary authority of the responsibility of executing its own policy, it also obligates its monetary authority to prepare for its potential departure from the board. To fulfill this obligation, the monetary authority could install the data base, analytical staff, and senior officials that it requires to study, debate, and adopt a monetary policy. It also could train its personnel and exercise their skills by forming shadow policies, perhaps using these policies to guide whatever limited operations its excess reserves and seasonal needs allow. Furthermore, the authority could adopt procedures, policies, and prices that foster the growth of its domestic money market, particularly its markets for government securities and foreign exchange. It could also encourage its financial institutions to measure and manage their risks according to practices of those institutions that do not operate under currency boards.

### *III. Beyond Currency Boards*

Economies that leave currency boards can take several courses, ranging from fixing their exchange rates to adopting floating rates.<sup>16</sup> A fixed exchange

---

<sup>16</sup> For a survey and evaluation of exchange rate regimes and their properties see International Monetary Fund (1997).

rate might assume the form of either a constant target or a crawling peg, which commits the target to change in a preordained way over time. Although fixed exchange rate regimes allow emerging economies somewhat more freedom for executing monetary policy, they otherwise share many of the attributes of currency boards. In particular, the maintenance of the

---

*Passing to a fixed exchange rate regime might be an attractive first step for an economy that leaves a currency board.*

---

exchange rate target likely will become less suitable as the economy develops, and the resources of the monetary authority likely will become increasingly inadequate to support the value of the currency in the event the target seems questionable to traders and investors. Nonetheless, passing to a fixed exchange rate regime might be an attractive first step for an economy that leaves a currency board.

Currency boards and fixed exchange rates can shelter emerging economies as they establish their identities and industries, but in time either floating exchange rates or economic unions offer more durable foundations for their financial systems. Whereas a fixed exchange rate allows its economy only partial economic independence, a float moves it toward greater independence; a union, greater dependence. By floating its exchange rate, a developing economy disconnects the value of its currency and its macroeconomic policies from those of any particular developed economy. Its currency derives its value principally from its economic performance relative to those of its trading partners. An economic union that fosters the mobility of factors of production and provides a common fiscal authority answers the potential problems of fixed exchange rates by coupling its constituent economies more closely, pooling their common resources.

### *Fixed Exchange Rates*

By moving from a currency board to a fixed exchange rate, an emerging economy gives its monetary authority and financial markets some latitude for

development without necessarily altering the value of its currency. Whereas a currency board requires the monetary authority to maintain sufficient reserves to back fully its base money, a fixed exchange rate regime allows its central bank to reduce this support. The foreign assets backing domestic base money typically are relatively high at first—for example, the monetary authority might establish a target that allows no less than 80 percent backing with foreign exchange, the remainder with high-quality domestic securities. Once investors become more confident in the performance of the economy and its central bank, the central bank can adopt lower targets.

With a fixed exchange rate, instead of a currency board, a central bank can undertake limited open market operations and lend to banks, but it cannot set its own targets for domestic interest rates. Should it attempt, for example, to reduce interest rates very much by buying domestic securities, it would precipitate capital outflows that offset its efforts to reduce domestic interest rates. This open market operation would mainly reduce the ratio of foreign currency assets to domestic base money.

If a monetary authority that enforces a fixed exchange rate recognizes the limits of its influence, its open-market operations can limit temporary strains on the liquidity of its banking system and foster the development of its domestic money market. For instance, domestic interest rates might be less volatile if

---

*A fixed exchange rate regime ultimately is no more durable than a currency board. Its success, much like that of a currency board, depends on the correspondence between its economy and that of the country that issues its reference currency.*

---

the monetary authority were to provide more base money to answer a temporary increase in the demand for currency, instead of allowing domestic rates to rise enough to induce the banks to incur the cost of selling foreign exchange assets. The reduction in the backing of the base money in this case is only temporary. To



protect itself from stretching the limits of these operations too far, the monetary authority's target for the backing of its base money arrests its ability to supply more base money once the backing of its base money falls to its minimum.

A fixed exchange rate regime also allows the monetary authority to provide, within limits, loans to its banking system. A solvent bank suffering an urgent deficiency of funds could qualify for a temporary, secured loan from the monetary authority. Because this lending increases the supply of base money, it also might be matched with an open market operation to withdraw a matching amount of base money in order to diminish any capital outflows that could be precipitated by the loan. In any event, the monetary authority's target for its minimum acceptable ratio of reserve currency to base money limits its ability to lend to banks without arranging offsetting open market operations.

A fixed exchange rate regime ultimately is no more durable than a currency board, even though its central bank has somewhat more freedom to vary the backing of its base money through its market operations and its loans to the banking system. The success of fixed exchange rate regimes, much like that of currency boards, depends on the correspondence between their economies and those of the countries that issue their reference currencies. The most suitable choices for a developing economy's reference currency and exchange rate target likely change as it develops. Moreover, as the value of its marketable assets increases relative to the resources of its central bank, its ability to protect the value of these assets and its currency diminishes.

### *Floating Exchange Rates*

A floating exchange rate releases a central bank from the commitment to defend the value of its currency and to guarantee this commitment with sufficient foreign exchange reserves. Although the central bank may intervene in foreign exchange markets to maintain orderly trading in its currency, the value of its currency is established by the net demands of traders and investors in exchange markets, instead of the central bank's store of reserve assets.

The maintenance of a fixed exchange rate forces an economy's domestic wages, prices, and incomes to bear the entire burden of macroeconomic adjustments when demands for its goods change. Once an economy matures sufficiently and establishes a reputation for its currency, a floating exchange rate allows its

monetary authority somewhat greater leeway for managing the consequences of these burdens—for example, by preventing aggregate demand from rising or falling excessively as resources shift to more rewarding occupations. Although a floating exchange rate cannot eliminate the macroeconomic pressures transmitted to its economy, it can assist its economy's adjustment to these pressures.

Floating exchange rates give central banks in small, open economies more control over their domestic stocks of money, but they do not necessarily allow their central banks to control the real stock of money or the real rate of interest. Suppose, for example, the central bank, through one-time purchases of domestic securities or loans to banks, attempts to increase its base money and reduce domestic rates of interest. The lower interest rates on domestic securities precipitate a capital outflow as the yields on assets in other currencies become more attractive. With a fixed exchange rate, this outflow would tend to return the stock of base money and interest rates to their former levels. With a floating exchange rate, the capital outflow alters the stock of base money negligibly.<sup>17</sup> Instead, the exchange rate falls, which, other things equal, raises the prospective yields on securities denominated in the domestic currency to the extent that investors expect the exchange rate to rise in the future to its appropriate equilibrium value. The exchange rate initially falls until the expected appreciation is sufficiently great to restore the appeal of the return on domestic assets.<sup>18</sup> Because the lower exchange rate also tends to make domestic goods more attractive in world markets, domestic prices rise, thereby reducing the domestic real stock of money. Lower domestic interest rates and the greater demand for exports encourage businesses to issue more domestic debt. After its initial drop, the gradual recovery of the exchange rate ends once it rises sufficiently to restore the balance between prices abroad and the new, higher level of domestic prices. By this time the real stock of money has returned to its initial level, and the

---

<sup>17</sup> The following assumes that the economy initially is in equilibrium and generally remains so. If, instead, demand were deficient, then this market operation could temporarily foster greater domestic demand, higher exchange rates, and larger stocks of money and credit as the economy proceeds to its equilibrium.

<sup>18</sup> In this case, "overshooting" does not necessarily indicate harmful volatility. When investors' assessments of the economy change considerably, their risk premiums also can increase abruptly, causing the exchange rate to fall further in order to provide their required rate of return. If the initial plunge in the exchange rate by itself precipitates higher risk premiums, however, then the depreciation can become excessive.

greater supply of domestic securities has restored the initial domestic rate of interest.

Floating exchange rates, therefore, grant central banks in smaller, open economies more independence, but not necessarily greater control. Although a central bank can choose its objectives for monetary policy and conduct open market operations, it cannot expect to achieve its objectives unless they are consistent with the prevailing equilibrium in world markets for its goods and capital. The central bank's monetary policy is generally limited either to offsetting disruptions that could temporarily displace its economy from its equilibrium or to assisting its economy's shift to a new equilibrium when necessary.

---

*With a floating exchange rate, the value of the currency is established by the net demands of traders and investors in exchange markets, instead of the central bank's store of reserve assets.*

---

Floating exchange rates principally adjust the prices of their economies' goods and assets to the demands prevailing in global markets. This revaluation reduces the need for their domestic prices to rise or fall so greatly, provided central banks respect the limitations on their ability to control their economies. Even so, no exchange rate regime can insulate a small, open economy from the consequences of conditions in world markets, especially when its industrial structure is not very diverse. When these consequences entail a sufficiently large drop in the prices of domestic goods and assets, a floating exchange rate can diminish the risk of currency crises that can arise when an economy retains a fixed exchange rate too long.

### *Economic Union*

Because a maturing economy often lacks diversity, its fortunes frequently depend too greatly on the demand for the few manufactured products and resources that it exports as well as the prices it must pay for essential imports. Consequently, its incomes and return on investment can be more volatile than that of more developed countries, which can impede its de-

velopment by raising the return that investors require of its assets (Goldstein and Turner 1996, pp. 9–12). Some emerging economies, for want of size or a sufficient range of endowments, cannot anticipate becoming highly diversified even after they have developed. For others that possess a somewhat greater range of resources, achieving the stability that attracts investors often requires their already having attained a sufficient level of development.

A proper choice of monetary regime can avoid unnecessary economic volatility, but it cannot protect an economy from the consequences of changing aggregate demands or relative prices in global markets. Currency boards, for example, might eliminate much of the instability that arises when investors question the motives of a monetary authority. Fixed exchange rates might allow developing economies to import monetary policies that initially command the confidence of traders and investors. Floating exchange rates might adjust prices most easily for economies with more mature, reputable monetary authorities. In every case, however, an irreducible degree of volatility confronts emerging economies—their living standards and the values of their assets must change when the demand for their products or their terms of trade change sufficiently.

Developing countries that attempt to foster stability by using fiscal policies to separate their economies more completely from global markets might postpone necessary adjustments at the cost of increasing the magnitude of these adjustments. Policies that tax imports and capital flows, limit foreign vendors' access to domestic markets, subsidize certain goods and services, protect industries, or otherwise control the flow of trade and capital insulate domestic relative prices from those prevailing elsewhere. Accordingly, the structure of domestic industries, their return on capital, the value of their assets, and their payments of wages and salaries are insulated from changes in net demands or relative prices in global markets. When an economy's industries eventually become too uncompetitive according to prices prevailing in world markets, the economy increases the magnitude of its postponed economic adjustments once it seeks the benefit of more extensive commerce.

Economic unions foster stability by opening economies and pooling their resources. The constituents of a union adopt a common currency and a common monetary policy. A union comprising economies with very different resources, in one sense, is not an optimal currency area (Tootell 1990)—the macroeconomic policies that are most suitable for one region can be

inappropriate for another. But a union that permits its people, goods, services, and capital to move relatively freely among its constituents can create an internal market that is larger and more diversified than those of its constituents. Should global demands shift away from one region's resources, the ensuing movement of capital and labor to other regions can diminish the volatility of economic conditions throughout the union. Furthermore, the inevitable drop in the value of the first region's assets is less likely to precipitate a "currency crisis," provided the value of the resources in other regions does not fall as well.

---

*An economic union that permits its people, goods, services, and capital to move relatively freely among its constituents can create an internal market that is larger and more diversified than those of its constituents.*

---

Economic unions can exceed simple currency unions. The success of a currency union depends on the mobility of its labor and capital as well as the flexibility of its prices. For example, if its factors of production are not mobile, a currency union would offer its constituents a kind of currency board. Although each region can influence the common macroeconomic policy, none can set its own policy independently of the others, and the exchange rate for each region's currency is fixed to that of the common currency. When a currency union is accompanied by a fiscal union, a more uniform fiscal policy among regions can foster the movement of factors of production and encourage its regions to adjust more rapidly to changing economic conditions.<sup>19</sup>

#### **IV. Conclusion**

Currency boards can provide a foundation for new currencies, but these boards alone cannot ensure success. A currency board can limit the rate of infla-

---

<sup>19</sup> Kopits (1999) discusses the costs and benefits of joining the European Monetary Union for the European emerging economies.

tion in its economy by eliminating its monetary authority's capacity for issuing base money to finance excessive public and private spending. But a currency board cannot guarantee a low rate of inflation or even a rate of inflation as low as that in the economy that issues its reserve currency. If prices in its economy are not sufficiently flexible, a currency board's monetary regime also might not stabilize the value of its economy's resources and its currency. Although a board guarantees the backing of its base money, faith in its currency rests on traders' and investors' confidence in its financial institutions, capital markets, and fiscal management. A currency board can reflect a country's commitment to a responsible fiscal policy, for example, but it cannot guarantee that commitment (Fieleke 1992). As long as a currency board is in force, a developing economy's government cannot rely on its monetary authority to finance its spending, but a currency board neither prevents the government from accumulating a large public debt nor ensures that public and private investments are allocated reasonably efficiently.

Although a board might cause its economy to import a reputable monetary policy, it cannot ensure that this policy suits its economy's needs. Even a promising choice of reserve currency and exchange rate can become a substantial burden as a currency board's economy matures and its economic structure diverges from that of the developed economy issuing its reserve currency. If the value of the developing economy's portfolio of resources in world markets should tend to vary with that of the developed country, then the monetary policy of the developed country might stabilize returns on the developing country's resources. In time, however, as correlations between returns on these two portfolios shift, then from the developing country's point of view the propriety of the developed country's monetary policy also shifts. In these circumstances a board can fix the value of the developing country's currency, but doing so might aggravate rather than diminish the volatility of the value of its resources and assets, thereby increasing rather than diminishing its risk of financial crises and undermining the foundation of its currency.

Currency boards represent a start, more than a destination, for the design of monetary authorities. They can offer emerging economies a temporary shield for cultivating reputable central banks and financial institutions. Yet, currency boards cannot fully insulate their economies from the consequences of changing conditions in world markets. As developing economies and their institutions mature, they

might attain a more secure foundation for the value of their resources either by joining economic unions that include a common fiscal authority or by adopting floating exchange rates. Economic unions might appeal most to less diversified economies which, for any choice of monetary regime, are likely to remain more

volatile than larger, developed countries. Perhaps, then, the principal legacy of currency boards is not their maintenance of sovereign currencies, but their introduction of developing economies into the networks of commerce, finance, law, and policies that rest upon their reserve currencies.

## References

- Balassa, Bela. 1964. "The Purchasing Power Parity Doctrine: A Reappraisal." *Journal of Political Economy*, vol. 72, no. 6, December, pp. 584–96.
- Bennett, Adam G. G. 1992. "The Operation of the Estonian Currency Board." International Monetary Fund, Paper on Policy Analysis and Assessment 92/3, December.
- Bruno, Michael, Stanley Fischer, Elhanan Helpman, and Nissan Liviatan with Leora Meridor. 1991. *Lessons of Economic Stabilization and Its Aftermath*. Cambridge MA: The MIT Press.
- Calvo, Guillermo A. 1999a. "Argentina's Dollarization Project: A Primer." <http://www.bsos.umd.edu/econ/ciecalvo.htm>, under Policy Notes. February 18.
- . 1999b. "On Dollarization." <http://www.bsos.umd.edu/econ/ciecalvo.htm>, under Policy Notes. April 18.
- Camard, Wayne. 1996. "Discretion with Rules? Lessons from the Currency Board Arrangement in Lithuania." International Monetary Fund, Paper on Policy Analysis and Assessment 96/1, March.
- Caprio, Gerard, Jr., Michael Dooley, Danny Leipziger, and Carl Walsh. 1996. "The Lender of Last Resort Function Under a Currency Board: The Case of Argentina." World Bank, Finance and Private Sector Development Division, Policy Research Working Paper 1648, September.
- Dornbusch, Rudi and Francesco Giavazzi. 1999. "Hard Currency and Sound Credit: A Financial Agenda for Central Europe." <http://www.stern.nyu.edu/nroubini/asia>. January.
- Enoch, Charles and Anne-Marie Gulde. 1997. "Making a Currency Board Operational." International Monetary Fund, Paper on Policy Analysis and Assessment 97/10, November.
- Fieleke, Norman S. 1992. "The Quest for Sound Money: Currency Boards to the Rescue?" Federal Reserve Bank of Boston, *New England Economic Review*, November/December, pp. 14–24.
- Gavin, Michael and Roberto Perotti. 1997. "Fiscal Policy in Latin America." In Ben S. Bernanke and Julio J. Rotemberg, eds., *Macroeconomics Annual*, pp. 11–61. National Bureau of Economic Research. Cambridge MA: The MIT Press.
- Ghosh, Atish R., Anne-Marie Gulde, and Holger C. Wolf. 1998. "Currency Boards: The Ultimate Fix?" International Monetary Fund, Working Paper 98/8, January.
- Goldstein, Morris and Philip Turner. 1996. "Banking Crises in Emerging Economies: Origins and Policy Options." Bank for International Settlements, Economic Papers No. 46, October.
- Honohan, Patrick. 1994. "Currency Board or Central Bank? Lessons from the Irish Pound's Link with Sterling, 1928–79." Centre for Economic Policy Research, Discussion Paper No. 1040, October.
- International Monetary Fund. 1997. *World Economic Outlook*, October, pp. 78–118. Washington, DC: IMF.
- Kopits, George. 1999. "Implications of EMU for Exchange Rate Policy in Central and Eastern Europe." International Monetary Fund, Working Paper 99/9, January.
- Kwan, Yum K. and Francis T. Lui. 1996. "Hong Kong's Currency Board and Changing Monetary Regimes." National Bureau of Economic Research Working Paper No. 5723, August.
- Perry, Guillermo E. 1997. "Currency Boards and External Shocks: How Much Pain, How Much Gain?" World Bank, Washington, DC, January.
- Santiprabhob, Veerathai. 1997. "Bank Soundness and Currency Board Arrangements: Issues and Experience." International Monetary Fund, Paper on Policy Analysis and Assessment 97/11, December.
- Schwartz, Anna. 1993. "Currency Boards: Their Past, Present, and Possible Future Role." *Carnegie-Rochester Conference Series on Public Policy*, vol. 39, pp. 147–87.
- Tootell, Geoffrey M. B. 1990. "Central Bank Flexibility and the Drawbacks to Currency Unification." Federal Reserve Bank of Boston *New England Economic Review*, May/June, pp. 3–18.
- Williamson, John. 1995. *What Role for Currency Boards?* Institute for International Analysis, Policy Analysis in International Economics 40. September.
- Zarazaga, Carlos E. 1995. "Argentina, Mexico, and Currency Boards: Another Case of Rules Versus Discretion." Federal Reserve Bank of Dallas *Economic Review*, Fourth Quarter, pp. 14–24.