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To: Members of the Executive Board

From: The Secretary

Subject: **Should Each Country Have Its Own Currency? The Pros and Cons of Full Dollarization**

Attached for consideration by the Executive Directors is a paper on Should Each Country Have Its Own Currency? The Pros and Cons of Full Dollarization, which will be brought for discussion in seminar on a date to be announced. Issues for discussion appear on page 35.

Mr. Borensztein (ext. 37679), Mr. Berg (ext. 37933), and Mr. Goldsbrough (ext. 34735) are available to answer technical or factual questions relating to this paper prior to the seminar discussion.

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INTERNATIONAL MONETARY FUND

**Should Each Country Have Its Own Currency?  
The Pros and Cons of Full Dollarization**

Prepared by Research and Western Hemisphere Departments

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October 29, 1999

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## I. INTRODUCTION

1. **This paper studies the implications of the adoption of a foreign currency as legal tender.** While the paper was motivated by the initiative considered in Argentina to adopt the U.S. dollar, the analysis of the issues involved is general and would also apply to other countries. It would also apply to the adoption of a strong, stable currency other than the U.S. dollar. To facilitate the discussion, however, the paper mostly concentrates on implications of a move from a currency board system (such as Argentina's) to a fully dollarized system. This helps to focus the analysis on the advantages and disadvantages of dollarization per se rather than on the full set of issues that are implied by the choice of exchange rate system.<sup>1</sup>

2. **Full dollarization would, if credible, eliminate the risk of monetary instability and currency crises.** This would lead to lower spreads on international borrowing and more stable international capital movements, which would lower fiscal costs and promote investment and growth. Moreover, full dollarization would reduce transaction costs and promote greater economic integration with the United States and the global economy.<sup>2</sup> It may also support the development of a reliable institutional framework for the economy. However, other country risks would remain, and interest rate spreads on liabilities in the dollarized economy would depend on the likelihood of nondevaluation-linked problems, such as potential financial sector or debt crises.

3. **Giving up the domestic currency may also have costs.** First, the monetary authorities will lose the seigniorage revenue they receive when they issue their own money. In addition, the country loses the option to pursue an autonomous monetary policy. A country with a currency board has already foregone the use of monetary and exchange rate policy, but there remain two potentially important differences with dollarization. First, even within the confines of a currency board system, the authorities retain some ability to act as a lender of last resort to the financial system.<sup>3</sup> Second, full dollarization is a permanent decision or nearly so. Even a currency board leaves some scope for an exit, if only under extreme circumstances. Indeed, the elimination of the perceived risk of such an exit would be the main purpose of full

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<sup>1</sup>The question of choice of exchange rate regime has recently been considered by Directors in their discussion of SM/99/216. Issues pertaining to partially dollarized economies (those that have not adopted the dollar as the legal tender but in which a significant fraction of monetary assets are nevertheless denominated in U.S. dollars) have been discussed in SM/97/234.

<sup>2</sup> Courchene and Harris (1999), for example, propose a monetary union with the United States for Canada largely for this reason.

<sup>3</sup> This depends on the rules under which the currency board operates. In the case of Argentina, as explained below, the central bank retains a margin to provide liquidity to the banking system that would be lost with full dollarization.

dollarization. However, historical experiences in the gold standard period, as well as the more recent example of the CFA Franc, suggest that this “exit option” can be used successfully in the appropriate circumstances.<sup>4</sup>

4. **What is the balance of costs and benefits?** No absolute answer can be given. The potential benefits of lower interest rates and the cost of foregone seigniorage revenues can be estimated, but other important considerations are less quantifiable. The analysis does, however, shed some light on which country characteristics would make dollarization an appropriate choice and suggest policies that could address some of the risks of dollarization. As the paper argues in more detail below:

- The benefits of lower interest rates and greater capital market integration will be larger for countries with a history of high inflation and frequent currency crises.
- The costs of foregone seigniorage will be lower in countries with a high degree of currency substitution, since demand for domestic money is likely to be low.
- The loss of some lender-of-last-resort capacity will be less important for countries with a healthy, well regulated and strongly supervised financial sector.
- The loss of the “exit option” will be less important for countries that are less likely to require large adjustments of the exchange rate vis à vis the dollar. This includes countries with strong fiscal policy and institutions, and flexible labor and goods markets. It also includes countries with dominant trade and financial links with the United States.
- Finally, the loss of the “exit option” will be less costly to countries for whom devaluation is already an ineffective policy tool. This includes countries in which domestic prices are denominated largely in dollars and those with a high degree of dollarization of monetary assets and liabilities in the domestic banking system.

5. **The paper also discusses the implications for regional trade arrangements such as Mercosur of the adoption of the U.S. dollar by one of its members.** There already exists a disparity of exchange rate regimes among the Mercosur partners, and thus a move to dollarization by one of them would not necessarily represent an important change for Mercosur. If the Mercosur arrangement were to evolve into an integrated, single-market system, however, the question of the desirability of a common currency—and whether this currency should be the U.S. dollar—would need to be considered.

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<sup>4</sup> The decision of giving up the domestic currency also has an important political dimension, as in the case of the European Union. This aspect is not addressed by this paper.

## II. MAIN BENEFITS AND COSTS OF DOLLARIZATION

6. **This section mostly focuses on the advantages and disadvantages of full dollarization relative to a firm dollar peg, such as the currency board system applied in Argentina.** Such a comparison isolates the effects that stem from dollarization itself, as distinct from those that result from the degree of flexibility in the exchange rate regime. Box 1 reviews some recent ideas that have been advanced as models for dollarization in Argentina and considers some of their different implications. The authorities have not formulated an explicit plan for moving towards dollarization.

7. **Most of the important benefits of dollarization, as well as some of its costs, depend on the assumption that dollarization would be substantially more difficult to reverse than a currency board arrangement.** While it is, in principle, possible to reintroduce a domestic currency, this would likely be a lengthy and complex process, particularly as the new currency might be presumed weaker than the dollar it would be attempting to replace. With few recent exceptions, countries introducing their own currencies have done so during exceptional political circumstances, notably in the context of newly gained national independence, as with the countries of the former Soviet Union, or civil war, as in Liberia. They have, moreover, almost always replaced a weak and inconvertible currency.<sup>5</sup> If dollarization is instituted through an accord with the United States, it would be even more difficult to terminate the legal tender status of the U.S. dollar.

8. **The analysis of the costs and benefits of dollarization is difficult for two main reasons.** First is the limited historical experience to draw from. The survey in Annex I shows that most economies that have adopted a foreign currency are tiny, with Panama being the only country of significant size now using a foreign currency as legal tender. Second is the need for the analysis to take a longer view than is usually the case when considering monetary and exchange rate options. The near irreversibility of dollarization implies that the analysis should consider events that may be rare but that cannot be ruled out from a long-term perspective, such as extreme terms of trade shocks or a global financial crisis.

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<sup>5</sup> The main exception to the rule that new currencies replace weak ones are Liberia and Slovakia after the breakup of the Czech and Slovak Federal Republic in 1993, while Botswana's introduction of its own currency in 1976, first circulating at par with the rand then following a basket peg, is an exception to both generalizations.

### **Box 1. Options Regarding Full Dollarization in Argentina**

Argentina has strengthened considerably its financial policies and economic performance since the adoption of a currency board arrangement in April 1991. Yet the economy has remained vulnerable to sudden shifts in the international macroeconomic environment, and the authorities continue to search for ways to help reduce the interest rate premium (and variability) on Argentine capital market instruments, relative to the comparable U.S. Treasury instruments (see Figure 3 and related discussion in text). When spreads on Argentine instruments once again increased following the external shock from Brazil, the authorities initiated new studies into strengthening further their commitment to convertibility, including perhaps a full dollarization of the economy.

Observers in Argentina have mentioned three possible options for full dollarization; the authorities have not made an explicit proposal. These options are:

- **Unilaterally dollarizing**, involving the repurchase of all peso currency outstanding with U.S. dollar reserves and a redenomination of all peso assets and liabilities into equivalent U.S. dollar-denominated assets and liabilities. This would be the quickest and easiest to implement. It would not provide any compensation for seigniorage.
- **Negotiating a Treaty of Monetary Association** with the United States, involving the gradual replacement of the peso with the U.S. dollar and certain compensations from the U.S. government (e.g., for seigniorage). This alternative could be expanded at a later stage to include more countries in the region. In addition to the gains from sharing seigniorage, the principal advantage to the Argentinean authorities over the unilateral approach would be that dollarization enshrined in a treaty would be even more credible and would thereby yield even lower credit risk spreads.
- **Seeking an American Monetary Union (AMU)** similar to the European Monetary Union, with a unified Central Bank and coordination of economic policies. In the monetary union, Argentina would obtain a voice in policy making, share in seigniorage and have access to a rediscount window. This option, the most far-reaching one, would provide the most institutional credibility, but it would involve complicated multilateral negotiations and the need to create a new multilateral central banking system. Observers believe that this is not a realistic option in the near future.

## A. The Risk Premium

9. **Dollarization, by avoiding exchange rate uncertainty, holds the promise of reducing country risk premia and lowering interest rates.** Lower interest rates and more stability in international capital movements would result in a lower fiscal cost of servicing the public debt, and also in a higher level of investment and economic growth.<sup>6</sup>

10. In Argentina, the persistence of a differential between peso interest rates and dollar interest rates is evidence of a residual risk of abandonment of the exchange rate peg. Yet interest rates on dollar-denominated Argentine government (and private) securities also exceed those on advanced countries' debt, reflecting "sovereign" or default risk on those securities. **With dollarization, the interest premiums owing to devaluation risk would disappear, but sovereign risk would not.** Moreover, whether governments or the private sector borrow in foreign or domestic currency is largely a matter of choice in an already heavily dollarized economy as Argentina. This means that borrowers can already eliminate the direct effect of devaluation risk from their borrowing costs.

### Currency Risk and Country Risk

11. **The key question is whether full dollarization would substantially reduce the risk premium on dollar-denominated debt.** Devaluation risk might increase sovereign risk for several reasons. First, fiscal losses stemming from a devaluation could increase default risks on external debt in countries where fiscal revenues depend largely on domestic output and much of public debt service is effectively denominated in foreign currency. Thus, governments attempting to avoid currency crises or lower borrowing costs through the issuance of dollar-denominated bonds or dollar-indexed bonds, as in Mexico in 1994, may increase the risk of default in case a sharp depreciation of the exchange rate occurs. Second, a government may impose capital controls in the interests of defending the currency, thereby causing other debtors to default on dollar-denominated debt.<sup>7</sup> Finally, the stress that a devaluation can place on the financial sector provides a further link from devaluation to default. As discussed in section F below, it is difficult for banks to insulate themselves from devaluation risk in highly (de facto) dollarized economies, and governments may bear the burden of supporting the distressed banking systems after a devaluation.

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<sup>6</sup> This discussion neglects the possibility, realized in cases such as Switzerland and Singapore, that countries with floating rates could have lower interest rates than the United States, due to expected appreciations of the currency. The focus here is on more typical developing countries.

<sup>7</sup> Russia chose in 1998 to impose currency controls to essentially forbid Russian private debtors in foreign currency from getting access to the foreign currency with which to service their obligations.

12. **Not all default risks emerge from the risk of currency crises.** Sovereign defaults may result from an unsustainable fiscal position or political turmoil. In response to such circumstances, investors may flee from domestic assets, from government obligations or from the country entirely, such that the government would have problems servicing its debt. Certainly, dollarization cannot prevent the occurrence of this sort of crisis. Moreover, a devaluation of the exchange rate may improve the domestic economy and the fiscal position, and thus *reduce* default risk. The importance or even existence of this effect would vary strongly from country to country.<sup>8</sup> However, the abandonment of a currency board under heavy market pressure would surely badly hurt the domestic economy.

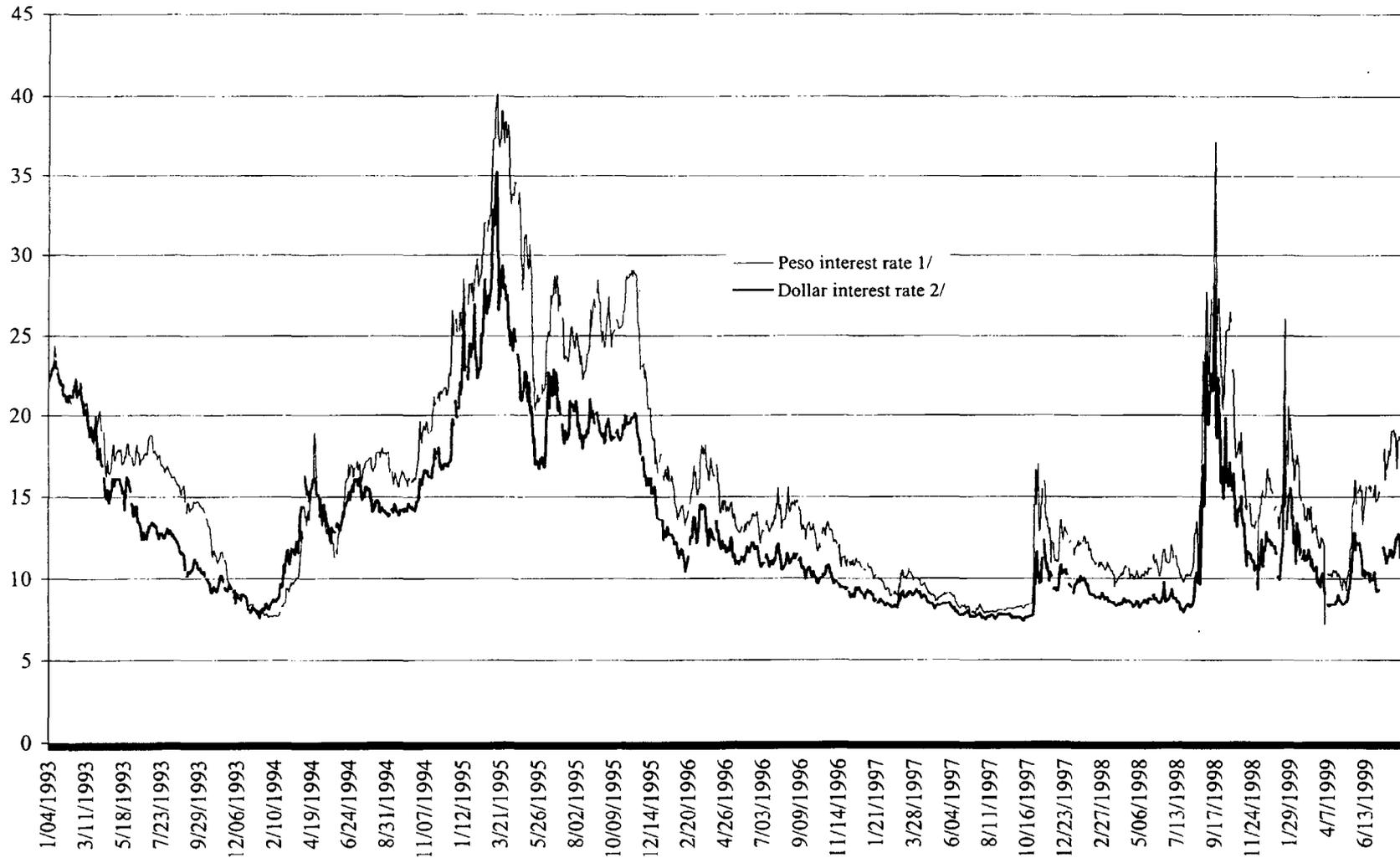
13. **Just as there are arguments on both sides of the question of how much of the default risk to attribute to devaluation risk, the empirical evidence is not easy to interpret.** Yields on bonds with different features can help disentangle sovereign and devaluation risk, as perceived by markets. In Argentina, both peso- and dollar-denominated interest rates have tended to come down since the currency board was implemented in 1991. Nonetheless, both peso- and dollar-denominated interest rates have shot up at times of market turbulence. In Figure 1, which shows the yields on otherwise identical dollar-denominated and peso-denominated Argentine government bonds issued in the domestic markets, spikes are visible at the time of the “tequila” crisis (end-1994–early 1995), the Russian default (August 1998), and the Brazilian crisis (January 1999), with a smaller one at the time of the failed attack on the Hong Kong dollar of October 1997. However, increases in interest rates have tended to be smaller and briefer in the post-“tequila” episodes. Sovereign risk can be measured by the spread on dollar-denominated Argentinean government bonds over U.S. Treasuries. This spread has also tended to come down with time, but still averaged 3.3 percentage points during 1997/1998. Devaluation risk can be measured by the spread between the peso- and dollar-denominated Eurobonds, which averaged 2.5 percent over the same period. (Figure 2 shows these yields since 1994).<sup>9</sup>

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<sup>8</sup> The paper returns to this issue in Section D below.

<sup>9</sup> For the top panel, the dollar spread is measured in terms of the spread on Brady bonds (“stripped” of collateral), while the numbers on dollar spreads in the text and the bottom panel refer to the spread on Eurobonds. The top panel provides a longer series, but as the Eurobond market is the source of new financing for emerging markets, it is more representative of the marginal cost of borrowing. As in other countries, Brady bonds carry yields significantly higher than Eurobonds. This apparent anomaly is due to the perception that countries would assign implicit seniority to Eurobonds over Brady bonds in order to strengthen market access, though the longer maturities and some special features of the Bradies may also explain part of this yield difference.

Figure 1. Argentina: Dollar and Peso Interest Rates

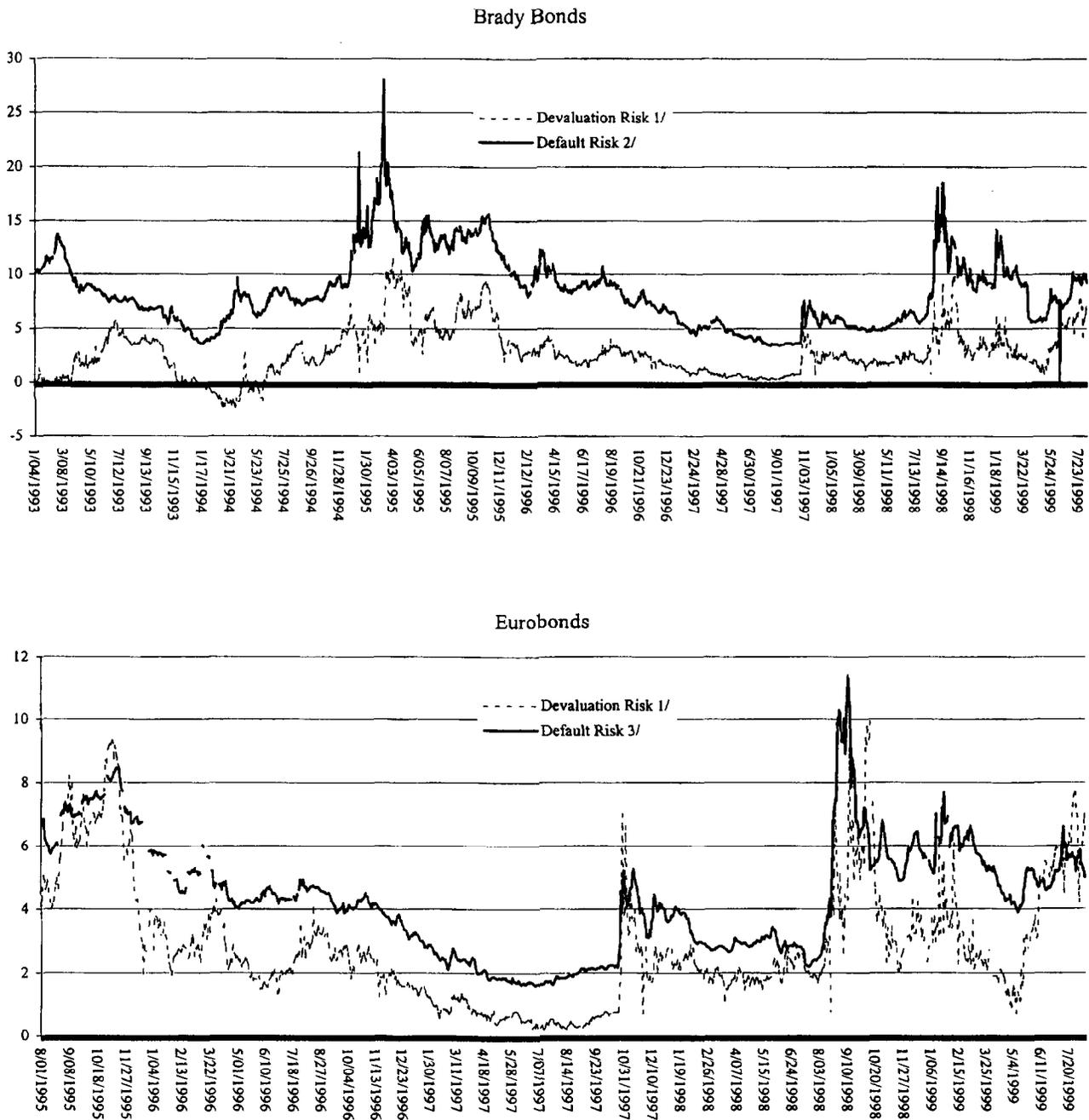


Source: Bloomberg and IMF staff estimates

1/ Annual interest rate on Argentinean domestic peso-denominated bond "Pre 1".

2/ Annual interest rate on Argentinean domestic dollar-denominated bond "Pre 2".

Figure 2. Argentina: Devaluation Risk and Default Risk



Source: Bloomberg and IMF staff estimates

1/ Yield on peso-denominated "Pre1" bond less yield on dollar-denominated "Pre2" bond.

2/ Spread (stripped of value of collateral) of Argentinean Brady bond over comparable US Treasury bond.

3/ Spread of Argentinean dollar-denominated Eurobond '03 over comparable US Treasury Bond.

14. **Although sovereign risk and devaluation risk move closely together, this does not establish a causal link from devaluation risk to sovereign risk (or vice versa).** In fact, a plausible explanation is that the observed correlation between spreads on dollar-denominated interest rates and spread differentials owes to common factors that affect both peso and dollar spreads. For example, a global “flight to quality” would raise both the measured risk of default and risk of devaluation. In this case, dollarization would not help reduce dollar spreads very much.<sup>10</sup>

15. **Evidence from Panama suggests that the observed co-movements in sovereign risk and devaluation risk reflect common factors, not causality from devaluation risk to default risk.** Figure 3 shows the relationship between the spreads over U.S. Treasuries of Argentine and Panamanian Brady bonds.<sup>11</sup> The figure suggests that yields on these two bonds are, in large measure, driven by common factors, despite the widening of the differential in recent months. The absence of currency risk in Panama does not isolate that country from swings in the prevailing market sentiment towards emerging markets.<sup>12</sup>

16. **Annex II takes a closer look at various bond prices for Argentina to calculate the possible reduction in the risk premium that could be achieved with dollarization.** The exercise is illustrative only: while bond prices provide important information, a variety of hypothetical assumptions are required to deduce from them the potential gain from dollarization. Table 1 in Annex II calculates the premium reduction under various illustrative assumptions about parameters such as the expected devaluation in the event of a departure from the currency board, and the probability that Argentina would (partially) default on its Eurobonds in the event of a currency crisis. The range of resulting spreads suggests that a reasonable estimate is that this risk premium could decline to about half of its current level if devaluation risk were eliminated. Of course, as illustrated in the Annex, the results are sensitive to various assumptions but overall they suggest that a nontrivial part of the default risk would likely remain after the devaluation risk was eliminated.

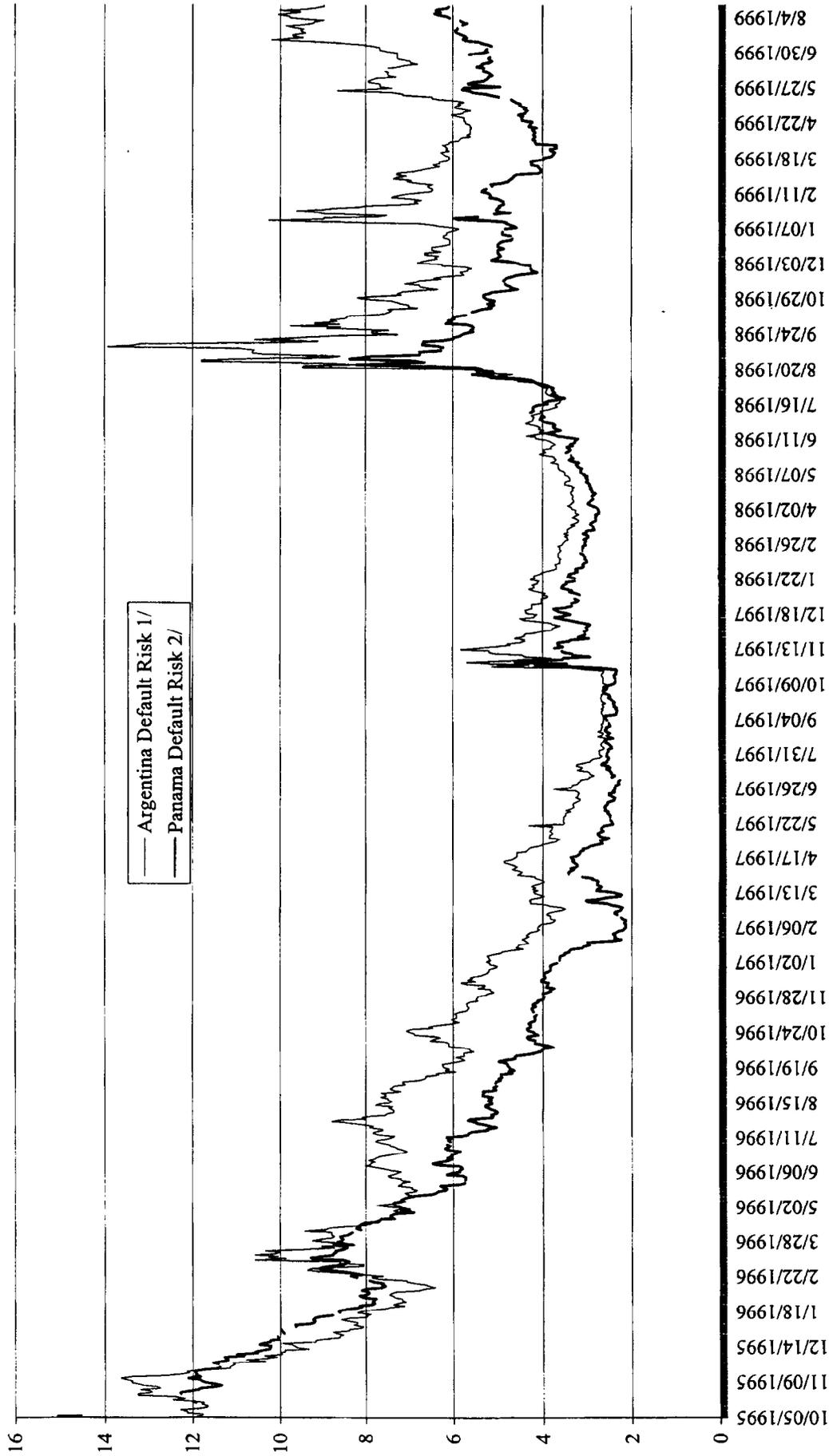
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<sup>10</sup> The ERM crisis provides an example where the direction of causality was plausibly from devaluation to default. For Italy, the spread of long-term lira bonds over German government (deutschemerk) bonds rose by roughly 200 basis points in 1992, while the spread on dollar-denominated Italian Republic bonds (not directly affected by a potential devaluation of the lira) also rose by some 60 basis points.

<sup>11</sup> Both are “stripped” of the value of U.S. Treasury collateral.

<sup>12</sup> Similarly, spreads on U.S. high yield (“junk”) bonds over Treasuries are highly correlated with both Panamanian and Argentinean dollar spreads, with correlation coefficients of 0.39 and 0.70, respectively, over the October 1995 through March 1999 period.

Figure 3. Panama and Argentina: Brady Bond Spreads



Source: Bloomberg and IMF staff estimates  
1/ Spread (stipped of collateral) of Argentinean Brady bonds over comparable US Treasuries.  
2/ Spread (stipped of collateral) of Panamanian Brady bonds over comparable US Treasuries.

17. **The full benefit from a reduction in the interest premium would only be realized over a period of years, as existing debt would be rolled over at the lower interest rates.** But Argentina could benefit immediately from better access to international financial markets. In addition to spreads, conditions such as the amounts, and maturity of placements of Eurobonds could become more favorable after dollarization thanks to the removal of the risk of devaluation. Favorable market access could also permit the implementation of Eurobond/Brady swap operations that would lower the face value of external debt.

### **B. Stability and Integration**

18. Important as risk spreads are, dollarization may offer other gains that, although not immediately observable, may provide larger benefits over time. For developing countries, the main attraction of full dollarization is the prospect of eliminating currency crises. **Currency crises are costly not just because their possible emergence widens risk premia but because of the dire consequences to the domestic economy.**<sup>13</sup> In Mexico, GDP fell by 7 percent in 1995, and the Asian countries affected by currency crises witnessed recessions in the range of 7 to 15 percent of GDP in 1998. Most of the severely affected countries in recent crises devalued and floated their exchange rate, but even countries with currency boards such as Hong Kong and Argentina suffered fierce speculative attacks that, although unsuccessful, still had a large impact on their economies.

19. **It should be stressed again that dollarization would not eliminate the risk of external crises, as investors may flee because of problems of sustainability of the fiscal position or the soundness of the financial system, and such a "debt crisis" could be very damaging.**<sup>14</sup> Nevertheless, dollarization holds the promise of a steadier market sentiment, as the elimination of exchange rate risk would tend to limit the incidence and magnitude of crisis and contagion episodes. Moreover, large swings in international capital flows cause sharp business cycle fluctuations in emerging economies even when they do not involve balance of payments crises.

20. **Dollarization may also increase confidence in the domestic economic system and promote financial development and investment.** The argument here is that dollarization would signal more than the adoption of a foreign currency; it may be perceived as an irreversible institutional commitment to low inflation, fiscal responsibility, and transparency. This perception would be reinforced if legal dollarization were instituted not as a unilateral action but through some sort of monetary agreement with the United States. Similarly, dollarization could also bring about closer integration of financial markets. Currency risk can

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<sup>13</sup> See WEO (1998) for estimates of the cost of currency crashes.

<sup>14</sup> Indeed Panama has had several crises, and a high number of Fund programs, as discussed in Annex I.

be an important source of vulnerability in financial systems, particularly when there are large volumes of dollar-denominated assets and liabilities. The elimination of that source of vulnerability may contribute to build a stronger system that can more easily participate actively in international financial markets.<sup>15</sup> Dollarization also would make the imposition of capital controls more difficult as access to dollar currency would always be unrestricted.

21. **Dollarization may also contribute to integration of trade with the United States to an extent not possible otherwise.** A number of studies have found evidence that Canadian provinces tend to be more integrated (in terms of trade volume and price level differences) among themselves than with U.S. states that are closer geographically. Canadian provinces trade more than 20 times more among themselves than with U.S. states after correcting for other variables that explain trade across provinces or states (McCallum (1995)). The prices of similar goods exhibit 50 percent more variability for cities across the U.S.-Canadian border than for cities within a country (Engel and Rogers (1996)). The use of a common currency may be one important factor explaining this pattern of national market integration, given the fairly low transaction costs and restrictions to trade across the U.S.-Canadian border. The difference in prices across the border, for example, may be due to “sticky” prices (or wages) in the domestic currency, so that fluctuations in the nominal exchange rate result in changes in the relative prices of (nontraded) goods in cities across the border. A similar idea was advanced by Mussa (1986) who noted the higher variance of the real exchange rate between different Canadian and U.S. cities (using the local price levels in the calculation) when there are floating exchange rates between the United States and Canada. In short, the adoption of a common currency could bring about closer economic of goods markets.

### C. Seigniorage

22. **A country adopting a foreign currency as the legal tender would forego its seigniorage revenues,** which are the profits accruing to the monetary authorities from its right to issue legal tender currency. Currency can be thought of as noninterest-bearing debt; the ability to issue it is a source of revenue for the government. In addition, legal reserve requirements on banks may also be noninterest bearing (or be remunerated well below market levels) and thus contribute to seigniorage. Thus, the annual flow of seigniorage is frequently measured as the increase in base money (the sum of currency plus bank reserves). The monetary authorities can use seigniorage to purchase assets (foreign currency reserves, government securities, and loans to the banking sector, typically) or to “consume” it by financing a fiscal deficit. The measurement of seigniorage is explained in more detail in Box 2.

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<sup>15</sup> Panama benefits from a close integration of its banking system with that of the United States and indeed with the rest of the world, particularly since a major liberalization in 1969-70 (see Annex I).

### Box 2. Measurement of Seigniorage

The annual flow of seigniorage is simply the increase in the volume of domestic currency, assuming that there are no unremunerated reserve requirements on banks. As counterpart of the issue of currency, the central bank acquires assets that do pay interest, such as foreign currency reserves, government securities and loans to private banks. In a currency board system, for example, the central banks must acquire foreign reserves in an amount equal to the domestic currency issue. As a result of issuing noninterest bearing debt (currency) and holding interest-earning assets (foreign reserves, etc.) the central bank earns a (gross) profit, which is often also called seigniorage by central banks.

The relationship between seigniorage (the increase in volume of domestic currency) and the resulting central bank profits may create some confusion. It is useful to show, then, that these two quantities are equivalent in present discounted value. For the currency board case, this can be done in the following way. First the present value of the annual increases in currency is equal to:

$$S_1 = M_t - M_{t-1} + \frac{M_{t+1} - M_t}{(1+i)} + \frac{M_{t+2} - M_{t+1}}{(1+i)^2} + \dots$$

Second, (gross) profits of the central bank are the interest earned on reserves (equivalently, on currency), which in present value are equal to:

$$S_2 = \frac{iM_t}{1+i} + \frac{iM_{t+1}}{(1+i)^2} + \frac{iM_{t+2}}{(1+i)^3} + \dots$$

Rearranging the right-hand side of the first equation gives:

$$S_1 = -M_{t-1} + \frac{iM_t}{1+i} + \frac{iM_{t+1}}{(1+i)^2} + \frac{iM_{t+2}}{(1+i)^3} + \dots = S_2 - M_{t-1}$$

which shows that the two measures are equivalent in present value sense, except for the initial stock of money,  $M_{t-1}$ .

23. **There are two components to the seigniorage loss implied by dollarization.**<sup>16</sup>

First, there is an immediate stock cost. To adopt the dollar and withdraw the domestic currency from circulation exchanging it for U.S. dollar currency, the monetary authorities would have to “purchase” the stock of domestic currency held by the public (and banks), effectively returning to them the accumulated seigniorage that had accrued over time. Second, the monetary authorities would give up future seigniorage earnings stemming from the flow of new currency printed every year to satisfy the increase in money demand. Note that, even with dollarization, the central bank (or its successor institution) will still preserve the ability to impose reserve requirements on banks.<sup>17</sup> Therefore, the unavoidable loss of seigniorage comprises only currency.

24. **For Argentina the seigniorage cost of dollarization would be an initial \$15 billion to redeem domestic currency in circulation plus the annual loss of roughly \$1 billion in foregone seigniorage due to ongoing increases in currency demand.** The latter estimate is roughly equal to the average increase in currency demand during 1993–98, and represents 0.3 percent of GDP.<sup>18</sup> Equivalently, one can estimate the potential loss of seigniorage from dollarization as the interest currently earned on reserves that will be foregone as those reserves will circulate as currency. (This measure is akin the central bank profits measure described in Box 2.) The annual interest earnings accruing on the stock of international reserves that is the counterpart of the stock of domestic currency is presently about \$0.7 billion per year, or 0.2 percent of GDP.<sup>19</sup> These interest earnings would grow over time on account of the increase in currency demand.

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<sup>16</sup> See Fischer (1982).

<sup>17</sup> Currently, liquidity requirements deposited at the central bank of Argentina earn an interest rate comparable to market levels. But the decision to maintain or change that policy is independent from dollarization.

<sup>18</sup> Argentina perceived much higher seigniorage, an average of 2.2 percent of GDP, over the past 20 years, which resulted in high inflation.

<sup>19</sup> Under the rules of the currency board the government is required to hold sufficient foreign reserves to back the domestic currency, and thus cannot “consume” the annual issue of currency by financing public spending, for example.

25. **For countries that do not already have enough foreign reserves to buy up their domestic currency and thereby dollarize, the acquisition of the initial stock may bring with it some indirect costs.**<sup>20</sup> If the country is credit constrained, for example, it would have to pay high-risk premiums or be forced to run current account surpluses that may not be optimal from a saving/investment perspective.

26. **The United States would get more seigniorage from dollarization in other countries.** There is, therefore, a case for the U.S. authorities to share part or all of these additional seigniorage revenues with other economies that adopt the U.S. dollar (see Section III). There is a precedent to this in the arrangements between South Africa and three other states that use the rand (Lesotho, Namibia, and Swaziland) (see Box 3 for a summary of existing seigniorage-sharing arrangements). The United States does not have a sharing arrangement with Panama or any other legally dollarized economy, but the U.S. authorities have so far not rejected this possibility in connection with countries in the Western Hemisphere willing to adopt the U.S. dollar.

#### **D. Monetary Policy Autonomy and the “Exit Option”**

27. The elimination of the risk of an exchange rate adjustment is the main purpose of full dollarization. Thus, full dollarization implies the complete relinquishing of monetary and exchange rate policy. It may seem that there is no difference in this regard between currency board arrangements and full dollarization, since a country with a currency board arrangement cannot devalue. **A currency board does, however, imply some scope for exit of the pegged exchange rate, if only under extreme circumstances.**

28. **Large shocks may require sizable adjustments of the real exchange rate, and without exchange rate flexibility these adjustments may be particularly costly.** Without exchange rate flexibility, the adjustment to such shocks may require lowering nominal wages and certain prices, which may not be feasible without an economic recession, particularly for economies with less flexible labor markets.<sup>21</sup> A prolonged deflation (fall in the price level) that a required fall in the real exchange rate without exchange rate flexibility would entail may have other costs. Such a deflation, if unexpected, would result in high real interest rates and large transfers from debtors to creditors. At the same time, the deflation would limit the extent

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<sup>20</sup> See Fischer (1982).

<sup>21</sup> An alternative adjustment mechanism, typical across U.S. states during recessions, is labor migration. See Blanchard and Katz (1992).

### Box 3. Seigniorage Sharing in Fully Dollarized and Multilateral Monetary Systems

Seigniorage is the most visible and quantifiable element in the cost-benefit calculus of full dollarization. Therefore, possible sharing arrangements are likely to figure prominently in any discussion of prospective full dollarization projects, as has already been the case with Argentina. Hence, it is useful to compare some of these arrangements with the current proposals for Argentina and the United States.

**Seigniorage sharing in Common Monetary Area.** The monetary agreement between the CMA members Lesotho, Namibia, and South Africa provides Lesotho and Namibia a share of seigniorage determined as two-thirds of the return on the estimated rand circulation in their territories that these countries would have earned had these funds been invested in South African government securities (see Collings 1983, for details). The proportion of two thirds was agreed as a compromise to take account of the differences between short-term and long-term returns on securities. The rand currency in circulation—the basis for the calculation of the two countries' shares of seigniorage—is estimated using amounts of rand currency at a base date (December 31, 1973), subsequently adjusted to reflect changes in the amount in total rand currency in circulation outside banks in the entire monetary area. The adjustment factors are set as 6:5 for an increase and 4:5 for a decrease, reflecting an assumption of a more rapid monetization in the less developed countries in the monetary union. While this arrangement remains the basis for seigniorage sharing today, there were recent modifications which altered somewhat the countries' actual share of seigniorage from the one outlined above.

**Sharing arrangements in the European Monetary Union.** Monetary income of the national central banks and net profits of the European Central Bank (ECB) are distributed according to national central banks' shares of the paid-up capital of the ECB, which were determined as an equal-weighted function of population and GDP.

**Seigniorage sharing in the Eastern Caribbean Currency Board (ECCB).** All ECCB bank notes are coded according to the country to which they are issued, and the ECCB allocates profits to member governments in proportion to the currency issued in each territory (SM/99/70).

**Seigniorage sharing in the Belgium-Luxembourg Monetary Union (BLEU).** Prior to the introduction of the Euro in 1999, the Belgian franc was legal tender in Luxembourg, which also issued a limited amount of its own currency that circulated at par. The National Bank of Belgium (NBB) ran monetary and exchange rate policy for the union and held all foreign reserves of the BLEU. The profit payments of the NBB were shared between Luxembourg and Belgium according to population shares. (See OECD (1997)).

**Possible seigniorage sharing arrangements from dollarization.** A recent report (Joint Economic Committee Staff Report, April 1999), suggested a formula for sharing revenues from seigniorage whereby a dollarizing country's share would be as follows:

$$\begin{aligned} & \{ [\text{total average dollar monetary base over the period} \times \text{average interest rate on 90-day Treasury bills} \\ & \text{during the period}] - \text{net costs of operating the Federal Reserve} \} \\ & \times \text{dollarized country's share of total dollar monetary base} \\ & \times \text{proportion of seigniorage revenue that the United States shares} \end{aligned}$$

The report estimates that Argentina's share of total average dollar monetary base would be about 2.8 percent on the basis of the value of its currency in 1998 (US\$ 16 billion). Furthermore, assuming (1) a 5 percent interest rate on the 90-day Treasury bill as a proxy for the opportunity cost of reserves, (2) net operating costs of the Federal Reserve of about US\$ 1 billion per year, (3) an estimated total average dollar monetary base of US\$580 billion in the year 2000, and (4) full sharing by the United States of additional seigniorage, it estimates Argentina's share of net seigniorage as follows:

$$\begin{aligned} & = ( [\text{US\$580 billion} \times 0.05] - \text{US\$1 billion} ) \times 0.028 \times 1 \\ & = \text{US\$784 million} \end{aligned}$$

**The Barro proposal.** Barro (1999) proposed that the United States simply transfer to a dollarizing country the U.S. dollar equivalent of its peso currency in circulation. Instead of receiving annual transfers based on a more complex formula, such as the one proposed by the Joint Economic Committee, the country would receive this equivalent transfer only once.

to which real interest rates could fall to mitigate the output decline. This set of circumstances could be as stressful for the financial system as a sharp unanticipated devaluation.<sup>22</sup>

29. **Experiences with major devaluations of rigid pegs, such as departures from the gold standard and the devaluation of the CFA franc, suggests that an exit option may in fact have some real value in the presence of extreme shocks.** The Great Depression is perhaps the most important example in this century of an extreme negative shock that justified an exit from the fixed exchange regime of the time, the gold standard. Indeed, in 1931, Argentina started to follow an active monetary policy that sterilized the monetary impact of capital outflows (after abandoning convertibility a couple of years earlier), and this policy has been considered responsible for the relatively minor impact of the Depression on Argentina (della Paolera and Taylor (1999)). Advanced countries that had an early exit from the gold standard also fared better during the Great Depression (Eichengreen and Temin (1997) and Eichengreen and Sachs (1985)).<sup>23</sup>

30. **The countries of the CFA franc zone of West and Central Africa represent recent examples of firmly pegged countries choosing to devalue in the face of severe external shocks and poor growth performance.** The western African regime resembles in some respects a currency board, with a fully convertible currency and a fixed exchange rate with the French franc maintained from 1948 until 1994. Convertibility is guaranteed by provisions for overdrafts at the French treasury and a requirement that a percentage of local monetary liabilities be backed by foreign reserves deposited at the French treasury.<sup>24</sup> During the second half of the 1980s and in the early 1990s, a prolonged worsening of the terms of trade and a steep rise in labor costs, combined with a nominal appreciation of the French franc against the U.S. dollar, led to a considerable real effective exchange rate appreciation of the CFA franc and contributed to a stagnation of real output. In 1994, the 14 countries of the zone devalued their common currency by 50 percent. This exchange rate realignment led to a significant turnaround in economic activity in the zone, with output, exports, and investment increasing rapidly during 1994–97 and little inflation passthrough.<sup>25</sup>

31. **Some countries will need the exit option more than others.** Some are more likely to face large shocks that require a real exchange rate adjustment. For example, countries that dollarize but trade mostly with countries other than the United States would face large swings

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<sup>22</sup> Calvo (1999) makes this point. Note that adjustment via devaluation also generates sharp capital gains and losses for agents that have different positions on foreign exchange.

<sup>23</sup> Departures from the gold standard by Argentina at other times, during financial crises for example, did not suffice to avoid serious recessionary consequences.

<sup>24</sup> For a description of the workings of the CFA franc zone, see Clement et al. (1996).

<sup>25</sup> This account draws heavily on Hernández-Catá et al. (1998).

in their real effective exchange rate if the dollar itself were to exhibit large swings. In addition, countries that have highly inflexible domestic labor and goods markets will find it especially hard to engineer a real devaluation without a nominal devaluation.

32. **Other countries will find it difficult to use the devaluation option successfully.** To the extent that monetary policy has been poorly managed and inflationary expectations are highly sensitive to the exchange rate, a devaluation is likely to have a high degree of passthrough to domestic prices, making it hard to achieve changes in the real exchange rate by this means. Similarly, countries that are highly dollarized, so that the dollar is often the de-facto unit of account, would tend to find rapid pass-through of devaluation into domestic prices, limiting the effectiveness of devaluations. In fact, these were central reasons why Argentina adopted a currency board.

33. **Countries with a high degree of dollarization of financial assets and liabilities may also be constrained from using devaluations as a policy instrument.** If a country receives substantial inflows in the form of dollar-denominated lending to banks or corporations, a devaluation sharply worsens the balance sheet of these domestic banks and firms. Even if banks on-lend to domestic firms in dollars, and thus have matched risks in terms of currency on their books, they will still carry a substantial currency risk. If there was a sharp depreciation of the domestic currency, some of the banks' clients would experience a sharp fall in the value of their revenues in dollar terms, and would not be able to service dollar debts. Hedging instruments, furthermore, may only be available for short maturities, and may become very expensive at times of high risk. In short, in highly (de facto) dollarized economies, it is ultimately difficult for banks to insulate themselves from devaluation risk.<sup>26</sup>

34. **Finally, while the United States enjoys now a strong reputation for monetary stability and the U.S. dollar is globally accepted and desired, this situation could eventually change.** Two or three decades ago, the U.S. dollar was perceived as weaker than the deutsche mark, for example. One exit option from a currency board system is to change the currency to which the domestic currency is pegged, in case a different currency becomes a more desirable choice. While the desirability of the U.S. dollar is likely to continue in the foreseeable future, the option to switch to a different foreign currency would not be available.

#### **E. Lender of Last Resort Function and Financial System Stability**

35. **Full dollarization could limit the lender-of-last-resort (LLR) function and hence the central bank response to financial system emergencies, even compared to the tight constraints already imposed by a currency board arrangement.** Under a currency board system, in principle, the central bank can provide credit to banks only to the extent that it is

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<sup>26</sup> This is pointed out in Calvo (1999). See also Hausmann et al. (1999) for other arguments against the use of exchange rate policy in the Latin America case.

fully backed by international reserves. It is significant, however, that in important currency board cases described below the authorities have allowed themselves some flexibility to create money that is not fully backed on the margin, in part so as to be able to deal with banking crises. This creates the ability to relax liquidity conditions in situations where pressures may be high and the normal adjustment channels of a currency board (through the external sector) may operate relatively slowly. Even though the margin for this type of operation is necessarily limited, it can be helpful in a situation of stress in financial markets.

36. **During the 1995 “tequila” crisis, for example, the Argentinean monetary authorities were able to partially accommodate the run out of bank deposits by temporarily reducing the reserve coverage of the money base.** Under the rules of operation of the monetary system in Argentina, the central bank could use government issued dollar-denominated debt to fulfill up to 20 percent of its international reserves backing of the monetary base.<sup>27</sup> In the wake of several speculative attack episodes, the Hong Kong Monetary Authority also introduced in September 1998 a discount window to provide short-term liquidity to banks. In contrast to the Argentine case, however, the system currently requires rediscounts to be fully backed by international reserve assets.

37. **It is important here to distinguish the role of the central bank operating a discount window to provide short-term liquidity from its role as the ultimate guarantor of the stability of the financial system and the payments system in the event of a systemic bank run.** As with a currency board, dollarization should not greatly impede the ability of the authorities to provide short-term liquidity to the system or assistance to (small) individual banks in distress. The central bank (or its replacement) needs to “save” the necessary funds in advance or perhaps secure lines of credit with international banks. In contrast, the authorities would lose some ability to respond to a sudden run on bank deposits throughout the entire system.

38. **Even without the restrictions imposed by dollarization or a currency board system, the ability of a central bank to find a way out of a financial crisis by printing money is limited.** The injection of liquidity into the banking system to keep it from defaulting on depositors may only lead to greater pressure on foreign reserves or the exchange rate. Foreign exchange reserves will generally not be large enough to finance a large move out of deposits.

39. **Dollarization may, moreover, make a bank run less likely.** With all monetary assets already dollarized and without significant currency mismatches in the banks’ positions, depositors may be more confident in the domestic banking system. A dominant role of large and solid foreign banks in the domestic banking system, which presumably would be encouraged by dollarization, would also reduce the risk of a banking crisis, because of the

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<sup>27</sup> The margin was later expanded to 33 percent (see Box 4).

possible support from foreign headquarters, and by boosting depositors' confidence. These effects may be stronger than the more stringent limits to perform LLR functions under full dollarization.

40. **Certain measures could be taken to strengthen the banking system and make it more resilient to runs.**<sup>28</sup> For example, setting higher liquidity requirements and securing contingent credit lines with foreign financial institutions, as Argentina did after the tequila (Table 1), may help improve the ability to respond to a drawdown of deposits. The banking system in Argentina has very high liquidity levels nowadays; it could withstand the loss of 27 percent of deposits out of its readily available financial resources, and more if liquidity requirements were lowered during the crisis.<sup>29</sup> (Box 4 discusses LLR issues in Argentina in more detail).

41. **There are limits and costs to this type of measure, however.** Imposing high liquidity requirements raises the cost of financial intermediation and ultimately reduces the amount of credit available for use. Moreover, credit lines from international banks could probably play only a small role in the event of an unfolding crisis. The experience so far with this type of financing has been limited, but suggests that commitments will have short maturities and banks will have alternative means to reduce their exposure during the crisis periods when the lines would be activated.<sup>30</sup>

42. **Financial sector stability may require a stronger fiscal policy in a dollarized economy.** In other exchange rate regimes, even a currency board such as Argentina's, the response to systemic problems in the financial sector usually involves, in part, the resort to central bank credit to institutions, financed by some form of public borrowing. The resulting increase in debt will eventually require an increase in fiscal surpluses. In a dollarized economy, the authorities would not be able to pursue this line of action. One alternative would be for the fiscal authorities to create a fund in *anticipation* of a possible systemic need in the financial sector.

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<sup>28</sup> Of course, improving supervision and regulation would help to strengthen the banking system, but those initiatives should be pursued whether the economy is dollarized or not.

<sup>29</sup> During the "tequila," bank deposits declined by less than 20 percent.

<sup>30</sup> See IMF, 1999a.

Table 1. Argentina: Liquid Resources in the Financial System

	December-94		June-99	
	In billions of U.S. dollars	As percent of deposits	In billions of U.S. dollars	As percent of deposits
Total resources	13.4	29.0	33.9	42.5
Liquidity requirements	7.7	16.7	16.5	20.7
Cash in banks in pesos and dollars (A)	3.0	6.5	2.9	3.7
Central bank rediscounts (B) 1/	2.7	5.9	7.8	9.7
REPO agreement with international banks (C)	0.0	0.0	6.7 2/	8.4
Maximum loss of deposits covered 3/	6.8	14.8	21.8	27.2
Memorandum Items:				
Total deposits	46.2		79.9	
In pesos	22.8		34.3	
In dollars	23.5		45.6	
Deposits in foreign banks	7.54	16.3	39.6	49.6

Sources: IMF staff estimates; and Estudio Broda.

1/ Assuming the full use of 33% of the monetary base, which can be backed with government dollar-denominated bonds.

2/ Including World Bank and IDB loans of \$1.0 billion for "margin calls".

3/ Calculated as  $(A+B+C)/(1-\text{liquidity requirements rate})$ .

#### **Box 4. Argentina: Lender of Last Resort, and Banking Soundness**

The ability of the Central Bank of Argentina (BCRA) to provide liquidity to banks in the event of a run on deposits is limited in the currency board regime, and would be more so in a fully dollarized economy. After the tequila crisis, the authorities took measures to strengthen the banking system. Key initiatives to strengthen the banking system included:

- An increase in minimum capital adequacy requirements to 11½ percent of risk weighted assets; and more stringent criteria for measuring asset risks to include counterpart credit risk and market risk. The actual capital adequacy ratio for the consolidated financial system as of March 1999 amounted to 21 percent (Basle methodology).
- A tightening of the regulatory and supervisory environment, which, inter alia, contributed to a consolidation of the financial system. The number of entities declined from 205 in December 1994 to 123 in March 1999, with the top 10 banks accounting for 70 percent of total deposits, from 50 percent four years earlier. At the same time, there was an increase in foreign ownership of banks as their share in total assets rose from 18 to 53 percent during this period.
- The establishment of a privately funded deposit insurance system, covering up to US\$30,000 per depositor.
- The implementation of liquidity requirements equivalent to 20 percent of bank deposits and selected other liabilities. These requirements are remunerated and largely held abroad in the form of liquid foreign exchange reserves.
- A contingent line of credit with a group of foreign financial entities, whereby the BCRA and participating local banks have the option to engage in a repurchase agreement against Argentine government securities for US\$6.7 billion.
- In the event of an emergency, the Argentine currency board arrangement allows to reduce the international reserves coverage of the BCRA's monetary liabilities to 66 percent. This provision, along with liquidity requirements, banks' excess reserves, and the contingent line of credit could cover a loss of 27 percent of deposits (up from 15 percent of deposits for a similar calculation in December 1994). (See Table 2 for details.)
- A stabilization fund for the financial sector could make up for the lack of a central bank rediscount facility under dollarization. One suggestion has been to negotiate with the United States for the preservation of the seigniorage flow that Argentina enjoys under the currency board regime, and then pledge this flow as collateral in establishing a supplementary borrowing facility. For example, one option suggested by Calvo (1999) would involve a liquidity facility backed by seigniorage-sharing flows. In the example he describes, the United States would retain US\$150 million in seigniorage, and commit to Argentina a US\$600 million annual seigniorage flow. The permanent flow discounted at an interest rate of, say, 5 percent could yield a stabilization fund of some US\$12 billion, more than the emergency lending capacity that the BCRA now enjoys in the convertibility regime.

43. **In the event of a banking crisis, public support would likely be needed to stabilize the banking system.** This suggests that some form of official assistance with the LLR function could help mitigate this type of risk. Or, as mentioned above, a stabilization fund could be created from domestic fiscal sources. One appealing suggestion has been to establish a mechanism to apply a potential return of seigniorage by the United States to the creation of a fund that provides LLR functions (see Box 4).

#### F. Dollarization and Regional Trade Arrangements

44. The development of regional trade arrangements like Mercosur adds another dimension to the dollarization question and to the choice of exchange rate regime more generally.<sup>31</sup> **In particular, a question that has been posed is whether dollarization by Argentina would be compatible with deepening economic integration through Mercosur when the largest Mercosur partner, Brazil, maintains a floating exchange rate.** The disparity of exchange rate systems leads to volatility in the bilateral real exchange rates of member countries that may be problematic both on political and economic grounds.

45. **The real bilateral exchange rate of Argentina and Brazil, by far the largest partners of Mercosur, has displayed a varying degree of volatility in recent years.** (Figure 4)<sup>32</sup> The widest fluctuations were related to episodes of high inflation and stabilization in both countries, and to the more recent currency crisis that forced the flotation of the *real*. During 1994–98, the bilateral real exchange rate was quite stable. During that period, which comprises most of the Mercosur years, the currencies of both countries were, to a significant extent, effectively pegged to the U.S. dollar. While it is difficult to anticipate the volatility of this bilateral rate with the floating *real*, one would expect the volatility to be higher than in the period when both countries were pegging to the U.S. dollar but much lower than during the periods of highest volatility that occurred in the context of hyperinflations or currency crises.

46. **Some degree of flexibility in real bilateral exchange rates is, in fact, desirable to achieve necessary changes in relative prices and maintain macroeconomic balance.**<sup>33</sup>

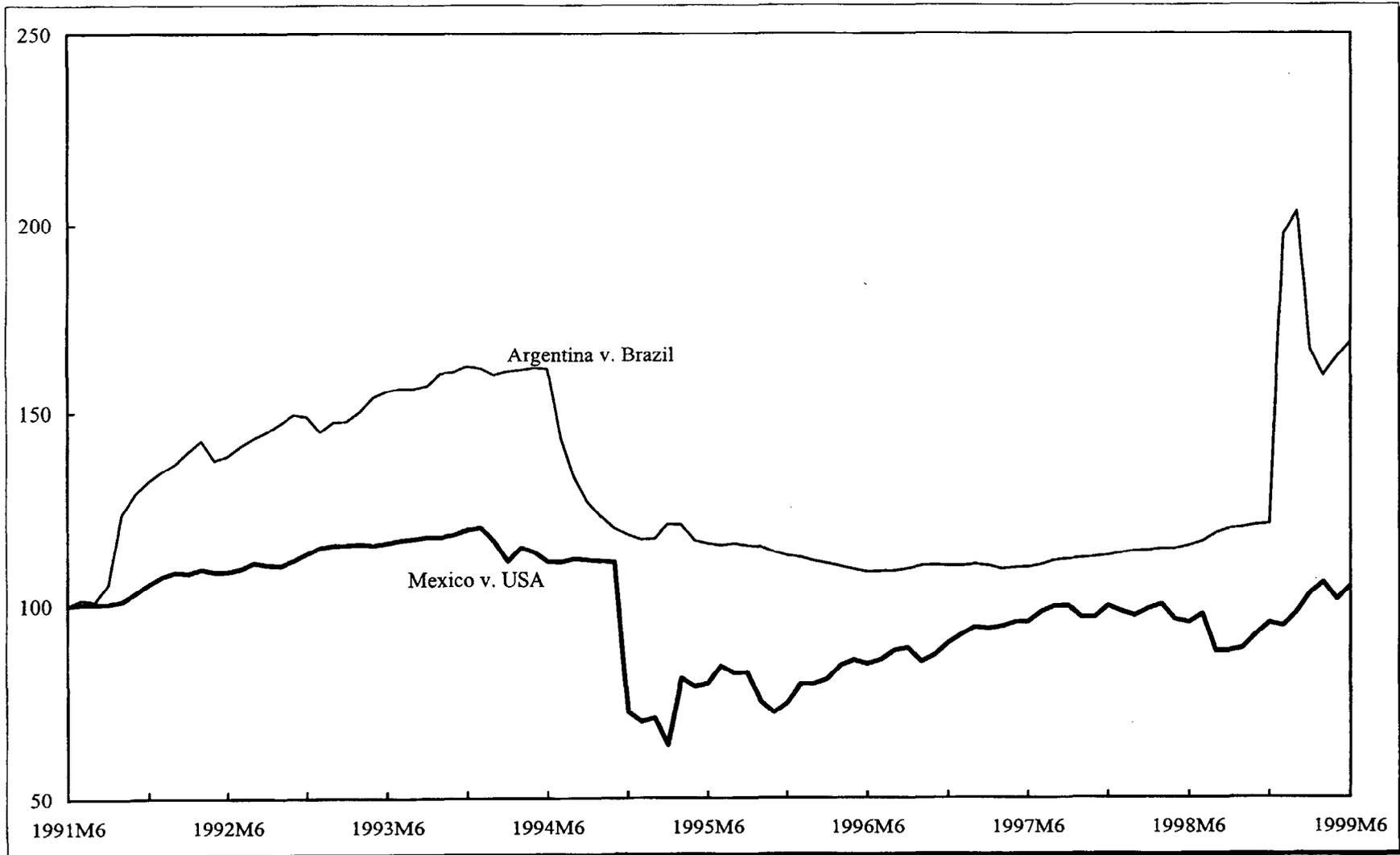
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<sup>31</sup> The general issues involved in the relationship between regional trading arrangements and exchange rate regimes in developing countries have been recently analyzed in SM/99/216.

<sup>32</sup> The customs union of the Mercosur countries started on January 1, 1995. The lifting of trade barriers within the region, however, started as early as 1986 with a significant acceleration after the Treaty of Asunción in 1991.

<sup>33</sup> In general, some of the fluctuations in the bilateral real exchange rate may result from fluctuations in exchange rates between third countries. This could happen when the two countries in the region have a different configuration of global trade partners, even in the case in which each country does not experience a movement in its own (multilateral) real effective exchange rate.

Figure 4. Real Bilateral Exchange Rates, June 1991-June 1999  
( June 1991 = 100 )



Source: International Monetary Fund, International Financial Statistics.

Exchange rates respond to macroeconomic conditions and, if business cycles are not synchronized in two countries, the real exchange rate between their currencies should be expected to show a fair degree of variability. It is possible to shed some empirical light on this question for a given set of countries by generating estimates of supply and demand shocks in each country and asking to what extent these shocks are correlated across countries. If the shocks are highly correlated, little adjustment of the bilateral real exchange rate is called for on their account. Despite the incidence of common factors such as US interest rates and contagion, empirical work has found very weak evidence that demand or supply shocks are positively correlated across Mercosur countries.<sup>34</sup> This implies that changes in intra-Mercosur exchange rates may be appropriate responses to shocks, and that fixing these exchange rates could increase real output volatility.

47. **The impact of bilateral real exchange volatility depends on how extensive are the trade links between the economies.** While Mercosur economies were once fairly closed, this has been changing rapidly in the last decade, with regional trade also growing rapidly. Yet the tendency towards “regionalization” of international trade is not as strong as commonly believed, especially if one takes 1995 as the starting date for Mercosur. While exports by Mercosur countries to the region have expanded considerably since the launching of the agreement, there has not been a significant increase in market penetration in the import markets of member countries. In other words, exports within the agreement region have grown largely in line with the growth of imports by member countries, but the share of Mercosur countries in the imports of Mercosur countries has increased only moderately (Table 2).<sup>35</sup> The increase in import penetration is much more significant, however, if an earlier date is considered as the starting point, partly reflecting the fact that some tariff reductions were agreed prior to the customs union. Even from that longer perspective, however, the process can be seen as slowing down significantly in recent years.

48. **The impact of bilateral exchange rate fluctuations also depends on the structure of the trade between the countries.** If trade largely comprises commodities or other homogeneous products with a well integrated world market, fluctuations in the bilateral exchange rates would not have much of an impact. But if bilateral trade takes place in sectors producing similar products and competing for market share in the domestic markets of both countries (intra-industry trade), large changes in the real exchange rate would have a quick impact on the profitability and performance of the affected producers. Even if the fluctuations in the bilateral real exchange rate represented an adjustment to changing macroeconomic conditions in the respective countries, the close integration in the context of a trade agreement may still give rise to political tensions. Indeed, trade frictions between Argentina and Brazil have increased considerably following the depreciation of the *real* in early 1999.

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<sup>34</sup> Bayoumi and Eichengreen (1994), updated with data through 1998 by Arora (1999).

<sup>35</sup> Levy Yeyati and Sturzenegger (1999) make this point.

Table 2. Share of Trade Within Mercosur, 1980–1998 (selected years)

(In percent of the country's total trade)

	1980			1985			1990			1995			1998		
	Exports	Imports	Total												
Argentina	18.6	17.2	17.8	10.1	30.6	16.5	19.1	30	21.8	40	25.6	33	43.7	28	35.1
Bolivia	31.8	21.6	27.3	57.4	40.9	49.1	38.2	40.8	39.3	16.2	28.7	23.2	16.2	50.2	39.7
Brazil	12.1	6.6	8.9	5.5	6.6	5.9	6.3	13.2	9.4	16.9	16.1	16.5	20.7	17.8	19.1
Chile	16.9	11.9	14.3	8.4	12.7	10.3	9.1	15.7	12.3	11.9	17.5	14.6	11.6	15.6	13.8
Paraguay	44	51	48.6	29.3	54.6	44.6	38.9	32.3	35.2	61.2	43.1	47.1	58.9	52	53.6
Uruguay	35.2	30.3	32.2	25.3	32.5	28.6	35.4	42.5	38.5	48.9	47.9	48.3	55.3	41	46.5

Source: International Monetary Fund, Direction of Trade Statistics.

49. **As regards compatibility with Mercosur arrangements, dollarization would not significantly alter the current situation, with Argentina maintaining a firm peg to the U.S. dollar and Brazil having a floating exchange rate.** However, the degree of integration between the economies of Argentina and Brazil may increase considerably in the future. While the agreement is currently a customs union (with a number of special exemptions) there are plans to extend it towards forming a single market economy, much in the European Union style. If the region does reach that level of economic integration, the question of the necessity of a common currency, and whether it should be the dollar, would need to be considered.<sup>36</sup> In this situation, the near-irreversibility of dollarization might constrain choices for Mercosur as a whole.<sup>37</sup>

### III. IMPLICATIONS OF DOLLARIZATION FOR THE UNITED STATES<sup>38</sup>

50. **Foreign holdings of U.S. currency have increased steadily since the mid-1970s, but the importance of seigniorage in the U.S. fiscal accounts has declined.** Although estimates of overseas dollar holdings are subject to considerable uncertainty, Porter and Judson (1996) concluded from a variety of direct and indirect information that between 55 percent and 70 percent of the total U.S. currency stock outstanding was held abroad in 1995.<sup>39</sup> Federal Reserve profits transferred to the U.S. Treasury have declined, however, from about 0.5 percent of GDP in 1980 to about 0.25 percent of GDP in recent years, primarily reflecting lower interest rates. In fiscal years 1997 and 1998, for example, the Federal Reserve transferred to the Treasury \$20.7 billion and \$17.8 billion, respectively (about 1 percent of total federal revenues). Based on the estimates of the proportion of total currency held abroad made by Porter and Judson, average seigniorage earnings from abroad in these two years was probably in the range of \$10–\$13.5 billion (about 0.15 percent of GDP).

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<sup>36</sup> This question is discussed in SM/99/216. See also Eichengreen (1998).

<sup>37</sup> Indeed, Cavallo (1999) has suggested that currency boards may just be the first stage in the development of sound currencies, and that a multinational regional currency (a la euro) could be the next stage once institutions and credibility have reached the necessary degree of maturity.

<sup>38</sup> A discussion of these issues was also included in the selected issues paper for the United States—1999 Article IV Consultation.

<sup>39</sup> This range also encompasses the U.S. Administration's view that "Foreign holdings of U.S. currency are conservatively estimated at 60 percent of the total in circulation." (Council of Economic Advisors (1999)). By comparison, work at the Deutsche Bundesbank suggests that between 30 percent and 40 percent of deutsche marks are held abroad (Porter and Judson, 1996).

51. The declining significance of Federal Reserve profits in the U.S. fiscal accounts reflects a general decline in interest rates on government securities since the early 1980s as well as a trend decline in the demand for currency associated with increased credit card use and the emergence of automated teller machines. This trend has partially offset the continued increase in U.S. dollar holdings abroad (Figure 5). **If these trends continue, U.S. seigniorage will increasingly be attributable to overseas dollarization.**

52. **In addition to seigniorage, there are a number of possible benefits for the United States from foreign holdings of U.S. dollars.** The discussion in the *Economic Report of the President* (U.S. Council of Economic Advisors, 1999) identifies a number of these benefits although they are obviously hard to quantify: (i) the “power and prestige” that might be associated with having an international currency; (ii) the possibility of increased business for U.S. banks and other financial institutions; and (iii) reduced transaction costs for U.S. resident importers, exporters, borrowers, and lenders. Beyond these general considerations, the United States would indirectly benefit from stronger growth and stability in the countries that adopt the dollar as currency, if dollarization is indeed beneficial for the economies of those countries.

#### **A. Implications of an American Monetary Union**

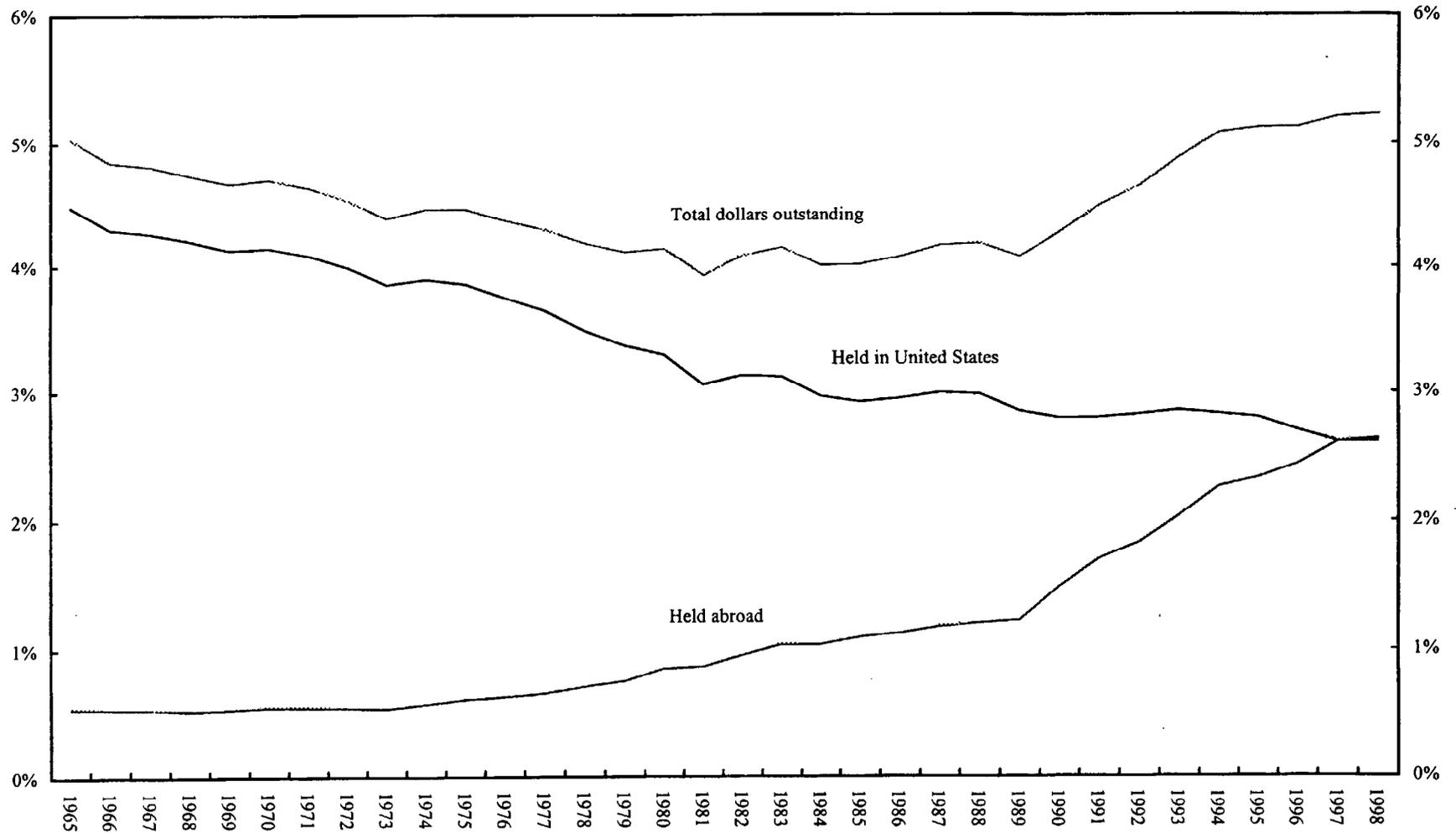
53. **One option for the adoption of the U.S. dollar as the common currency for countries in the Western Hemisphere would be the creation of a monetary union with a common central bank, in the style of the European Union.** The economic literature on OCAs points to similarity of economic shocks as the most important condition for a group of regions or countries to find it optimal to share the same currency and the same monetary policy. Bayoumi and Eichengreen (1994) find that the supply shocks across countries in South America have, on balance, been both large and negatively correlated with those in the United States, making the region relatively unsuited to monetary union. A staff update of the estimates using data through 1998 reached the same conclusion.<sup>40</sup> This suggests that political tensions could arise if there were to be a marked divergence between the United States monetary policy stance and the near-term cyclical requirements of dollarized partners. It should be noted, though, that U.S. interest rates already exert a powerful influence on emerging markets economies.<sup>41</sup>

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<sup>40</sup> Arora (1999).

<sup>41</sup> In fact, Frankel (1999) presents evidence suggesting that the impact of U.S. interest rates on domestic interest rates of several Latin American countries is quantitatively larger than the impact on interest rates in Panama, the only dollarized economy in the continent.

Figure 5. United States: U.S. Dollars Outstanding, 1965-98  
(Percent of GDP)



Sources: Board of Governors of the Federal Reserve System, Flow of Funds z-series data tables, Table F204; and Fund Staff estimates.

54. **The influence of the United States over a hemispheric monetary union would be so strong that changes in the way that U.S. monetary policy is currently conducted are likely to be relatively small.** A full monetary union would require the United States to relinquish monetary policy autonomy and to accept a framework based on regional, rather than domestic, economic developments and objectives. But the economic size of the United States is such that, even with a full monetary union in which the monetary authority's objectives were defined in terms of the overall union, the United States component would predominate—much more so than Germany does in Europe (see Box 5). In practice, the U.S. authorities have already indicated that they would not be prepared to alter the focus of States monetary policy on serving domestic interests as part of any dollarization initiative.

#### **B. Implications for Seigniorage and Money Demand**

55. **Since full dollarization involves an expansion in overseas dollar holdings, even a full remittance of the additional seigniorage to the dollarizing countries would leave the United States no worse off, in budgetary terms, than prior to the dollarization.**<sup>42</sup> As an indication of the magnitudes involved, the total amount of seigniorage associated with full dollarization in Argentina would have been about US\$0.7 billion a year in 1998 (about 0.01 percent of U.S. GDP), although this amount is likely to grow over time. Of course, the involved amounts would be much larger in the event of a more generalized move to dollarization in the American continent, though still small relative to U.S. GDP.

56. **Even in the absence of a monetary union, there may be other implications for U.S. monetary policy.** In particular, there may be concerns that shifts in money demand in the newly dollarized economy complicate the conduct of U.S. monetary policy. However, as with any liquidity shock, whatever the source, if the Federal Reserve can respond in a timely manner, there would be no real effects. Suppose, for example, that the demand for dollars held by the public in Argentina were to increase, putting upward pressure on U.S. interest rates. The Federal Reserve could respond automatically by buying bonds and expanding liquidity to fully offset the pressure on interest rates.

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<sup>42</sup> In contrast, if the seigniorage-sharing formula were based on an estimate of *total* dollars in circulation, a full transfer of seigniorage would imply a net budgetary cost because it would include seigniorage already received by the United States currently.

**Box 5. How Dominant Would the United States be in any Regional Monetary Arrangement?**

If the United States were to enter into a monetary union with a number of its regional partners—which is obviously unlikely in the foreseeable future—its economic weight would dominate that union to a far greater extent than any country in the European Monetary Union.

As a practical matter, therefore, monetary policy in such a union would be dominated by domestic economic considerations in the United States.

<b>Western Hemisphere</b> <sup>1/</sup>	<b>100%</b>		
<i>Of which:</i>			
United States	76%	<b>European Monetary Union</b>	<b>100%</b>
		<i>Of which: 1/</i>	
California	10	Germany	33
New York	6	France	22
Texas	5	Italy	18
Illinois	4		
Florida	4		
Ohio	3		
Brazil	8		
Canada	6		
Mexico	4		
Argentina	3		

Sources: WEO data; and Bureau of Economic Analysis, U.S. Department of Commerce.

<sup>1/</sup> Based on 1997 GDP (at prevailing exchange rates) and estimates of Gross State Product. The sample includes the United States, Canada, and the ten largest economies in Latin America (Argentina, Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico, Peru, Uruguay, and Venezuela).

57. **Moreover, the demand for U.S. currency outside the United States (which is part of the monetary aggregates regularly monitored) is already subject to volatility stemming from outside forces.** In countries with extensive currency substitution, shifts between domestic money and U.S. dollars in response to changing expectations or the evolution of the domestic economy may be of significant magnitude. For example, variations in net international currency outflows, which rose sharply in the early 1990s, help to explain the breakdown between the growth in the monetary aggregates and nominal GDP in the United States. For this reason, it has been suggested by some that currency should be excluded from measures of the U.S. money supply if monetary aggregates are to be useful in guiding the conduct of monetary policy (Sprenkle, 1993). In fact, one might argue that full dollarization may stabilize foreign demand for currency because it would eliminate the shifts between the demand for the domestic currency and the U.S. dollar that are the main source of instability in the foreign demand for the U.S. currency.

#### IV. ISSUES FOR DISCUSSION

58. Directors may wish to focus their discussion on the following issues.

- What criteria do Directors view as most important for determining whether dollarization would be in the best interests of a particular country?
- Directors may consider conditions under which it would be desirable for a country to share seigniorage with economies that adopt its currency as legal tender, and modalities for doing so, for example, in terms of conditionality on the use of the seigniorage resources for LLR purposes.
- How important do Directors think the impairment of the LLR function would be for a dollarized economy? Do they see a role for bilateral or multilateral assistance in this respect?
- Directors may wish to discuss the implications of dollarization for countries that participate in regional trade arrangements, and how this depends on the degree of integration of the economies of member countries.
- In view of the difficulties involved in reversing a decision like dollarization, Directors may wish to discuss the tradeoffs involving credibility gains versus the option of exiting a fixed exchange rate arrangement.
- How do Directors view the balance of costs and benefits implied by full dollarization as set out in the paper?

## CURRENT EXPERIENCES WITH FULLY DOLLARIZED AND BIMONETARY SYSTEMS<sup>43</sup>

This annex reviews the worldwide incidence of fully dollarized economies, and their close cousin—bimonetary systems—and discusses the experience of Panama, by far the largest fully dollarized country. As is common, “dollarization” is used as a shorthand to refer to the use of any foreign currency, not only the U.S. dollar.

### FULLY DOLLARIZED AND BIMONETARY SYSTEMS

**Full dollarization** is a complete monetary union with a foreign country from which a country “imports” a currency, by making the foreign currency full legal tender and reducing its own currency, if any, to a subsidiary role. (Full legal tender means not only that a currency is legally used in contracts between private parties, but also that the government accepts it, and may use it in payments.) In a few countries, which are also included in this category as borderline cases—perhaps better called bimonetary systems—a foreign currency is used widely in the role of legal tender but it has subsidiary role to the domestic currency. Despite unofficial use of foreign currency in many countries, only a relatively small number of economies (independent nations and dependencies) have officially adopted a foreign currency as legal tender.

About 7.5 million people live in fully dollarized economies today (Table 1). Most fully dollarized economies are small and most are political dependencies (Puerto Rico accounts for about half of the combined population); many are islands, often with only a few thousand inhabitants. The six dollarized economies that are members of the IMF (Kiribati, the Marshall Islands, Micronesia, Palau, Panama, and San Marino) have about 3 million inhabitants among them. Of these six economies, by far the largest is Panama, which has 2.7 million people and a GDP of over US\$9 billion.

Most fully dollarized economies have convertibility for current-account transactions. Five of the six that are members of the IMF have long accepted Article VIII status.<sup>44</sup> Dollarized economies typically also have few or no restrictions on capital-account transactions.

A variation of full dollarization is what one might call an officially **bimonetary system**, in which a foreign currency is legal tender and may dominate bank deposits, but may not dominate payment of wages, taxes, and everyday transactions. In that sense, the foreign legal tender plays a subsidiary role in the domestic monetary system. Based on these criteria, a

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<sup>43</sup>This annex is based on Bogetic (1999).

<sup>44</sup>The exception is Palau which joined the IMF recently, on December 17, 1997.

number of countries and territories could be classified as bimonetary systems (Table 2).<sup>45</sup> Again, all are small, though the average size is larger than in the case of fully dollarized economies. Examples are Namibia and Lesotho, which are members of the Common Monetary Area (CMA) with South Africa. They are also the only independent countries that collect seigniorage from either dollarization or a bimonetary system (for details, see box). The CMA has an agreement for sharing seigniorage and for maintaining common exchange controls with respect to outside countries. The Namibian dollar and the Lesotho loti both circulate at one-to-one with the South African rand.

Much as the fully dollarized systems, bimonetary systems typically have highly open economies with liberal current and capital account regulations. They tend to be located in the neighborhood of a dominant economy or groups of economies with which they conduct much of their trade and capital transactions. Hence, the use of the foreign currency in their domestic economies is often necessitated by virtue of their openness and heavy reliance on trade (and factor mobility) with their larger neighbors.

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<sup>45</sup>Until the 1970s, Liberia used only U.S. dollar as its legal tender. Later, Liberia introduced a Liberian dollar coin which circulated in parallel with the U.S. dollar, much like in Panama. In 1989, however, Liberia shifted from a fully dollarized to a bimonetary system when it introduced Liberian dollar notes in parallel to U.S. dollar, which is still legal tender.

Table 1. Fully dollarized Economies in 1999

Country	Pop.	Political status	Currency used	Since
Andorra	73,000	Independent	French franc/Euro, Spanish peseta/Euro 2/	1278
Cyprus, Northern	180,000		Turkish lira	1974
Guam	160,000	U.S. territory	U.S. dollar	1898
Kiribati 1/	82,000	Independent	Australian dollar, own coins	1943
Liechtenstein	31,000	Independent	Swiss franc	1921
Marshall Islands 1/	61,000	Independent	U.S. dollar	1944
Micronesia 1/	130,000	Independent	U.S. dollar	1944
Monaco	32,000	Independent	French franc/Euro	1865
Nauru	10,000	Independent	Australian dollar	1914
Palau 1/	17,000	Independent	U.S. dollar	1944
Panama 1/	2.7 mn	Independent	U.S. dollar notes and coins, Panamanian Balboa coins	1904
Puerto Rico	3.8 mn	U.S. commonwealth	U.S. dollar	1899
Saint Helena	5,600	British colony	pound sterling	1834
Samoa, American	60,000	U.S. territory	U.S. dollar	1899
San Marino 1/	26,000	Independent	Italian lira/Euro, own coins	1897
Tuvalu	11,000	Independent	Australian dollar, own coins	1892
Vatican City	1,000	Independent	Italian lira/Euro, own coins	1929
Virgin Islands, U.K.	18,000	British dependency	U.S. dollar	1973
Virgin Islands, U.S.	97,000	U.S. territory	U.S. dollar	1934

Sources: *The Statesman's Year-Book*, various issues; IMF Exchange Arrangements and Exchange Restrictions Annual Report (1998); IMF Web site (for information on member countries); and IMF *World Economic Outlook* data. In addition, a few other, very small territories use foreign currencies, such as Cook Islands and Niue (New Zealand dollar), Norfolk Island, Cocos (Keeling) Islands (Australian dollar), Pitcairn Island (New Zealand dollar and U.S. dollar), Tokelau (New Zealand dollar), and Turks and Caicos Island (U.S. dollar).

1/ IMF member country.

2/ Issues Andorran diner coins for collectors.

Table 2. Bimonetary Systems in 1999

Country	Pop.	Political status	Currency used	Since
Bahamas 1/	290,000	Independent	Bahamian dollar, U.S. dollar	1966
Bhutan	1.9 mn	Independent	Bhutan ngultrum, Indian rupee	1974
Bosnia and Herzegovina 1/ 2/	4.1 mn	Independent	Bosnian convertible marka, German mark, Croatian kuna, Yugoslav dinar	1998
Brunei Darussalam 1/ 2/	300,000	Independent	Brunei dollar, Singapore dollar	1967
Cambodia 1/	10.6 mn	Independent	Cambodian riel, U.S. dollar	1980
Haiti 1/	8 mn	Independent	Haitian gourde, U.S. dollar	n.a.
Lao PDR 1/	4.7 mn	Independent	Lao kip, Thai baht, U.S. dollar	n.a.
Lesotho /1 3/	2.1 mn	Independent	Lesotho loti, South African rand	1974
Liberia 1/	2.9 mn	Independent	U.S. and Liberian dollars	1944
Namibia 1/ 3/	1.6 mn	Independent	Namibian dollar, South African rand	1993
Tajikistan 1/	5.8 mn	Independent	Tajik ruble, use of other currencies permitted	1994

Sources: *IMF Exchange Arrangements and Exchange Restrictions Annual Report (1998)*; IMF Web site (for information on member countries); *The Statesman's Year-Book*, various issues; and IMF *World Economic Outlook* data. Also, the Isle of Man and Channel Islands use British pound and local pound concurrently. The identification of bimonetary systems relies on the classification of currency regimes in *IMF Exchange Arrangements and Exchange Restrictions Annual Report (1998)*. We included in the list of bimonetary systems those countries that are using, according to this report, foreign currency as "other legal tender," which means that the foreign currency, while circulating widely, plays a subsidiary role to the domestic currency.

1/ IMF member country.

2/ Brunei Darussalam operates a currency board. Brunei dollar is tied to the Singapore dollar at the rate 1 Brunei dollar = 1 Singapore dollar. Similarly, Bosnia and Herzegovina operates a currency board with its domestic currency, Konvertibilna marka, tied to German marks at par.

3/ Uniquely among fully dollarized and bimonetary systems, Lesotho and Namibia have a seigniorage sharing agreement with South Africa, the other member of the Common Monetary Area.

### PANAMA'S EXPERIENCE WITH FULL DOLLARIZATION

Panama is by far the largest politically autonomous fully dollarized economy, with an almost 100-year long experience with such a system. It is, therefore, the best available "laboratory" for understanding how such a system might work in other settings. Nonetheless, any inferences must make appropriate allowance for Panama's specific (and, in some respects, not representative) circumstances. Panama is a fairly small economy with very close links to the United States, reflecting in part the strong presence, both economic and military, of the United States in Panama in this century. The following is a brief overview of some salient characteristics of Panama's experience with full dollarization (for more details, see Moreno-Villalaz (1999)).

**Monetary system.** Since 1904, Panama has used the U.S. dollar notes (paper money) as domestic currency. Panama issues a domestic currency, the balboa (1 balboa = US\$1), but it circulates only as coins. Panama's financial system has a significant presence of foreign banks. There is no central bank and no centralized foreign reserves. The Banco Nacional de Panamá is a government-owned commercial bank.

**Role of foreign banks.** In 1970, a banking law liberalized Panama's financial markets and allowed full entry of foreign banks. The capital account is entirely open, and banks are free to invest excess funds in Panama or abroad.

**The payments system** is a real time gross settlement system operated by the BNP. Payment is effected through the bank's account at a New York bank. Foreign banks sometimes bypass local clearing and clear through the New York Clearing House or the Federal Reserve's Fedwire, as in the case of the branch of a U.S. bank in Panama lending to the branch of another U.S. bank. There are also banks, such as the Hongkong and Shanghai Bank, that act as correspondents for other banks in clearing.

**Lender of last resort and banking supervision.** Panama has no domestic lender of last resort. Domestic banks have established lines of credits with foreign banks with branches in Panama and have usually been able to draw on them during liquidity crunches (though not during the 1988 crisis, discussed below). The Panamanian government and the BNP have not rescued failing banks, but only a few banks have failed over the past 30 years. A privately funded deposit insurance scheme is in the process of being established in accord with a 1998 law. In 1998, Panama established a new office of Superintendent of Banks; before then, a supervisory agency existed but its powers and impact were marginal. Foreign banks are subject to their home country supervision and regulation.

**Seigniorage sharing.** The United States collects all seigniorage on the use of U.S. dollar in Panama, and there is no seigniorage sharing. Panama collects small amount of seigniorage on domestic balboa coins which comprise about 9 percent of total cash and coin in circulation.

**Macroeconomic performance.** Panama's overall macroeconomic performance is broadly consistent with the general results of Ghosh et al. (1997), who find that countries with pegged exchange rates have lower inflation, lower output growth, and higher output volatility than countries with flexible exchange rate systems. Thus, Panama has experienced relatively low inflation, which averaged 3 percent per year in the 1961–97 period (almost 2 percent lower than in the United States). This is low even compared to the average of fixed exchange rate countries, as shown in Table 1 below. Average annual growth in Panama has been robust at 3.6 percent since 1975, exceeding the averages for Central American countries (2.9 percent) and the Western Hemisphere as a whole (3.2 percent). However, this performance was somewhat weaker than for the average country with a pegged exchange rate, while the volatility of output in Panama was higher than average, even for countries with pegged exchange rates.

Table 3. Panama and Comparator Countries: Macroeconomic Performance

(Deviation from average for all countries, in percent)

	Panama	Average for Various Exchange Rate Regimes		
		Pegged	Intermediate	Floating
Inflation				
Rate	-5.2	-2.90	-0.10	3.80
Volatility	-2.9	-1.74	0.53	1.67
Output				
GDP growth	-1.6	0.00	0.70	0.50
GDP volatility	0.6	0.08	-0.80	-0.52
Employment volatility	-0.2	0.05	0.01	-0.32

Source: Ghosh, Gulde, Ostry and Wolf (1997), using as comparators all Developing Countries with data for 1960 to 1995.

**The nature of major shocks and economic adjustment.** Panama experienced several major shocks that caused significant economic disruption. Indeed Panama had 13 IMF programs (12 stand-bys and one EFF) over the 1975–96 period, more than any other country.<sup>46</sup> Crisis episodes include political upheaval in January 1964 and in 1967–69, the oil shocks of 1973 and 1979, the 1982 Latin American debt crisis, and the 1988–89 financial crisis immediately preceding and during the economic embargo and the U.S. intervention. All caused a withdrawal of domestic deposits and major economic dislocation. However, in many cases the banking system held up well. During the 1964 and 1967–69 crises, several private banks responded by selling their assets abroad and increasing domestic credit, despite the outflow of domestic deposits. This cushioned the adverse impact on the domestic economy.

Much of the output volatility mentioned above can be attributed to the severe crisis associated with the January 1988 U.S. indictment of Panama's leader and subsequent sanctions and eventual military intervention. Panama suspended payment on its external debts during 1987–88, and there was a run on bank deposits that resulted in temporary bank closures for domestic banks. GDP fell by 15.6 percent in 1988 and a further 0.2 percent in 1989. In sum, full dollarization in Panama is not a panacea, and could not insulate the country from all or even majority of major shocks. But those shocks were essentially external to the monetary-exchange system and at least during some major crises, the banks responded in a stabilizing fashion.

**Sovereign spreads, interest rates, and availability of long-term credit.** As shown in Figure 3 in the text, Panama currently has quite low spreads on its external debt. This cannot necessarily be attributed to legal dollarization, however. As recently as 1995, Panama's spreads were at or above levels of countries such as Mexico and Argentina. Even now, Panama's spreads are higher than Costa Rica's.<sup>47</sup> As discussed in the text, Figure 3 suggests that yields on Panamanian and Argentinean Brady bonds are, in large measure, driven by

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<sup>46</sup> See Mussa and Savastano (1999).

<sup>47</sup> In May 1999 Costa Rica issued a Eurobond whose spread over a comparable U.S. Treasury bond has averaged 366 basis points through August 1999. The spread for a comparable Panamanian Eurobond averaged 416 basis points over the same period. The Costa Rican Eurobond is much less liquid than Panama's, which renders this comparison less reliable. Note, however, that, other things equal, lower liquidity would imply a higher premium, and thus the spread on Costa Rican bond may in fact be biased upward.

common factors. The absence of currency risk in Panama does not isolate that country from swings in the prevailing market sentiment towards emerging markets.<sup>48</sup>

There is no “sovereign ceiling” for Panama. That is, private borrowers can have higher ratings from international ratings agencies than the Panamanian government itself. This highly unusual circumstance is due to the view that dollarization may limit the extent to which sovereign defaults automatically imply corporate defaults. This, in turn, may reflect the fact that government often chose to devalue and even impose capital controls when they threaten to default on external obligations.

Nominal interest rates in Panama have persistently been among the lowest or nearly the lowest in Latin America. Real interest rates have also been relatively low and steady, avoiding the swings from negative to positive double digits that have occurred elsewhere in Latin America. Finally, observers have noted the availability of long-term domestic credit. In Panama, 30-year fixed-rate mortgages are readily available (Hausmann et al 1999). By contrast, even in developing countries with relatively stable currencies, loans for 20 or 30 years are often unavailable and interest rates on shorter-term loans are typically adjusted periodically rather than offered at fixed rates.<sup>49</sup>

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<sup>48</sup> Similarly, spreads on U.S. high yield (“junk”) bonds over Treasuries are highly correlated with both Panamanian and Argentinean dollar spreads, with correlation coefficients of 0.39 and 0.70, respectively, over the October 1995 through March 1999 period.

<sup>49</sup> Of the seven other Central American countries, Belize also has long-term fixed rate mortgages. See Stein et al. (1999).

**ARGENTINA: ESTIMATING DEFAULT RISK IN THE ABSENCE OF CURRENCY RISK**

We are interested in getting some sense of the reduction in the risk premium or, more precisely, the spread over U.S. Treasuries applied to Argentine foreign debt, in the event of dollarization. We can exploit market information on default premiums and expected exchange rate changes as measured by various interest rate spreads, complemented with some assumptions, to infer what markets assess as the probability of default on Argentinean foreign debt in the absence of currency crisis risk.

The perceived probability of default on Argentinean dollar-denominated bonds, that accounts for the interest premium on those securities, can be decomposed, by definition, into a component associated with currency crisis and a pure default component:

$$d = \underbrace{p(d|cc) * p(cc)}_{\text{Currency crisis term}} + \underbrace{p(d|ncc) * [1 - p(cc)]}_{\text{Pure default term}}$$

where:

d is the (total) probability of default

p(d|cc) is the probability of a default given that there is a currency crisis,

p(cc) is the probability of a currency crisis, and

p(d|ncc) is the probability of default given that there is no currency crisis.

We are interested in estimating p(d|ncc). This probability, which measures the remaining default risk if the risk of currency crisis disappears, is equal to:

$$p(d|ncc) = \frac{d - p(d|cc)p(cc)}{[1 - p(cc)]}$$

We can infer the value of the total default probability, d, and of the probability of currency crisis, p(cc), from the pricing of various bonds, although this requires to adopt some assumptions. Conditional on those assumptions, we can calculate the reduction in the interest rate spread that could be achieved by dollarization.

A measure of the total default probability, d, can be inferred from the interest rate spread between dollar-denominated Argentinean bonds and comparable U.S. Treasury bonds. Thus:

$$(1 - \alpha)d = \frac{i_A^{\$} - i_{US}^{\$}}{1 + i_A^{\$}}$$

where the yield on dollar-denominated Argentine bonds, is the yield on U.S. Treasury bonds  $\alpha$  is the assumed expected (fraction) recovery value of the bond in case of default. The idea is that defaults are almost never complete; even the Russian Czarist bonds preserved some positive value.

A direct estimate of the probability of currency crisis,  $p(cc)$ , can be obtained from the differential between dollar and peso interest rates on Argentinean bonds of similar characteristics. Assuming that the interest differential is equal to the expected exchange rate change, we have:

$$(1 + i_A^{peso})(1 - \Delta e * p(cc)) = 1 + i_A^{\$}$$

*Expected return to peso asset in dollars      Expected return to dollar asset*

where  $\Delta e$  is the expected size of devaluation (measured as a discount) in the event of a currency crisis.

We can directly measure the interest rate differential and make an assumption about the expected size of devaluation in the event of a currency crisis, allowing us to estimate  $p(cc)$  as:

$$p(cc) = \frac{(i_A^{peso} - i_A^{\$})}{\Delta e(1 + i_A^{peso})}$$

We need to make one more assumption, about the probability of default in the event of a currency crisis,  $p(d|cc)$ . Having made this last assumption and calculated the probability of default in the absence of a currency crisis,  $p(d|ncc)$ , from the above formula, we can calculate what would be the spread on dollar-denominated bonds in the absence of currency crisis risk for Argentina.

The risk premium on Argentinean dollar-denominated Eurobonds averaged 3.3 percentage points during 1997 and 1998. How much of this might be attributed to devaluation risk? Table 1 shows how variations in assumption I ( $\Delta e$ , the size of devaluation in the event of a currency crisis) and assumption II ( $p(d|cc)$ , the probability of default in the event of a currency crisis) affect the estimate of the interest rate spread that would remain after the elimination of currency crisis risk. If, for example, a currency crisis would result in a 20 percent probability that Argentina defaults on its Eurobonds, while a currency crisis would result in a 30 percent devaluation, then the elimination of currency crisis risk would reduce spreads by 138 basis points spread and the resulting spread would be 182 basis points.<sup>50</sup>

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<sup>50</sup> A few shortcuts have been taken in performing these calculations. In particular, we are inferring annual default risk probabilities on the basis of spreads that apply to multi-annual bonds with the implicit assumption that those probabilities will stay constant over time.

Table 1. Argentina: Reduction in Dollar Spread After Elimination of Currency Risk

		Assumption I: Size of Devaluation in the Event of a Currency Crisis (percent)			
		20	30	40	50
Assumption II: Probability	10	103	85	77	72
of default in the event of a	20	186	138	116	103
currency crisis (percent)	30	271	182	155	133

Note: Based on average Eurobond spread of 330 basis points during 1997-98. Assumes a recovery fraction after default of 25 percent.

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