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The Pros and Cons of Full Dollarization

Andrew Berg and Eduardo Borensztein

IMF Working Paper

Research Department

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Prepared by Andrew Berg and Eduardo Borensztein¹

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Abstract

The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.

We analyze the costs and benefits of full dollarization compared to its closest alternative, a currency board, quantifying for Argentina where possible. Potential advantages include lower borrowing costs and deeper integration into world markets. One cost is the transfer of seigniorage to the United States. The country may also lose the “exit option” to devalue in the face of major shocks. Similarly, even a country with a currency board may lose some ability to act as lender of last resort to the banking system. We review how various country characteristics influence the balance of arguments.

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Authors' E-Mail Addresses: aberg@imf.org; eborensztein@imf.org

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I. INTRODUCTION

There is an old joke that says that the exam questions in economics remain the same every year--only the answers change. Certainly, the debate about the best exchange rate regime has been with us forever, but new answers keep appearing. The newest answer to the question of what exchange rate regime countries should choose is "none." That is, countries should forgo using their own currency entirely and adopt as legal tender a stable foreign currency, most commonly the U.S. dollar. Then-president Carlos Menem of Argentina suggested last year that Argentina should adopt the U.S. dollar--that is, "dollarize"--as the ultimate solution to its long history of difficulties with monetary and exchange rate policy. More recently, Ecuador has announced its intention to adopt the dollar, in the context of a deep economic and political crisis. Prominent economists have begun to argue that essentially all developing countries should also dollarize (see Calvo and Reinhart, 1999). Not only developing countries, however, are considering dollarization. Partly prompted by the example of the adoption of the euro this year, some have suggested that Canada should adopt the U.S. dollar as well.

New answers to the exchange rate question appear because the world continually presents new problems to policymakers, while old ones sometimes recede. During the 1980s, much of the debate about exchange rate regimes for developing countries centered on the role of exchange rate pegs in inflation-stabilization programs. Two distinguishing features of the 1990s have changed the terms of the discussion. First, the inflation problem has abated notably. Second, as the degree of capital mobility and scale of capital flows have increased sharply, so has the apparent frequency and severity of currency crises. And many of the victims of these fierce speculative attacks were maintaining some sort of pegged exchange rate regime. Because of those crises, the idea of dollarization has elicited considerable interest. The view has emerged that in a world of high capital mobility, exchange rate pegs are an invitation to speculative attacks and that only extreme choices--a firm peg such as a currency board or a free float--are viable. Advocates of dollarization have gone on to attack both of these alternatives. Free floats, they argue, are not viable for many countries because they result in excessive exchange rate volatility or a de facto "soft peg" if the authorities resist exchange rate movements. Meanwhile, it has become clear that even currency boards are not immune to costly speculative attacks. Argentina and Hong Kong suffered from contagion episodes in recent years that resulted in both sharp increases in interest rates and recessions.

Dollarization promises a way of avoiding currency and balance of payments crises. Without a domestic currency there is no possibility of a sharp depreciation, and sudden capital outflows motivated by fears of devaluation are ruled out. Dollarization may also bring other benefits. A closer integration with both the U. S. and global economies would be promoted by lower transaction costs and an assured stability of prices in dollar terms. By definitively rejecting the possibility of inflationary finance, dollarization might also strengthen institutions and create positive sentiment toward investment.

Yet countries may be reluctant to abandon their own currencies. For one thing, the currency is a national symbol, and proposals to join a monetary union (or directly adopt the U.S. dollar) may draw questions and criticism from some political quarters. From an economic point of view, the right to issue a country's currency provides its government with seigniorage revenues, because currency, and sometimes all of base money (the central bank's monetary liabilities), is non-interest-bearing debt. These seigniorage revenues show up as central bank profits and are transferred to the government. They would be lost to countries that dollarized their economies, unless the United States decided to share part of the extra seigniorage it would obtain. In addition, a dollarizing country would be relinquishing any possibility of having an autonomous monetary and exchange rate policy, including the use of central bank credit to provide liquidity support to its banking system.

Is dollarization, then, a better exchange rate regime for developing countries? Two considerations make this a difficult question to answer. First is the virtual absence of historical experiences to draw upon. Panama is the only sizable country now using a foreign currency as legal tender--the others that have done so have mostly tiny economies. And even Panama is a fairly small economy with very close historical, political, and economic links to the United States. Second, the difficulty of reversing dollarization dictates that the analysis should consider a much longer horizon than is usual for evaluating monetary and exchange rate options.

To simplify the discussion, we compare the merits of dollarization to those of its nearest "competitor"--the currency board. Such a focus is more tractable and captures the main implications of dollarization and how its effects differ from those of adopting a firm peg rather than the more general question of choice of exchange rate regime. Furthermore, if we were to conclude that a currency board is at least equivalent to dollarization, in terms of the balance of costs and benefits, then a currency board should be the alternative for countries seeking a firmly pegged exchange regime as it preserves seigniorage and it is simpler to establish.

Currency board and dollarization arrangements are quite similar, but a comparison is nonetheless revealing. To begin with, dollarization implies the loss of seigniorage revenue for the government. But dollarization's key distinguishing feature is that it would be permanent, or nearly so. It would presumably be much more difficult to reverse dollarization than to modify or abandon a currency board arrangement. With few recent exceptions, countries introducing their own currencies have done so in the context of newly gained national independence, as with the countries of the former Soviet Union. These currencies have, moreover, almost always replaced a weak and inconvertible currency. In fact, the largest benefits from dollarization derive from the credibility attached to it, precisely *because* it is nearly irreversible. We now take a closer look at the benefits and costs of full dollarization.

II. MAIN BENEFITS AND COSTS OF DOLLARIZATION

A. Why Dollarize?

The main attraction of full dollarization is the expectation that the elimination of the risk of sharp exchange rate adjustments will bring about significantly more stable international capital movements. A higher level of confidence by international investors would also lead to lower spreads on international borrowing, which would lower fiscal costs and promote investment and growth. Moreover, dollarization would promote a closer economic and financial integration with the United States and the global economy, which would contribute to accelerate the convergence to the income levels of the advanced economies. The actual impact of these factors is difficult to quantify, however, particularly for those effects that would depend on institutional changes resulting from greater financial integration.

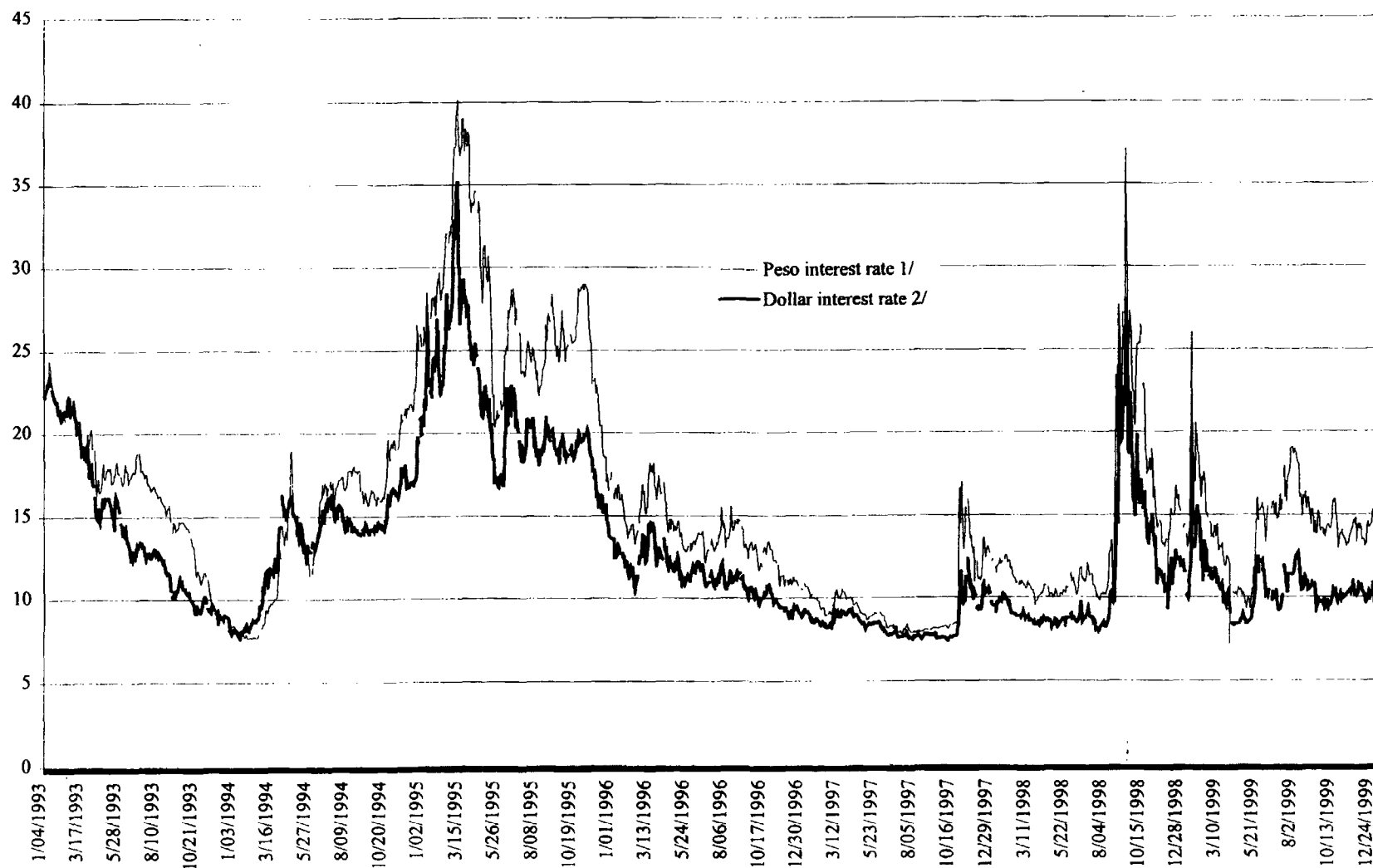
B. The Risk Premium

An immediate benefit from the elimination of the risk of currency crisis would be a reduction of country risk premia and a consequent lowering of interest rates. Lower interest rates and more stability in international capital movements would result in a significantly lower fiscal cost of servicing the public debt, and also in a higher level of investment and economic growth.

It is difficult to estimate the magnitude of this potential gain. 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, and that the key question is the effect of dollarization on the cost of dollar-denominated borrowing.

In Argentina, both peso- and dollar-denominated interest rates have tended to come down since the convertibility plan (currency board) was implemented in 1991. Both peso- and dollar-denominated interest rates have shot up at times of market turbulence, however. 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. Increases in interest rates have tended to be smaller and briefer in the more recent episodes than in the "tequila," however.

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".

The key question is whether full dollarization, by eliminating currency risk, would substantially reduce the risk premium on dollar-denominated debt. Yields on bonds with different features can help disentangle sovereign and devaluation risk, as perceived by markets. Sovereign risk can be measured by the spread on dollar-denominated Argentinean government bonds over US Treasuries. This spread has tended to come down with time, but has 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).

A surprising feature revealed in Figure 2 is the much higher yields on Brady bonds than on Eurobonds. This poses the question of what is the relevant cost of borrowing for Argentina. The discrepancy seems to be somewhat of a puzzle; after all, both are bonds owed by the same borrower, the Argentine state.² 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. The former are a new source of finance to which they may wish to resort again in the future, while the Bradies are the result of a debt restructuring agreement after debt service had been missed (Petas and Rahman (1999)).³ In fact, the yields on Brady bonds are broadly similar to the yields on other Argentine dollar-denominated bonds, the BOCONs, that were also issued in the context of a debt restructuring agreement, in this case to settle arrears to domestic suppliers and pensioners (Kiguel (1998)). In any event, as the Eurobond market is the source of new financing for emerging markets, it would be appropriate to take the yield on this type of bond as representative of the marginal cost of borrowing currently faced by Argentina.

Currency risk and country risk

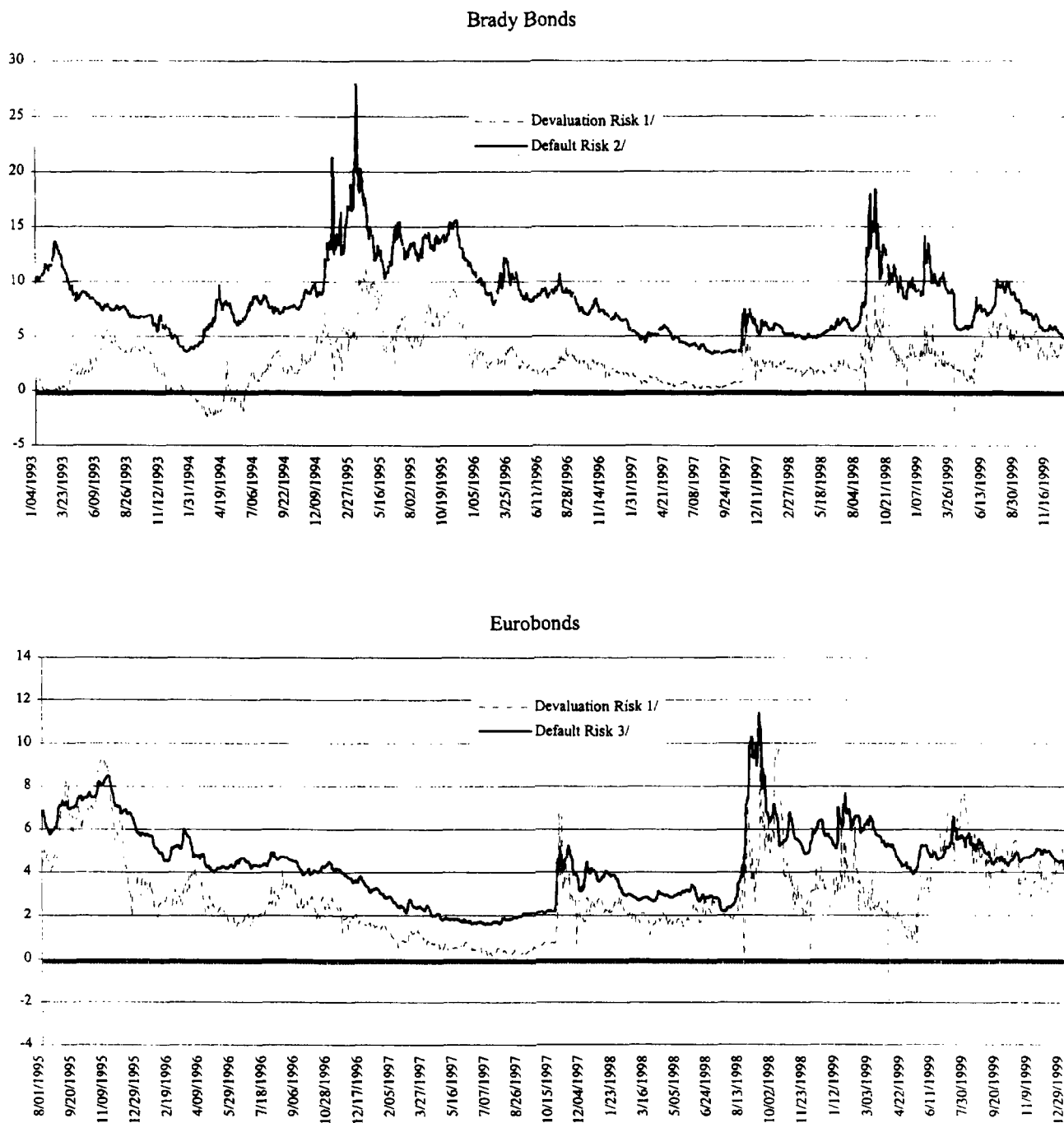
Devaluation risk might increase sovereign risk for several reasons. First, governments attempting to avoid currency crises may take actions that increase the risk of default. For example, an attempt to defend the currency may cause the government to issue too many dollar-denominated bonds or dollar-indexed bonds, as in Mexico in 1994. A government may also impose capital controls in the interests of defending the currency, thereby causing other debtors to default on dollar-denominated debt. 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.

Default risks could rise with devaluation risk due to fiscal losses stemming from the devaluation. Government revenues are largely related to domestic prices, so a government borrowing in dollars is exposing itself to exchange rate risk. A large devaluation would

² The same discrepancy exists for other countries that have issued Brady bonds.

³ The longer maturity of the Bradies and the effect of the existing collateral on the "stripped" part of the return may also explain part of this yield difference.

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.

compromise the financial strength of a government that is heavily indebted in dollars, especially if it faces large short-term debt payments.

The stress that a devaluation can place on the financial sector provides a further link from devaluation to default. As discussed below, it is difficult for banks to insulate themselves from devaluation risk in highly (de facto) dollarized economies. Governments in turn may bear the burden of supporting the distressed banking systems, raising the risk of devaluation on other obligations.

Not all default risks emerge from the risk of currency crises, however. Sovereign defaults may result from an unsustainable fiscal position or political turmoil. Investors may flee from domestic assets, from government obligations or from the country as a whole, 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. Indeed, this has been the case with some of the currency devaluations in the European Monetary System. Even devaluations that have initially contractionary effects may improve longer-term prospects and thus reduce the risk of sovereign default. The importance or even existence of this effect would vary strongly from country to country.⁴ The abandonment of a currency board under heavy market pressure would, however, surely badly hurt the domestic economy.

There are thus arguments on both sides of the question of how much of the default risk to attribute to devaluation risk. Although sovereign risk and devaluation risk move closely together (Figure 2), this does not establish a causal link from devaluation risk to sovereign risk (or vice versa).⁵ 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.

⁴ The paper returns to this issue below.

⁵ 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 (deutschmark) bonds rose by roughly 200 basis points in 1992, while the spread on dollar-denominated Italian Republic bonds (not affected by a potential devaluation of the lira) also rose by some 60 basis points.

In illustration of this possibility, Figure 3 shows the relationship between the spreads over Treasuries of Argentine and Panamanian Brady bonds.⁶ 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. Moreover, since movements in dollarized Panama's spreads cannot reflect devaluation risk, the implication is that at least a part of Argentina's spread also cannot be explained by currency risk alone.⁷

Estimating the remaining 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 US 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:

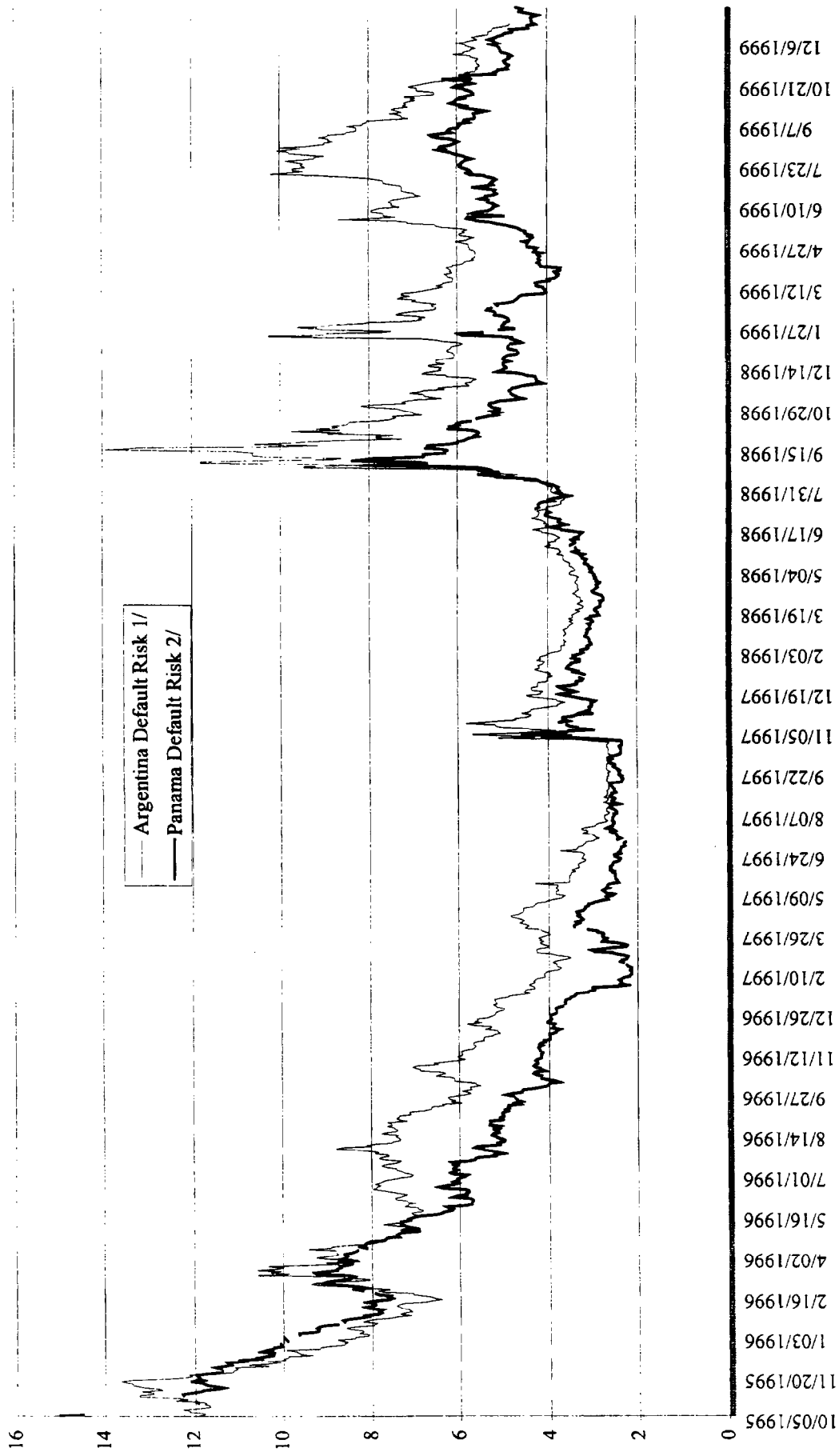
d is the (total) probability of default
 $p(d|cc)$ is the probability of a default given that there is a currency crisis,
 $p(cc)$ is the probability of a currency crisis, and
 $p(d|ncc)$ is the probability of default given that there is no currency crisis.

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:

⁶ Both are "stripped" of the value of US Treasury collateral.

⁷ Similarly, spreads on US 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 (stripped of collateral) of Argentinean Brady bonds over comparable US Treasuries.

2/ Spread (stripped of collateral) of Panamanian Brady bonds over comparable US Treasuries.

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

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 US 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 US Treasury bonds α 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 Δe 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 (Δe , 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.⁸

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.

C. Stability and Integration

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. To begin with, currency crises are not costly just because their possible emergence widens risk premia but because of the dire consequences to the domestic economy.⁹ In Mexico, GDP fell by

⁸ 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.

⁹ See WEO (1998) for estimates of the cost of currency crashes.

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 serious consequences for their economies.

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 just as damaging.¹⁰ 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.

Another powerful but somewhat hypothetical argument for full, legal dollarization is that the change in monetary regime may establish a firm basis for a sound financial sector, which would provide the basis for strong and steady economic growth. The argument here is that dollarization would signal more than the adoption of a foreign currency; it may be perceived as an irreversible institutional change towards low inflation, fiscal responsibility, and transparency. This perception would be reinforced, in particular, if legal dollarization is instituted not as a unilateral action but through some sort of monetary agreement with the United States.

Furthermore, dollarization may contribute to economic integration 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 US states that are closer geographically. Canadian provinces trade more than 20 times more among themselves than with US 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 US-Canadian border than for cities within a country (Engel and Rogers (1996)).

The use of a common currency may be an important factor explaining this pattern of national market integration, given the fairly low transaction costs and restrictions to trade across the US-Canada 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 (non-traded) goods in cities across the border. A similar hypothesis was advanced by Mussa (1986) who noted the higher

¹⁰ Indeed Panama has had several crises, and a high number of Fund programs.

variance of the real exchange rate between different Canadian and American 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 thus bring about a closer economic integration in goods markets.

Dollarization could also bring about a closer integration in financial markets. One of the most profound effects attributed to dollarization in Panama is the 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 1969-1970. Currency risk can 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 be an active part of international financial markets. Dollarization also would make the imposition of capital controls more difficult as it would be possible to convert all assets to dollar cash. Thus, dollarization makes integration easier and insulation of the domestic financial system more difficult.

D. Seigniorage

A country adopting a foreign currency as the legal tender would forego its seigniorage rights. Seigniorage are the profits accruing to the monetary authorities from its right to issue legal tender currency. Currency can be thought of as non-interest bearing debt; the ability to issue this noninterest bearing debt is a source of revenue for the monetary authorities. In addition, legal reserve requirements on banks may also be noninterest bearing (or be remunerated well below market rates 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 1.

There are two components to the seigniorage loss implied by dollarization. First, there is an immediate "stock" cost. To adopt the dollar and withdraw the domestic currency from circulation exchanging it for US 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 to with dollarization, the central bank (or its successor institution) will still preserve the ability to impose reserve requirements on banks.¹¹ Therefore, the unavoidable loss of seigniorage comprises only currency.

¹¹ 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.

Box 1. 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 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} . (Or that they are fully equivalent if the computation starts from the beginning of the economy, when money was first issued).

In the case of Argentina, the first, or stock, cost of dollarization would be the redemption of about \$15 billion in domestic currency held outside the central bank. In addition, one should consider the flow of additional seigniorage that comes from the increase in currency over time. This annual increase in currency averaged \$1.0 billion or about 0.35 percent of GDP in 1993-98, although it was seriously affected by the tequila crisis.¹² Looking forward, even in the absence of crisis, the annual increase in currency is likely to decline as technological progress permits an increasing use of alternative means of payment.

For G7 countries, average annual increase in currency was equivalent to 0.3 percent of GDP over the last 10 years. Making the assumption that the annual increase in currency for Argentina will also amount to 0.3 percent of GDP over the next few years, the loss of seigniorage on account of the increase in currency demand would amount to an additional \$1.0 billion approximately. Thus, the seigniorage cost would be an initial \$15 billion plus the annual loss of \$1 billion on account of the increase in currency demand. 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 1). The annual interest earnings accruing on the stock of international reserves that is the counterpart of the stock of domestic currency is estimated at some 700 million dollars per year, or 0.2 percent of GDP.¹³ These interest earnings would grow over time on account of the increase in currency demand; under the above assumptions, the flow of interest profits would double the original amount in about ten years.

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.¹⁴ If the country is credit constrained and cannot borrow the reserves, it would be forced to run current account surpluses to accumulate them. This might represent a substantial cost in terms of forgone investment if, as is likely for many developing countries, the optimal policy would otherwise involve some current account deficits. Even if the country can borrow the required backing, the resulting increase in external government debt might increase the risk premium faced by the country and hence domestic interest rates, and more generally may increase the risk of debt crisis down the road.

¹² Argentina perceived much higher seigniorage, an average of 2.2 percent of GDP, over the past 20 years, which resulted in high inflation.

¹³ 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.

¹⁴ On these points see Fischer (1982). For Argentina, the stock of reserves on hand is sufficient to purchase the outstanding monetary base.

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

E. Monetary Policy Autonomy and the “Exit Option”

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. Indeed, the elimination of the risk of such an adjustment is the main purpose of full dollarization. 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. They have, moreover, almost always replaced a weak and inconvertible currency.¹⁵ 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 US dollar. Thus, full dollarization is much like a currency board with no exit option.

Large shocks may require sizable adjustments of the real exchange rate. Without exchange rate flexibility, the adjustment to such shocks may require lowering nominal wages and certain prices, which may not be feasible without a substantial recession, particularly for economies with less flexible labor markets.¹⁶ It is worth remembering, also, that a prolonged deflation (fall in the price level) that a required fall in the real exchange rate would entail may have other problems. 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

¹⁵ The main exception to the rule that new currencies replace weak ones is 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.

¹⁶ An alternative adjustment mechanism, typical across US states during recessions, is labor migration. See Blanchard and Katz (1992).

the extent 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 devaluation.¹⁷

Experiences 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, Argentina started to follow an active monetary policy that sterilized the monetary impact of capital outflows since 1931 (after abandoning convertibility a couple of years earlier), and this policy has been considered instrumental for the relatively minor impact of the Depression on Argentina (della Paolera and Taylor (1998)). There is also a consensus that advanced countries that had an early exit from the gold standard fared better during the Great Depression (Eichengreen and Temin (1997) and Eichengreen and Sachs (1985)).¹⁸

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 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.¹⁹ 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 ceased to rely exclusively on measures of internal adjustment and 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 1994-1997 and little inflation pass-through.²⁰

These examples suggest that foregoing the option to exit from a fixed exchange rate arrangement in the face of large shocks could imply a substantial cost, particularly for

¹⁷ 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.

¹⁸ Departures from the gold standard by Argentina at other times, during financial crises for example, did not suffice to avoid serious recessionary consequences.

¹⁹ For a description of the workings of the CFA franc zone, see Clement et al. (1996).

²⁰ This account draws heavily on Hernández-Catá et al. (1998).

countries that are in a better position to benefit from a devaluation. For example, some countries are more likely to face large shocks that require a real exchange rate adjustment. 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. Finally, highly credible policymakers would be in a more favorable position to take advantage of the option to devalue, as the negative effects of the devaluation on inflationary expectations would be lower.

Under different conditions, it would be difficult for countries 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.²¹

A high degree of dollarization of financial assets and liabilities provides another reason why some economies may not benefit from devaluations. 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. That is, for highly (de facto) dollarized economies, it is ultimately difficult for banks to insulate themselves from devaluation risk. Thus, a devaluation may result in major disruptions in the financial sector. As observed in a variety of recent currency crises from Mexico in 1994 to the East Asian crises of 1997, devaluations in a context of weak banking systems and large foreign exchange exposure in the private sector can damage the financial health of banks and firms, sharply disrupting real activity.²² This implies that devaluation as a policy option may be prohibitively costly for highly dollarized economies, and that moving to full dollarization would not entail the loss of an important policy tool.²³

²¹ Note, however, that 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.

²² See Lane et al. (1999) for a review of the Asian crises.

²³ 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.

Finally, it is noteworthy that, while the United States enjoys now a strong reputation for monetary stability and the US dollar is globally accepted and desired, this situation could eventually change. Two or three decades ago, the US dollar was perceived as weaker than the deutsche mark, for example, although this did not affect the global demand for dollars significantly. Therefore, one exit option from a currency board system is to change the currency to which the domestic currency is pegged. While the desirability of the U.S. dollar is likely to continue in the foreseeable future, the nearly permanent nature of a decision like dollarization through a bilateral or multinational agreement makes it worthy of consideration.

F. Lender of Last Resort function and Financial System Stability

The paper has already argued that one potential benefit of full dollarization is the elimination of currency mismatch throughout the entire economy, so that sharp devaluations cannot cause or aggravate a banking crisis, as was the case in many recent currency crises.²⁴ However, full dollarization could impair the lender-of-last-resort (LLR) function and hence the central bank response to financial system emergencies.

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. 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. In the case of a generalized loss of confidence, the authorities would be unable to guarantee the whole payments system or to fully back bank deposits. Ultimately, the ability to print money as needed is what allows a central bank to guarantee beyond any doubt that all claims (in domestic currency) will be fully met under any circumstances. Once the ability to print money ceases to exist, limits to the LLR function appear.

The ability to respond to a bank run in a dollarized economy would also depend on the nature of the disturbance. If the run involved a flight to quality within the domestic banking system, it could be accommodated by action of the monetary authorities to withdraw liquidity from strong banks and provide it to the weaker institutions. However, if the emergency involved a run from the whole domestic banking system and into dollar assets held abroad, it would require that the authorities held large liquid dollar assets relative to the total banking system liabilities. In the latter case, a fully dollarized economy would have less

²⁴ Banking crises may of course be a cause of currency crises, but in general the causality runs in both directions. On these "twin crises", see Kaminsky and Reinhart (1999).

flexibility to respond if it operates with less international reserves (as would be the case, other things equal, if foreign exchange reserves have been “spent” to redeem the stock of domestic currency).

Currency boards can create base money only to the extent that they accumulate reserves, so they are almost as tightly constrained as would be the monetary authorities in a dollarized economy. It is significant, however, that in important currency board cases 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 operations by a central bank would be necessarily limited, they can be helpful in a situation of stress in financial markets. In the case of the run on the Argentinean peso during the 1995 “tequila” crisis, for example, the Argentinean monetary authorities were able to partially accommodate the run out of peso deposits into dollars held abroad as well as dollar cash.²⁵ By temporarily reducing their reserve coverage of the money base, they could increase the issuance of dollar cash and provide the dollar credits the banks needed to stay afloat. In the wake of the 1997 attack on the Hong Kong dollar, the Hong Kong Monetary Authority (HKMA) introduced in September 1998 a discount window to provide short-term liquidity to banks in a more flexible way and at lower cost than under previous arrangements. The new system is expected to reduce the volatility in short-term domestic interest rates. The maximum volume of rediscounts is bounded, however, and the HKMA fully backs rediscounts with foreign exchange.

The scope for accommodation to financial crises in a currency board is inevitably restricted. Indeed, even without the restrictions imposed by a currency board system, the ability of a central bank to find a way out of a financial crisis by resorting to printing money alone 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.

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 banking system, which presumably would be encouraged by dollarization, would also reduce the danger of a weakened LLR, both because those banks could indirectly bring support from foreign central banks, and because depositors’ confidence on the financial backing of those institutions would be significantly higher. These effects

²⁵ See Baliño, Bennett and Borensztein (1999).

may be stronger than the more limited ability to perform LLR functions under certain circumstances.

Certain measures could be taken to strengthen the banking system and make it more resilient to runs.²⁶ For example, setting higher liquidity requirements and securing contingent credit 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 lowered²⁷ (Table 2).

There are 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.²⁸

It seems inherent to the nature of banking crises that only public support would be consistently available in the event it is needed. This suggests that some form of official assistance with the LLR function could help mitigate this type of risk. This could be provided by international organizations or even the United States. One suggestion has been to establish a mechanism to apply the return of seigniorage by the United States to the creation of a fund that provides LLR functions.

²⁶ Of course, improving supervision and regulation would help to strengthen the banking system, but those are initiatives that should be followed whether the economy is dollarized or not.

²⁷ During the "tequila," bank deposits declined by less than 20 percent.

²⁸ See IMF, 1999a.

Table 2. Argentina—Liquid Resources in the Financial System

	December-94		June-99	
	In billions of US dollars	As percent of deposits	In billions of US 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

Source: IMF staff estimates and Estudio Broda.

1/ Assuming the full use of 33 percent 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 $(A+B+C)/(1-\text{liquidity requirements rate})$

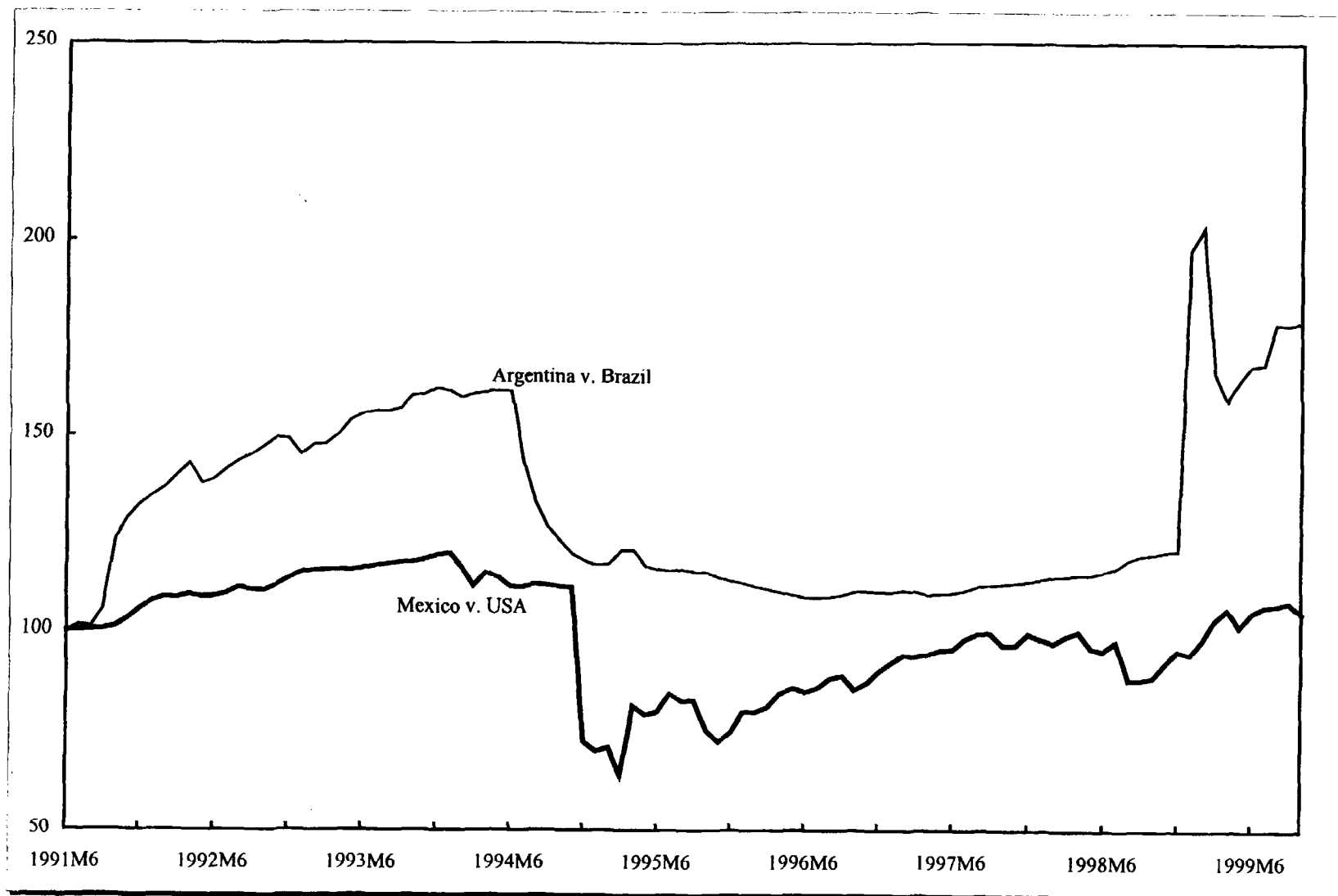
III. DOLLARIZATION AND MERCOSUR

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. 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.

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).²⁹ The widest misalignments 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 larger or lesser extent, pegged to the US dollar. While it is difficult to anticipate the volatility of this bilateral rate after the floating of the *real*, one would expect the volatility to be higher than in the period when both countries were pegging to the US dollar but much lower than during the periods of highest volatility that occurred in the context of hyperinflations or currency crises. Some degree of flexibility in real bilateral exchange rates is desirable to achieve changes in relative prices and macroeconomic balance. 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. We have seen that much of the Argentina-Brazil bilateral real exchange rate volatility in recent years seems to be associated with anti-inflationary programs, a type of demand shock. It can be expected that a unified exchange rate policy would eliminate most of these types of shocks and hence this justification for bilateral real exchange rate fluctuations. The pattern of supply shocks, however, is more likely to be the same under different exchange rate regimes and so is of more interest. The evidence suggests that neither demand nor supply shocks are positively correlated across Mercosur countries. This implies that changes in intra-Mercosur exchange rates may be

²⁹ 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.

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



Source: International Monetary Fund, International Financial Statistics.

appropriate responses to shocks.³⁰ Alternatively, the implication is that fixing these exchange rates could increase real output volatility.³¹

Highly volatile bilateral real exchange rates may nonetheless be problematic for economies that are closely integrated in the context of a regional trade agreement, both for economic and political reasons. The impact of bilateral real exchange volatility depends on how extensive the trade links between the economies are. While Mercosur economies were once fairly closed, this has been changing rapidly in the last decade. Yet the tendency towards "regionalization" of international trade in this region 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.³² 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 3). 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.

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. This volatility would affect investment and growth in the affected sectors and may also give rise to protectionist pressures. Even if the fluctuations in the bilateral real exchange rate represent 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.

³⁰ The methodology is that of Bayoumi and Eichengreen (1994), updated with data through 1998 by Arora (1999).

³¹ The same analysis suggests that there is also a weak basis for an OCA comprising the United States and other countries in the hemisphere.

³² See, for example, Levy Yeyati and Sturzenegger (1999).

Table 3. 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	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports	Total	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.

As regards the compatibility of Mercosur arrangements with dollarization, two issues must be underscored. First, dollarization would not significantly alter the current situation, with Argentina maintaining a firm peg to the US dollar and Brazil having a floating exchange rate. Perhaps the main difference would be in terms of the near irreversibility of dollarization compared to the currency board arrangement. Second, 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 would need to be considered.³³

IV. CONCLUSIONS

What is the balance of costs and benefits of full dollarization? Our analysis has been perhaps frustratingly two-handed. In our view, this is inevitable, given the complexity of the issue and the current state of knowledge about it. We can at least estimate the potential benefits of lower interest rates and the cost of forgone seigniorage revenues. But many of the most important considerations, such as the value of keeping an exit option, are the least quantifiable.

Which countries are likely to benefit from dollarization? The first group of candidates is formed by countries that are highly integrated with the United States in trade and financial relations (and are candidates to form what the economics literature calls an optimal currency area). Yet most countries in Latin America are quite different from the United States in their economic structure and would probably not benefit greatly from dollarization unless it took place in the context of a deep market integration (in European Union style). The current discussion (and this article) centers on a different group of candidates: emerging market economies exposed to volatile capital flows but not necessarily close, in an economic sense, to the United States. For this group, the more the U.S. dollar is already used in their domestic goods and financial markets, the smaller the advantage of keeping a national currency. For an economy that is already extremely dollarized, seigniorage revenues would be small (and the cost of purchasing the remaining stock of domestic currency also would be small), the exposures of banks and businesses would make devaluation financially risky, and the exchange rate would not serve as a policy instrument because prices would be "sticky" in dollar terms. In such cases, dollarization may offer more benefits than costs.

³³ This point is made by Eichengreen (1999).

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