Journal of Economic Integration
17(3), September 2002; 502-516

# Costs and Benefits of Dollarization: Evidence from North, Central, and South America

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## Abstract

*This paper examines the macroeconomic costs and benefits of dollarization. Economic theory suggests that the main benefit is enhanced price stability, while the main cost is higher business-cycle volatility if the dollarizing country's output is not sufficiently correlated with that of the U.S. Data from 1950-1997 are used to estimate various cost and benefit measures for nineteen North, Central, and South American countries. The paper finds that these cost and benefit factors exhibit substantial variability across the countries considered. Furthermore, they are strongly positively correlated: countries (such as Peru) that have a lot to gain from dollarization, also have a lot to lose from it; while countries (such as Canada) that have little to lose by dollarizing, have also little to gain by it. The empirical results can be also used to compare net benefits for individual countries, showing, for example, that Chile is a better dollarization candidate than Mexico.*

• **JEL Classifications:** E42, F36, F42

• **Key Words:** Dollarization, Monetary Union, Optimum Currency Area

## I. Introduction

Despite cautious comments by the previous U.S. Treasury Secretary (Summers, 1999), enthusiasm for "dollarization," the replacement of national currencies in the Americas by the U.S. dollar, is spreading fast and for a growing number of countries. In fact, dollarization has been endorsed by both academic economists

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(Barro, 1999) and the business community (Wall Street Journal, 1999a, 1999b; Financial Times, 1999).

This paper examines the main macroeconomic costs and benefits of dollarization.[1] Economic theory suggests that the main benefit for a dollarizing country is enhanced price and exchange-rate stability, and thus a lower inflation rate. At the same time, dollarization rules out the possibility of independent monetary policy, so it may contribute to business-cycle volatility if the dollarizing country's output is not sufficiently correlated with that of the U.S.

Annual data from the 1950-1997 period are used to estimate various measures for these costs and benefits for nineteen North, Central, and South American countries (including the U.S.). The paper finds that these cost and benefit factors vary substantially across the countries considered. Furthermore, costs and benefits are strongly *positively* related, making net benefits very difficult to compute. In a nutshell, countries (such as Peru) that have a lot to gain from dollarization, also have a lot to lose from it; while countries (such as Canada) that have little to lose by dollarizing, have also little to gain by it. The empirical results can also be used to compare between countries, pointing out, for example, that Chile is a better dollarization candidate than Mexico.

The rest of the paper is organized as follows. Section 2 uses a recent model of monetary policy in order to illustrate the theoretical derivation of costs and benefits from dollarization. Section 3 describes the empirical methodology and the data. Section 4 presents and discusses the empirical results, and section 5 concludes.

## II. Theoretical Background

The theoretical framework follows the "New Keynesian" monetary policy model of Clarida, Gali, and Gertler (1999).[2] Suppose there are $N$ economies indexed by $i$ ($i$=1,2,...,$N$). The loss function of each economy's monetary authority

[1]The related literature is growing very rapidly. For example, Bayoumi and Eichengreen (1994) examine whether NAFTA is an optimum currency area, while Eichengreen (1998) asks the same for Mercosur. Eichengreen (2000) argues that success or failure for dollarization will depend on its timing. See also Berg and Borensztein (2000) and LeBaron and McCulloch (2000).

[2]Very similar results can be derived from the "older" monetary policy model based on the work by Kydland and Prescott (1977), Barro and Gordon (1983), and Rogoff (1985), and used to evaluate the effects of monetary integration by Alesina and Grilli (1992, 1994), DeGrauwe (1994), and Alesina and Wacziarg (1999). The main differences between these models and the present formulation (see below) is a more modern aggregate supply specification and a richer dynamic structure.

takes the form

$$L_i = \frac{1}{2}E_t\left\{\sum_{j=0}^{\infty}\beta^j[\alpha_i(y_{i,t+j}-k_i)^2+\pi_{i,t+t}^2]\right\} \quad (1)$$

where $y$ denotes output (in deviations from trend), $\pi$ is inflation, $\alpha$ is the relative weight on output deviations $(\alpha>0)$, $\beta$ is the discount factor, $E$ denotes mathematical expectation, and $k$ is the output target. As usual, it is assumed that $k\geq 0$ because of distortions such as imperfect competition or taxes.

For each economy, aggregate supply is given by a "New Keynesian" expectations-augmented Phillips curve

$$\pi_{i,t} = \lambda_i y_{i,t} + E_t\pi_{i,t+1} + u_{i,t}, \quad (2)$$

where $\lambda_i>0$, $u_{i,t}=\phi_i u_{i,t+1}, z_{i,t}$, $0<\phi_i<1$ and $z_{i,t}\sim iid(0,\tau_i^2)$. This can also be written in aggregate-supply form as

$$y_{i,t} = \vartheta_i(\pi_{i,t}-E_t\pi_{i,t+1})+v_{i,t}, \quad (3)$$

where $\vartheta_i = 1/\lambda_i$ and $v_{i,t}=-u_{i,t}/\lambda_i$.[3] Note that this implies $v_{i,t}=\phi_i v_{i,t}-\lambda_i^{-1}z_{i,t}$, and define .

Without dollarization, when each economy's central bank can pursue an independent monetary policy, minimizing (1) subject to (2) leads to the following outcome ("discretion"):

$$\pi_{i,t}^{IND} = \alpha_i q_i u_{i,t} + \frac{\alpha_i}{\lambda_i}k_i = \alpha_i q_i \lambda_i v_{i,t} + \frac{\alpha_i}{\lambda_i}k_i \quad (4)$$

and

$$y_{i,t}^{IND} = \lambda_i q_i u_{i,t} = \lambda_i^2 q_i v_{i,t} \quad (5)$$

where the *IND* superscript denotes outcomes under independent monetary policy, and $q_i = 1/[\lambda_i^2+\alpha_i(1-\beta\phi_i)]$. The macroeconomic performance of the economy will be characterized by average ("trend") inflation equal to

[3]This specification of the Phillips curve goes back to Calvo (1983). For more recent examples see Rotemberg (1987), Roberts (1995), and Gali and Gertler (1999).

$$\bar{\pi}_i^{IND} = \alpha_i k_i / \lambda_i \tag{6}$$

and output ("business-cycle") volatility

$$Var(y_i^{IND}) = \lambda_i^4 [\lambda_i^2 + \alpha_i (1 - \beta\phi_i)]^{-2} \sigma_i^2 \tag{7}$$

As expected, the inflation bias is increasing with the weight on output ($\alpha$), the output target ($k$), and the slope of the aggregate supply $\vartheta = 1/\lambda$. It is also apparent that there is a trade-off between average inflation and output variability:[4] if $\alpha$ is very low (so that the central bank is very "conservative" in the sense of assigning a higher relative weight to inflation than to output), average inflation will be very low, but output very unstable.[5]

Next, consider dollarization: assume the $N$ economies form a monetary union, monetary authority is delegated to the U.S. ($i$=1), and the dollar is adopted by all $N$ economies. Then, at equilibrium, $\pi_{i,t}^{DOLL} = \pi_{1,t}^{DOLL} = \pi_{1,t}^{IND}$, $\forall i$, where $\pi_{1,t}^{IND}$ is given by (4). Substituting into (3), we get

$$y_{1,t}^{DOLL} = -\alpha_1 q_1 (1 - \phi_1) v_{1,t} + v_{i,t}, \tag{8}$$

where the *DOLL* superscript refers to outcomes under dollarization. Note that, with dollarization, economy $i$'s output is affected not just by its own output shock, $v_{i,t}$, but also by the U.S. shock, $v_{1,t}$. The reason, of course, is that the U.S. shock is "exported" to the dollarized countries via the conduct of monetary policy by the Federal Reserve.

How does the macroeconomy perform under dollarization ? Average inflation will be given by

$$\bar{\pi}_i^{DOLL} = \alpha_1 k_1 / \lambda_1 \tag{9}$$

and business-cycle volatility by

$$Var(y_i^{DOLL}) = \alpha_1^2 q_1^2 (1 - \phi_1)^2 \sigma_1^2 + \sigma_i^2 - 2\alpha_1 q_1 (1 - \phi_1) \rho_{i,1} \sigma_i \sigma_1 \tag{10}$$

[4]As pointed out by Taylor (1979), there is also a trade-off between output variability and inflation variability, given here by: $Var(\pi_i^{IND}) = \alpha_t^2 \lambda_t^2 [\lambda_t^2 + \alpha_t (1 - \beta\phi_i)]^{-2} \sigma_t^2$ a low $\alpha$ reduces the volatility of inflation but raises that of output. See Fuhrer (1997).

[5]Rogoff (1985) examines the optimal value for $\alpha_i$. Fischer and Summers (1989) show that a similar trade-off exists if the source of uncertainty is the central bank's inability to determine the inflation rate without error.

where $\rho_{i,1} \equiv corr(v_{i,t}, v_{1,t})$. Costs and benefits of dollarization can now be identified.

The main macroeconomic *benefit* of dollarization can be seen if we compare equations (6) and (9). From these two equations, it is apparent that dollarization will reduce a country's average inflation rate, provided the U.S. has a more "conservative" monetary authority ($\alpha_1 < \alpha_1$ and $k_1 < k_i$) and a less tempting aggregate supply ($\vartheta_1 < \vartheta_i$): $\bar{\pi}_i^{DOLL} < \bar{\pi}_i^{IND}$.

At the same time, however, comparing equations (7) and (10) shows that dollarization may very well increase output volatility: this is the macroeconomic *cost* of dollarization. From (10), this cost will be smaller, the closer $\rho_{i,1}$ is to unity. Intuitively, if business cycles in Argentina and the U.S. are very highly correlated, countercyclical monetary policy conducted by the U.S. Federal Reserve will be a very close substitute for monetary policy conducted by Argentina's central bank. In this case, dollarization by Argentina, even though it means giving up independent monetary policy, will not be very costly. If, on the other hand, Argentinean output is negatively correlated with the U.S., so that expansions in one of the two countries tend to coincide with recessions in the other, surrendering monetary policy to the U.S. will *de*stabilize Argentina by amplifying its business cycle.

## III. Data and Empirical Methodology

Two data sets are utilized in order to quantify the costs and benefits outlined above. *Data Set I* (PWT 5.6) uses real GDP and nominal exchange rates from the Penn World Tables, Mark 5.6. GDP is expressed in PPP-adjusted constant 1985 prices, as documented in Summers and Heston (1991) and updated in 1995. These series are available annually from 1950 to 1990. *Data Set II* (IFS) uses annual real GDP, in 1990 prices, and annual CPI data from the IMFs International Financial Statistics on CD-ROM. The period covered is from 1968 to 1997. Both data sets include the same nineteen American countries: Canada, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama, the U.S.A., Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela.[6]

The construction of inflation and depreciation rates is straightforward (see also

[6]Country selection has been dictated by data availability only. The methodology employed here can be used for any set of countries which may consider the option of monetary integration, such as the EU, an East Asian monetary union, a Latin American common currency, etc.

**Table 1.** Average Annual Depreciation and Inflation Rates

| $i$ | Data Set I: PWT 5.6 (1950-1990) | | Data Set II: IFS (1968-1997) | |
|---|---|---|---|---|
| | $\overline{\Delta e}$ | $\sqrt{Var(\Delta e)}$ | $\bar{\pi}$ | $\sqrt{Var(\pi)}$ |
| Canada | 0.23 | 3.47 | 5.56 | 3.31 |
| Costa Rica | 9.15 | 26.49 | 17.41 | 16.52 |
| Dominican Rep. | 6.55 | 16.82 | 14.78 | 14.77 |
| El Salvador | 3.02 | 6.97 | 12.82 | 7.76 |
| Guatemala | 4.78 | 17.01 | 11.64 | 9.97 |
| Honduras | 2.19 | 8.35 | 10.51 | 8.70 |
| Mexico | 20.14 | 39.53 | 33.82 | 34.28 |
| Panama | 0.00 | 0.00 | 3.47 | 3.87 |
| U.S.A. | 0.00 | 0.00 | 5.42 | 2.96 |
| Argentina | 258.85 | 743.91 | 317.98 | 677.67 |
| Bolivia | 516.74 | 2299.33 | 469.76 | 2143.59 |
| Brazil | 149.82 | 392.10 | 683.26(*) | 884.59(*) |
| Chile | 72.45 | 139.44 | 70.84 | 124.15 |
| Colombia | 15.78 | 15.28 | 21.21 | 6.80 |
| Ecuador | 11.99 | 21.80 | 25.70 | 18.30 |
| Paraguay | 17.50 | 29.39 | 15.50 | 9.81 |
| Peru | 273.22 | 1145.38 | 439.06 | 1467.51 |
| Uruguay | 43.50 | 40.53 | 59.56 | 28.11 |
| Venezuela | 9.15 | 28.70 | 23.83 | 25.31 |

$\Delta e_{i,t} = 100 \cdot (e_{i,t} - e_{i,t-1}) / e_{i,t-1}$, and , where is the nominal exchange rate (units of country *i*s national currency per U.S. dollar at time *t*). Averages, $\overline{\Delta e}$ and $\bar{\pi}$, and standard deviations are computed over the time periods indicated.

(*) Brazil's inflation numbers are for the 1981-1997 period.

Table 1), but the derivation of cyclical output warrants some additional discussion. Three different methods are used to detrend the output series of each country and estimate its cyclical component. The first is simple differencing, using $(GDP_{i,t} - GDP_{i,t-1}) / GDP_{i,t-1}$ as the growth rate of real GDP.

The second method is the Hodrick-Prescott (HP) filter, proposed by Hodrick and Prescott (1980) and extensively used in the business-cycle literature. Letting $y_{i,t} = ln(GDP_{i,t})$, the HP filter defines the trend component $\bar{y}_{i,t}$ as the one that minimizes

$$\sum_{t=1}^{T} (y_{i,t} - \bar{y}_{i,t})^2 + l \sum_{t=2}^{T-1} [(\bar{y}_{i,t+1} + \bar{y}_{i,t}) - (\bar{y}_{i,t} + \bar{y}_{i,t-1})]$$

for $l > 0$. The cyclical component is simply $y_{i,t} - \bar{y}_{i,t}$. Here we selected $l = 100$, the value recommended by Kydland and Prescott (1989) for annual data.

The third method makes use of the recently very popular Band-Pass (BP) filter proposed by Baxter and King (1995) and evaluated by Stock and Watson (1998) and Christiano and Fitzgerald (1999), who also compare its properties to those of the HP filter. The low pass (LP) filter $\alpha(L)$, which forms the basis for the band pass filter, selects a finite number of moving average weights $\alpha_h$ to minimize

$$Q = \int_{-\pi}^{\pi} |\delta(\omega)|^2 \, d\omega$$

where $\alpha(L) = S_{h=-K}^{K} \alpha_h L^h$ and $\alpha_K(\omega) = \sum_{h=-K}^{K} \alpha_h e^{-i\omega h}$. The LP filter uses $\alpha_K(\omega)$ to approximate the infinite MA filter $\beta(\omega)$. Define $\delta(\omega) \equiv \beta(\omega) - \alpha(\omega)$. Minimizing $Q$ minimizes the discrepancy between the ideal LP filter $\beta(\omega)$ and its finite representation $\alpha_K(\omega)$ at frequency $\omega$. The main objective of the BP filter as implemented by Baxter and King (1995) is to remove both the high frequency and low frequency component of a series, leaving the business-cycle frequencies. This is formed by subtracting the weights of two low pass filters. We define $\omega_L$ and $\omega_H$, the lower and upper frequencies of two low pass filters as 8 and 2, respectively. We therefore remove all fluctuations shorter than two or longer than eight years. The frequency representation of the band pass weights becomes $\alpha_K(\omega_H) - \alpha_K(\omega_L)$, and forms the basis of the Baxter-King filter which provides an alternative estimate of the trend component $\bar{y}_{i,t}$, and the cyclical $y_{i,t} - \bar{y}_{i,t}$.

Figures A1 and A2 in the Appendix plot, for each country and both data sets, the cyclical output components according to each of the three methods.[7] While minor differences among the results obtained by the three filters are not difficult to detect (for example, differencing generally produces the most volatile series, while the BP filter the smoothest), the main characteristics are remarkably similar. This robustness will be formally confirmed by the findings of the next section.

## IV. Empirical Results

### A. Benefits

As discussed in section 2, an economy benefits from dollarization by having a lower average inflation rate and reduced inflation variability. By definition, dollarization will also eliminate exchange-rate variability, making depreciation (or

[7]Note that Figures A1 and A2 use the same scale for all countries on the vertical axis, in order for the amplitude of cyclical output to be easily comparable.

devaluation) of the currency against the U.S. dollar impossible.[8] How important would such a benefit be in practice for the countries in our sample?

Table 1 provides an answer to this question by looking at average exchange-rate depreciation and inflation rates, over 1950-1990 and 1969-1997 respectively, for each of the 19 American countries in the sample. It is apparent that the extent of the inflation bias has varied enormously across these countries. Focusing first on exchange rates (and excluding Panama, which is already dollarized), the average *annual* depreciation rate against the U.S. dollar over 1950-1990 has ranged from 0.23% for the Canadian dollar to 516.74% for the Boliviano. Similarly, exchange-rate volatility, measured by the standard deviation of the depreciation rate, has been the smallest for Canada and the largest for Bolivia. Among the rest of the countries, Argentina, Brazil, Peru, and Chile have also labored under very unstable currencies. It is clear then that, in terms of exchange-rate stability, Bolivia, Argentina, Peru, Brazil, and Chile have the most to gain from dollarization. On the contrary, such benefits will be negligible for Canada.

The same picture emerges if one looks at price stability. Again looking at Table 1, the average *annual* inflation rate over 1969-1997 (again excluding the dollarized Panama and the U.S.) has ranged from 5.56% in Canada to 470% in Bolivia (and 683% in Brazil over 1981-1997). Inflation variability, measured by its standard deviation, exhibits virtually the same ranking, being the lowest in Canada and the highest in Bolivia. Once more the inflation bias has been most pronounced in Bolivia, Brazil, Argentina, Peru, and Chile, making these the economies that have most to gain from dollarization. Instead, the gains for Canada will be very small. The rest of the countries can be easily ranked in terms of likely benefits on the basis of their inflation and depreciation performance. For example, Mexico would stand to gain more than Costa Rica, but less than Uruguay.

**B. Costs**

If there were no costs, the evidence of Table 1 would suggest that dollarization would be beneficial for each of the countries considered, even though the extent of the benefit would differ by country. Dollarization, however, is costly because the dollarizing country, by giving up independent monetary policy, loses some of the ability to respond to output shocks and thus to smooth the domestic business cycle.

[8]Theoretically, of course, and especially in the long-run, there is no difference between the inflation and the exchange-rate results, as can be seen by combining the Purchasing Power Parity and Quantity Theory of Money relationships.

**Table 2.** Cyclical Correlations with the U.S.

| $i$ | Data Set I: PWT 5.6 (1950-1990) | | | Data Set II: IFS (1968-1997) | | |
|---|---|---|---|---|---|---|
| | $\rho^{DIFF}_{i,US}$ | $\rho^{HP}_{i,US}$ | $\rho^{BP}_{i,US}$ | $\rho^{DIFF}_{i,US}$ | $\rho^{HP}_{i,US}$ | $\rho^{BP}_{i,US}$ |
| Canada | 0.72 | 0.71 | 0.70 | 0.74 | 0.84 | 0.80 |
| Costa Rica | 0.38 | 0.49 | 0.43 | 0.55 | 0.57 | 0.69 |
| Dominican Rep. | 0.03 | –0.10 | –0.02 | 0.22 | 0.22 | 0.25 |
| El Salvador | 0.49 | 0.58 | 0.54 | 0.33 | 0.44 | 0.48 |
| Guatemala | 0.17 | 0.11 | 0.21 | 0.25 | 0.16 | 0.45 |
| Honduras | 0.50 | 0.49 | 0.51 | 0.56 | 0.52 | 0.68 |
| Mexico | 0.08 | 0.00 | 0.04 | 0.00 | –0.33 | –0.01 |
| Panama | –0.14 | –0.18 | –0.21 | –0.25 | –0.36 | –0.24 |
| U.S.A. | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Argentina | 0.08 | 0.12 | 0.05 | 0.02 | –0.01 | 0.03 |
| Bolivia | 0.35 | 0.38 | 0.31 | 0.02 | –0.00 | 0.03 |
| Brazil | –0.04 | –0.12 | –0.01 | 0.28 | 0.55 | 0.39 |
| Chile | 0.33 | 0.35 | 0.34 | 0.34 | 0.27 | 0.45 |
| Colombia | 0.22 | 0.27 | 0.29 | 0.35 | 0.48 | 0.46 |
| Ecuador | 0.03 | 0.10 | 0.06 | 0.28 | 0.19 | 0.39 |
| Paraguay | –0.07 | –0.05 | 0.01 | 0.05 | –0.04 | 0.11 |
| Peru | –0.01 | 0.02 | –0.17 | –0.10 | 0.09 | –0.18 |
| Uruguay | 0.07 | 0.11 | –0.06 | 0.02 | 0.09 | –0.09 |
| Venezuela | 0.27 | 0.37 | 0.20 | –0.16 | 0.01 | –0.23 |

Notes: $\rho_{u,US}$ is the correlation of country *i*'s cyclical component with the U.S. cyclical component. *DIFF* refers to differencing; *HP* to the Hodrick-Prescott filter, using *l*=100; *BP* to the Band-Pass filter, implemented as in Baxter and King (1995) using K=2 lags. See the text for details.

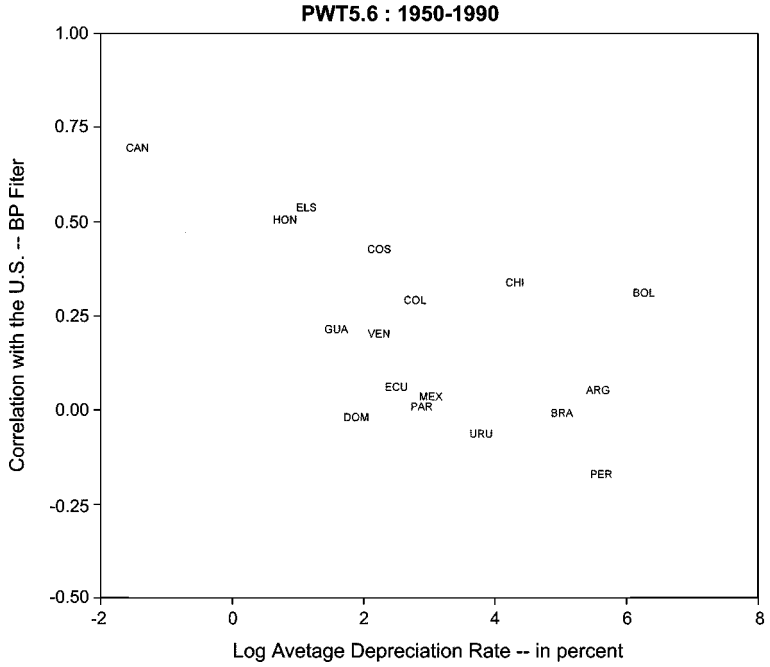
As shown in section 2, the size of the cost will depend on the correlation between the U.S. and the dollarizing economy's cyclical output.

Table 2 reports the correlation coefficient of each country's cyclical output component with that of the U.S., for the three methods outlined in section 3 (differencing, the Hodrick-Prescott filter, and the Band-Pass filter) and the two data sets used. Note that the correlations are remarkably similar across the three filtering methods, but somewhat less so between the two time periods. As expected, in every single case, Canada is by far the most highly correlated with the U.S., distantly followed by Honduras, El Salvador, and Costa Rica as the next group. The correlations are also consistently positive for Colombia, Chile, and Guatemala, while Argentina and Mexico appear to be uncorrelated with the U.S. Only Paraguay and Peru have a preponderance of negative correlations with the U.S.[9]

Table 2 suggests that the stabilization cost of dollarization will be minimal for Canada: its cyclical output is so highly correlated with the U.S. that monetary policy conducted by the Fed will be a very close substitute for that of the Bank of Canada. On the other hand, the costs of dollarization will be the highest for Paraguay and Peru, and considerable for Mexico and Argentina: their cycles are negatively correlated or uncorrelated with that of the U.S., so that delegating monetary policy to the Fed can be destabilizing for these economies.

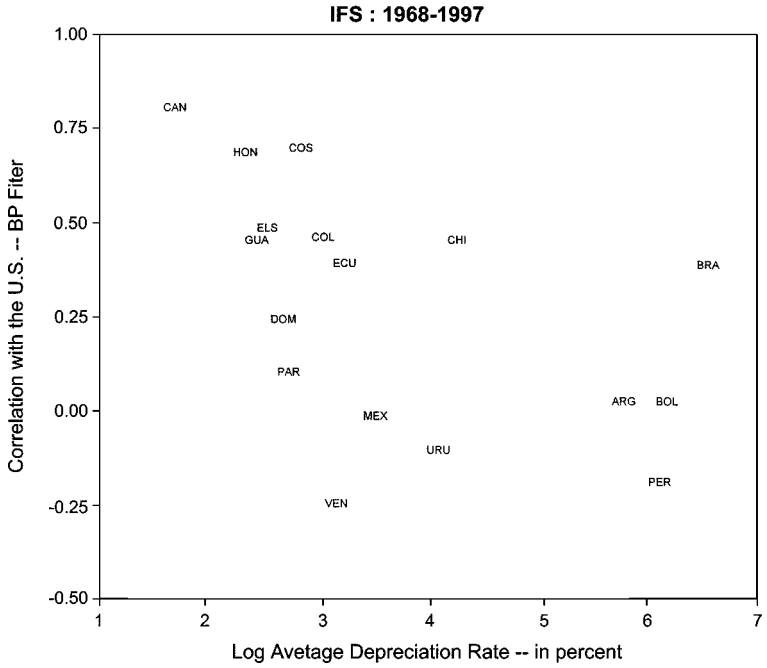
In fact, Panama provides an actual cautionary example. Panama has long dollarized, and, consistent with the model of section 2, it has a very low and stable inflation rate. From Table 1, Panama has the lowest average inflation rate over 1969-1997 after the U.S., and the least volatile inflation after the U.S. and Canada. But note from Table 2 that Panama's cyclical output is consistently negatively correlated with that of the U.S. The model of section 2 implies that, the benefits Panama is enjoying in terms of low and stable inflation, will be countered by business-cycle instability. Indeed this is the case: the variance of cyclical output in Panama is among the highest in the sample (see Figures A1 and A2), and four to

**Figure 1.** Cyclical Correlation with the U.S. vs Average Depreciation Rate: 1950-1990




[9]Only Bolivia and Venezuela show sizable difference between the two time periods. In both cases, positive correlations for 1950-1990 become virtual zeros or negative for 1969-1997.

**Figure 2.** Cyclical Correlation with the U.S. vs Average Inflation Rate: 1968-1997




six times higher than that of the U.S. depending on the filter used.

## C. Relationship between Costs and Benefits

Assessing whether dollarization is beneficial requires joint evaluation of costs and benefits. This is facilitated by Figures 1 and 2 which plot the correlation of each country's (BP-filtered)[10] cyclical output with that of the U.S. against (the logarithm of) each country's average inflation rate or depreciation rate.[11] Therefore, dollarization benefits increase along the horizontal axis, while dollarization costs decrease as we move up along the vertical axis. It is worth pointing out that, despite the different time periods and the use of different benefit measures (inflation vs depreciation), Figures 1 and 2 reach remarkably similar conclusions.

Perhaps the most interesting of these conclusions is that, for the countries in our sample, there is a strong *positive* relationship between costs and benefits of dollarization: high benefits, as a consequence of high inflation or depreciation

[10]Cyclical components based on differencing or the HP filter give very similar results (see footnote 12), so their results are not graphed here to preserve space.

[11]Panama is not included in the Figures because it is already dollarized, so (i) its depreciation rate with respect to the U.S. dollar is zero, and (ii) its long-run inflation rate has not been determined independently as in the other 17 economies, and thus it is not directly comparable with theirs.

rates, tend to be associated with high costs, in the form of low (or negative) cyclical correlations with the U.S.; while low benefits generally correspond with low costs.[12] This makes the dollarization question particularly difficult to answer because it implies that the countries for which the benefits will be high are also the ones for which the costs are likely to be high; while countries for which dollarization will have small costs will also experience small benefits. Put differently, countries (such as Peru) that have a lot to gain from dollarization, also have a lot to lose from it; while countries (such as Canada) that have little to lose by dollarizing, have also little to gain by it.

Theoretically, future research is needed to investigate the reasons for the positive relationship between the costs and benefits of dollarization found in the present paper. Determining whether this relationship is a historical accident (more or less unique to our sample) or implied by fundamental economic theory (and thus expected to hold generally) will have important implications for the theory and optimal design of monetary integration.[13]

It is still possible, however, to make statements about *individual* countries, and compare them to others in terms of the cost-benefit calculus. Both Figures 1 and 2, for example, suggest that Chile is a better candidate for dollarization than Mexico. Chile has more to gain, because Chile's inflation bias has been bigger than Mexico's, and less to lose, as its cyclical correlation with the U.S. is higher than Mexico's. Note, however, that, because of the strong positive relationship between costs and benefits noted above, few such unambiguous comparisons can be made.

## V. Conclusions

This paper examined the macroeconomic costs and benefits of dollarization. Economic theory suggests that the main benefit of dollarization depends on the size of a country's inflation bias, while the stabilization cost depends on the cyclical correlation between the dollarizing country and the U.S. Using two sets of data over the combined 1950-1997 period, and three methods of calculating the cyclical component of output, measures of these costs and benefits were estimated

[12]Specifically, using the notation of Tables 1 and 2, $corr(r^{DIFF}_{i,US}, \overline{\Delta e}) = -0.584$, $corr(\rho^{HP}_{i,US}, \overline{\Delta e}) = -0.053$, $corr(\rho^{BP}_{i,US}, \overline{\Delta e}) = -0.623$, $corr(\rho^{DIFF}_{i,US}, \bar{\pi}) = -0.526$ and $corr(\rho^{HP}_{i,US}, \bar{\pi}) = -0.313$ and $corr(\rho^{BP}_{i,US}, \bar{\pi}) = -0.516$.

[13]I am indebted to an anonymous referee for pointing this out. While there is nothing in the theoretical model of section 2 that predicts this positive relationship, it may be possible to derive it from an open-economy model that takes into account the importance of trade with the U.S. for a small open economy.

for nineteen countries of North, Central, and South America.

The empirical results show that the estimated costs and benefits, while varying widely across the countries in the sample, are strongly *positively* related: countries which stand to benefit the most from dollarization in terms of price stability, tend to be also the countries for which the stabilization costs of delegating monetary policy to the U.S. will be the highest. In other words, countries (such as Peru) that have a lot to gain from dollarization, also have a lot to lose from it; while countries (such as Canada) that have little to lose by dollarizing, have also little to gain by it. This means that the net benefits of dollarization are very difficult to compute and compare. Despite this general positive relationship between costs and benefits, however, it is still possible to make statements about individual countries. The results of this paper, for example, point out that Chile is clearly a more promising dollarization candidate than Mexico.

These conclusions should be qualified for two (at least) reasons. First, dollarization itself may enhance the structural similarities of the economies adopting it and raise some of the low or negative cyclical correlations estimated here. This is the argument made by Frankel and Rose (1998) about the "endogeneity" of optimum currency area criteria (but see also Eichengreen, 1992; and Krugman, 1993). Indeed, a similar argument has been made in defense of the European Monetary Union and the euro. The extent to which this is likely to happen, and therefore the extent to which the business-cycle costs measured here may be exaggerated, is one of the most promising areas of future research.

Finally, it has to be acknowledged that dollarization is, at least partly, a political process, involving more than strictly economic decisions. This is almost always the case with similar international arrangements, other examples of which are NAFTA, the accession of China to the WTO, and membership in the EU and the *euro* for various European countries. The fact that political issues are highly important, however, does not change the economic parts of the equation. If political criteria are more prominent than economic ones, an economy may dollarize when costs exceed benefits, or may be prevented from dollarizing when the net benefit is positive. In this case, the economic criteria may not be a good predictor of actual dollarization. However, the economic effects will always depend on these criteria. Thus, whether dollarization will benefit or harm a country's economy depends on the economic criteria only.

Date accepted: July 2001

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