POLICY RESEARCH WORKING PAPER 2340

Currency Substitution in Latin America

Lessons from the 1990s

Pere Gomis-Porqueras
Carlos Serrano
Alejandro Somuano

What causes currency substitution (foreign money substituting for domestic money)? What significance has it had in recent banking crises? And what is the relationship between currency conversion and macroeconomic volatility in Latin America?

The World Bank
East Asia and Pacific Region
Poverty Reduction and Economic Management Sector Unit
May 2000

Public Disclosure Authorized

Summary findings

Gomis-Porqueras, Serrano, and Somuano study how agents in Latin America allocate their balances between dollar–denominated and domestic currency–denominated accounts. They empirically determine the causes of currency substitution, its significance in recent banking crises, and the link between currency substitution and volatility in macroeconomic aggregates.

Their findings: The ratio of dollar deposits to broad money is strongly influenced by expectations of depreciation. They show that depositors in Latin America face some uncertainty and frictions when making their portfolio decisions.

They explore the macroeconomic consequences of a dollarized economy. In particular, they find that, in the presence of currency substitution, past banking crises are good predictors of future crises. In other words, having a highly dollarized economy increases the response of the banking system when there is a bad shock, which halts the outflow of capital. Once an economy is in a crisis, however, having more dollar-denominated deposits in the banking system increases the probability of a longer crisis in the future, because it increases exchange rate exposure in an already weak banking system.

Finally, they show that the volatility of macro-economic variables linked to the financial system increases whenever the economy becomes more dollarized, which in turn makes the choice of monetary targets more difficult.

This paper — a product of Poverty Reduction and Economic Management Sector Unit, East Asia and Pacific Region — is part of a larger effort in the region to understand the macroeconomic effects of dollarization. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Marjorie Puentes, room I4-218, telephone 202-473-9621, fax 202-522-2086, email address mpuentes@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The authors may be contacted at gomis@eco.utexas.edu, cserrano@worldbank.org, or somuano@eco.utexas.edu. May 2000. (31 pages)

Currency Substitution in Latin America: Lessons from the 1990s*

Pere Gomis-Porqueras

Economics Department

University of Texas at Austin

Carlos Serrano

World Bank

Alejandro Somuano

Economics Department

University of Texas at Austin

*The authors would like to thank Bruce Smith, Alex Minicozzi, Li Gan, Subal Kumbhakar, Gil Mehrez, Maria Soledad Martínez-Peria and the participants of the University of Texas Macroeconomic seminar.

and store of value. Finally, many authors define currency substitution as a situation in which domestic money demand is influenced by foreign economic variables.

Another term that has been subject to different interpretations is *dollarization*. Throughout the 1980s, it was common to treat the terms "currency substitution" and "dollarization" as indistinguishable. Both terms described a situation where local residents demand dollars. This misunderstanding follows perhaps from the fact that most of the studies of currency substitution in the 1980s were focused on Latin America, and it is well documented that the substitution of currencies in Latin American countries favored the U.S. dollar. Currently, the term dollarization is also used to describe the replacement, by monetary authorities, of the national currency by the dollar as legal tender.[1]

While there exists a good theoretical understanding of the implications of having two monies, the empirical consequences are still an open issue. It is commonly believed that allowing a foreign currency to coexist with the domestic one provides the opportunity for greater domestic intermediation, promotes financial sophistication by increasing the number of available assets, and increases credibility by raising the cost of monetary indiscipline. Furthermore, the rapid development of foreign currency-denominated operations in the banking system affects the stability of monetary aggregates, the dynamics of exchange rates, and government revenues from seigniorage.[2] Specifically, the higher the demand elasticity of substitution between monies, the larger the shift from foreign to domestic currency as a result of the fall in expected inflation, and thus the higher the fall in the nominal exchange rate. Currency substitution also reduces monetary independence, which may then endanger the ability of central bankers to implement stabilization programs. Finally, currency substitution lessens the central bank's ability to act effectively as a lender of last resort.

The purpose of this paper is to determine empirically the causes and significance of currency substitution in Latin America, as well as to explore some of its macroeconomic consequences in the last decade. Using panel data for thirteen Latin American countries from 1990 to 1998, we estimate a static (one-period) portfolio balance model, where optimal bank deposits denominated in both local currency and dollars are chosen simultaneously. Our results reveal that the dollar deposits to broad money ratio is strongly influenced by depreciation expecta-

[1] In the current debate of adopting the dollar as legal tender, a new distinction has developed: unilateral full dollarization, meaning a country adopts the U.S. dollar on its own, versus the unlikely but theoretically feasible multilateral agreement of an economic block with the U.S. dollar as the common currency.

[2] A good discussion of seigniorage losses due to the adoption of a foreign currency is provided in Fischer (1982).

tions of the domestic currency and the level of income. Using longer time series for a subset of three countries, we find that the probability of a banking crisis contemporaneously decreases with the degree of currency substitution. Once in a banking crisis, however, the higher the degree of currency substitution, the higher the probability of a future crisis. Finally, we find that volatility in macroeconomic aggregates linked to the financial system increases with the degree of currency substitution.

2 Currency Substitution in Latin America

During the last three decades, currency substitution —partial dollarization— has been an important phenomenon in several Latin American countries. The process began in the early 1970s fueled by financial reforms. As capital and foreign exchange controls were lifted, the US dollar began to gradually replace local currencies in the domestic citizens' portfolio. In several countries the observed pattern has been as follows; the dollar has first been used as a store of value as residents maintained increasing portions of their wealth in dollar-denominated assets in order to avoid possible losses brought by macroeconomic instabilities. The dollar has then been used as a unit of account, mainly in the real estate sector, where prices have increasingly been quoted in dollars as a way to differentiate between changes in relative prices and changes in overall inflation. And finally the dollar has been used as medium of exchange.

Today many transactions in several Latin American countries are actually carried out in dollars. Figure 1 shows the evolution of the partial dollarization phenomena in Latin America during the last decade. Currency substitution, however, has not been widespread across the region. While in some countries like Brazil, Chile and Venezuela currency substitution has not been a significant phenomenon, in others, such as Bolivia, Uruguay and more recently Ecuador, dollar deposits have been a very important component of monetary aggregates (see Figure 2, 3, 4 and 5). Moreover, we find Panama, and more recently Ecuador, where the dollar has been adopted as legal tender.

The corresponding empirical literature on currency substitution has primarily focused on the study of its main determinants. In general, several measures of macroeconomic instability have been used as explanatory variables —proxies for the expected depreciation being the most commonly used— in reduced money demand equations that allow for holdings of foreign currency. Throughout the literature we find several case studies: Ortiz (1983) on Mexico, Ramirez-Rojas (1985) on Argentina, Mexico and Uruguay, Marquez (1987) on Venezuela, Rojas-Suarez (1991) on Peru, and Clements *et al.* (1992) on Bolivia. Some of these papers have

found significant and positive, although not always statistically different from zero, signs on the coefficients for expected depreciation of the domestic currency and inflation in regressions where the ratio of foreign currency deposits in the financial system is used as a proxy for the degree of dollarization. These results suggest then that depositors run away from local currencies whenever they expect losses associated with their domestic currency.

However, there have been some cases where we find an increase in the degree of dollarization while the country is following a successful macroeconomic stabilization program. Bolivia, for example, experienced an increase in dollarization after the macroeconomic stabilization program of 1985. In fact, Clements *et al.* (1992) find that interest rate differentials and other measures for expected depreciation performed poorly when used as explanatory variables for the degree of dollarization for the 1986-1991 period. Other countries in the region have experienced similar episodes where the level of foreign currency deposits (FCD) increased after a decrease in inflation and expected depreciation. These episodes represent a puzzle for those that have tried to explain FCDs using the theory of optimal portfolio composition. Two possible hypotheses have been provided. The first one is given by Guidotti and Rodriguez (1991). They conclude that dollarization in Latin America has been characterized by hysteresis. That is, once domestic residents substitute part of their monetary holdings with dollars, it is costly for them to return to the local currency, even after domestic inflation decreases. The authors claim that agents will only switch back to the domestic currency if the expected value of domestic money balances exceeds the cost of doing so, something that has rarely happened in Latin America. Consequently, they argue that the degree of dollarization in Latin America depends not only on changes in the rate of inflation but also on its level. The second hypothesis is proposed by Clements *et al* (1992). They argue that episodes of high inflation will remain in the memory of domestic residents for long periods and are assigned more weight in comparison to episodes of low inflation. Therefore, they maintain that several lags have to be used when regressing inflation against dollarization.

Finally, institutional arrangements also need to be considered when studying currency substitution in Latin America. Many countries in the region have imposed restrictions on FCDs at different periods. Mexico allowed the public to maintain FCDs in 1977, prohibited them in 1982, and partially allowed them back in 1985. Bolivia allowed them in 1973, prohibited them in 1982, and reinstituted them in 1986. Finally, Peru permitted them in 1986, forbid them in 1985, and reopened them in 1988. Governments have prohibited these deposits because they impose important limitations on governmental actions. First, the existence of FCD's complicates monetary policy since monetary targeting becomes more difficult. Second, it creates a

loss of seigniorage for the government. Third, it jeopardizes the central bank's role as a lender of last resort. Finally, it has a large impact on the banking system.

3 An Alternative Approach to Currency Substitution

When estimating a single money demand equation, it is usually assumed that the money market is in equilibrium, and that the money stock is exogenous. It is well documented, however, that this is not always the case, since the money multiplier is built into the money supply, and some of its components are determined by the public. As broader definitions of money are considered, more sophisticated multipliers are needed. In order to avoid this identification problem, two alternatives can be considered. One can estimate a simultaneous equation model, with one equation specifying the money demand and a feedback rule describing the money supply. On the other hand, one can consider a single money demand equation where the dependent variable is the ratio of the two different monies. The effect of the multiplier is then canceled. In this paper, we follow the latter approach since it is rather difficult, if not impossible, to find a common monetary feedback rule for all the countries considered in this study.

Additionally, in order to take into account the increasing openness of Latin American economies during the 1990s, we consider two additional assets: foreign and domestic bonds. As financial markets further develop the number of available assets increases, thus affecting the agent's portfolio decision.

Consider the following standard money demand equations

$$log(m_{it}^d) = \beta_0 + \beta_1 log(y_{it}) + \beta_2 I_{it}^d + \beta_3 I_{it}^f \tag{1}$$

$$log(m_{it}^f) = \gamma_0 + \gamma_1 log(y_{it}) + \gamma_2 I_{it}^d + \gamma_3 I_{it}^f \tag{2}$$

where m_{it}^d and m_{it}^f denote the real demand for deposits by domestic residents in country i at time t in local and foreign currency, respectively; y_{it} is the national income in country i at time t; I_{it}^d is the domestic interest rate in country i at time t; and I_{it}^f represents the interest rate paid on deposits in U.S dollars in country i at time t. Subtracting equation (1) from (2), we obtain the following expression

$$log\left(\frac{m_{it}^f}{m_{it}^d}\right) = \delta_0 + \delta_1 log(y_{it}) + \delta_2 I_{it}^d + \delta_3 I_{it}^f. \tag{3}$$

If we further assume that the uncovered interest parity condition holds in every country[3]— i.e, $I^d = I^f + \hat{E} \ \forall i, t$, where $\hat{E}$ is defined as the expected appreciation of the domestic currency against the U.S dollar—, we can write equation (3) as follows

$$log\left(\frac{m_{it}^f}{m_{it}^d}\right) = \delta_0 + \delta_1 log(y_{it}) + (\delta_2 + \delta_3) I_{it}^d - \delta_3 \hat{E}_{it}. \tag{4}$$

Notice that if we now define the ratio $R_{it} = m_{it}^f/(m_{it}^f + m_{it}^d)$ and broad money in real terms as $M_3/P \equiv m^f + m^d$, it is easy to show that

$$log\left(\frac{m_{it}^f}{m_{it}^d}\right) = log\left(\frac{R_{it}}{1 - R_{it}}\right). \tag{5}$$

where R is the ratio of foreign money to broad money.

Combining equations (4) and (5) and allowing country-specific frictions in the uncovered interest parity condition, i.e. $I_{it}^d = I_{it}^f + \hat{E}_{it} + \epsilon_{it}$, we derive an estimable money demand equation

$$log\left(\frac{R_{it}}{1 - R_{it}}\right) = \alpha + \theta_1 log(y_{it}) + \theta_2 I_{it}^d + \theta_3 \hat{E}_{it} + \epsilon_{it}. \tag{6}$$

Equation (6) suggests that the substitution of domestic currency by foreign currency can be partially explained by the expected appreciation of the domestic currency against the U.S dollar. Notice that if the two demands for money, domestic and foreign, are identical then the coefficients should be statistically equal to zero. Therefore, any departure of the estimates from zero captures the frictions that agents face when making the portfolio decision, demonstrating that the different monies are not identical.[4]

Alternatively, our specification can be interpreted as a binary choice model where agents have only two options when depositing their savings: domestic currency or dollar denominated accounts. Notice that if we define the right hand side of equation (6) as $X\theta$, and we define

$$Prob(D = 1) \equiv R = \frac{1}{1 + e^{-X\theta}}$$

it is possible to recover our specification. R then can be interpreted as the probability of depositing funds in a U.S dollar denominated account (D=1), while $1 - R$ can be interpreted as the probability of depositing funds in a domestic-currency-denominated account (D=0).

[3]This assumption is suggested by Bordo and Choudri (1982).

[4]If we have flexible exchange rates and there are no frictions in the economy, agents are indifferent with respect to their money holdings.

Accordingly, the coefficients of the explanatory variables of equation (6) can be interpreted as the marginal effects on the probability of depositing money in a dollar-denominated account.

3.1 Data and Estimation Results

The data for this study are drawn from several sources: the 1999 International Financial Statistics (IFS) published annually by the International Monetary Fund (IMF), Levine, Loayza and Beck (1998), Caprio and Klingebiel's (1999) data set, and several central banks.

The countries included in the study are Argentina, Belize, Bolivia, Costa Rica, Dominica, Ecuador, El Salvador, Honduras, Mexico, Nicaragua, Paraguay, Peru and Uruguay. Due to data limitations we concentrate on the 1990-1998 period.[5] The resulting sample has 117 observations (13 countries, 9 years).

The variables used in the estimation of equation (6) were calculated as follows. The ratio of FCDs to domestic currency deposits measured at the end of the period was obtained from the IFS, from some central banks, and from the IMF Western Hemisphere Department.[6] The nominal GDP per capita was computed by dividing the nominal value of GDP by total population and then multiplying it by the end-of-period exchange rate.[7] The interest rates were proxied by the deposit rates reported by the IFS. Finally, the proxy used for expected appreciation was calculated by subtracting the U.S. gross rate of inflation from the domestic gross rate of inflation. The summary statistics for the sample are presented in Tables 1 and 2.

Although each country shows important peculiarities, some stylized facts can be derived. The first important thing to notice is that the dollarization ratio has been, in general, steadily increasing over time. While in 1990 the average ratio for these countries was 0.23, in 1998 rose to 0.37. A second interesting fact is that this increase comes in a period when the inflation rate has demonstrated a dramatic decrease. In 1990 the average inflation rate for the thirteen countries was 1,353% (315% without counting the hyperinflation episodes of Argentina, Nicaragua and Peru); in 1998 this figure was 10%. This fact supports the idea that the dollarization process in Latin America follows a hysteresis process, since the optimal portfolio theory would predict a return to the domestic currencies once their expected value increases with lower inflation differentials. In fact, Figure 1 shows that the inflation differential

[5]Although information on most monetary and macroeconomic variables is available since 1970 for all countries, we could only obtain data on FCDs for all these countries for the nine years.

[6]FCD include all dollar denominated bank accounts including domestic and foreign banks.

[7]These variables were obtained from the IFS.

and the dollarization ratio tend to move in opposite directions when inflation is decreasing.

The results of our partial dollarization exercise are presented in Table 3. As expected, the coefficient of expected appreciation is negative and significant, corroborating the hypothesis of currency substitution being dependent on expected relative returns between currencies. Notice that the foreign interest rates for the period in consideration have been relatively stable which accentuates the correlation between $\hat{E}$ and I_d. The coefficient of income is positive and significant: high-income economies tend to have a higher degree of currency substitution. A possible explanation is given by Chang (1994) where postulates that access to dollar-denominated accounts is reserved to wealthy agents. In Latin America, there are usually some fees associated with these type of accounts. Consequently, one would tend to believe that only high-income people can afford to deposit in foreign currency. Finally, although a negative coefficient was expected for the domestic interest rate, this turned out to be positive, though not significantly different from zero.

In order to check the robustness of our specification when studying currency substitution, suggested by equation (6), we run several auxiliary regressions. We first estimated the fixed-effects and the random-effects models and compared their estimates. Usually with small samples such as ours, the magnitude, sign and significance of the estimates vary widely from one specification to the next. However, our model has similar estimates and significance levels, suggesting a robust specification (see Table 3).[8] Theoretically speaking, we are only interested in the fixed-effects panel since we are not randomly drawing countries from our sample. In order to statistically test that the fixed effects specification is the preferred one, we performed the Haussman specification test. Table 3 reports the Haussman statistic used to test the validity of the fixed-effects versus the random-effects model. The null hypotheses is accepted at 95% of significance.

We also considered the possibility of endogeneity for some of the regressors. Since the model comes from a partial equilibrium model we assume income to be exogenous. The possible endogenous variables in the model are the real interest rate and expected appreciation. Using one-period lagged values as instruments for each of these two variables, the Haussman endogeneity test was performed. The critical statistical values for the interest rate and expected appreciation are 2.02 and 0, respectively.[9] Consequently, we reject the endogeneity of

[8]In order to check that our results do not depend on superfluous (non-significant) explanatory variables, we excluded them from the regression and found that the sign and significance level corresponding to the rest of the variables describing the dollarization phenomena did not substantially change (see Table 4).

[9]The actual statistic was -0.20, as is in the case whenever the variance-covariance elements are very close

these regressors at 95% of significance. Unfortunately, since our data set is fairly small, the Haussman test has not much power.

Finally, if the theory is to have any validity, any deviation in the demand for money must be necessarily temporary. Hence a key assumption of the theory is that the errors are stationary. We checked for cointegration by studying the residuals from equation (6) and found that they are indeed stationary. However, the significance of this test should not be considered conclusive since we only have nine residuals.

After considering all of the auxiliary regressions, we conclude that our specification is fairly robust, explaining the relative movements between dollar and domestic-denominated accounts. Such movements are explained by appreciation expectations of the domestic currency and income, demonstrating that depositors in Latin America face some uncertainty and frictions when making their portfolio decisions.

4 Currency Substitution and Banking Crises

In the 1980s and early 1990s a number of countries experienced severe banking crises. Such proliferation of large-scale banking sector problems has raised widespread concern, as banking crises disrupt the flow of credit to households and enterprises, reducing investment and consumption and possibly forcing viable firms into bankruptcy. Banking crises may also jeopardize the functioning of the payments system and, by undermining confidence in domestic financial institutions, they may cause a decline in domestic savings and/or a large-scale capital outflow. Finally, a systemic crisis may force banks to shut down. Therefore, preventing the occurrence of systemic banking problems is undoubtedly a major concern of policymakers.

While a number of studies have recently analyzed various episodes of banking sector distress, most of them are case studies, and just a few present econometric analyses. The purpose of this section is to formally investigate the effect of currency substitution on banking crises.

A variety of theoretical models try to explain the link between currency and banking crises. One chain of causation runs from balance of payment problems to banking crises. For example, Mishkin (1996) argues that if a devaluation occurs, the position of banks could be weakened further if a large share of their liabilities is denominated in foreign currency. On the other hand, models such as Velasco (1987) point to the opposite causal direction; i.e, financial sector problems give rise to the currency collapse.

to zero.

There seems to be consensus that the effect that currency substitution may have on the banking system is ambiguous. On the one hand, a high level of dollar deposits in an economy in which the dollar is used as a store of value but not as a medium of exchange will result in higher exchange rate risk in banks' balance sheets, since these banks will take deposits in dollars but will typically lend in domestic currency.[10] On the other hand, a system that allows the coexistence of domestic currency deposits and FCDs can help prevent a capital outflow by increasing the buffer that banks have, increasing their ability to absorb bad shocks. In this section we will try to determine which effect dominates.

As preliminary evidence, we investigate how the probability of a banking crisis is influenced by the degree of dollarization in the economy. Using the Caprio *et al* (1999) database which reports the banking crises for a large set of countries, we can then calculate the probability of a banking crisis for all the countries in our study given a certain level of dollarization. In order these conditional probabilities, we then divide our sample between high and low dollarized economies.[11] We then find that the probability of a banking crisis, of any kind, increases with the degree of dollarization. In particular, the probability of a banking crisis given that the economy is highly dollarized is 0.381. On the other hand, if the economy is not highly dollarized the probability of a banking crisis is 0.130. We then investigate how the degree of dollarization affects the nature of a banking crisis. Using Caprio's classification and considering all the countries in our study, we compute the probability of having a severe banking crisis given a certain degree of dollarization.[12] We find that the probability of a severe banking crisis increases with the degree of dollarization, presumably because of higher exposure. In particular, the probability of a severe banking crisis given that the economy is highly dollarized is 0.302. On the other hand, if the economy is not highly dollarized the probability of a severe banking crisis is 0.130. Note, the probability of having major banking problems in a highly dollarized economy is roughly three times larger than in a mildly dollarized economy.

In order to present stronger evidence, it is necessary to introduce additional controls. Following Demirgüç-Kunt and Detragiache (1998), we consider a multivariate logit specification. This approach can identify a number of interesting correlations. However, since we are

[10]This may weaken the Central bank's ability to be an efficient lender of last resort.

[11]When the average is above 30% for the period 1990 to 1998, the economy is classified as highly dollarized. This classification is suggested by Baliño, Bennett and Borenstein (1997).

[12]Caprio *et. al.* (1999) classify the banking crises into two major groups: systemic banking crises where most or all of banking system capital is eroded, and mild banking crises.

estimating a reduced form equation without support from a specific structural model, such correlations should be interpreted with caution because they do not specify the direction of causality.

The presence of individual effects in panel data complicates the estimation of any limited dependent variable model, since the fixed-effects can not be consistently estimated for a fixed number of observations. In order to avoid this problem we may consider a limited dependent variable model for each country. Unfortunately, due to data limitations, this alternative can only be studied for a subset of countries.[13]

Within a macroeconomic framework, previous work on banking crises has not systematically addressed the issue of persistence. Some authors ignore the issue altogether, others consider observations up to the first crisis, and finally some studies introduce the length of the crisis as an indicator of persistence. We propose a more formal framework that will allow us to study the effect of a previous crisis by considering a two-stage Markov process. In other words, we allow for the possibility that the previous outcome may affect future crisis.[14] As a result, we consider the following conditional probability,

$$P(Y_t|Y_{t-1}) = F(X_t\beta + X_tY_{t-1}\alpha)$$

where $P(Y_t|Y_{t-1})$ is the probability that a banking crisis takes place given what happened in the previous period, F is the logistic distribution function, X_t is the set of explanatory variables, and β and α are the parameters to be estimated. This conditional probability can be thought of in terms of the following Markov transition probabilities

$$P_{01} = F(X_t\beta)$$

$$P_{11} = F(X_t\beta + X_tY_{t-1}\alpha).$$

If shocks to the banking system persist, we expect that the predicted probabilities for P_{11} to be greater than P_{01} whenever we have two consecutive crises. Unfortunately, the information set on which we condition the probabilities is restricted, since there exists high correlation among the X_tY_{t-1} variables.[15] Therefore, the Markov transition probabilities are restricted to the interaction between the degree of currency substitution and the past banking crisis. Furthermore, due to data limitations we consider one control at a time. The variables we

[13]For the majority of the countries in our panel, long time series on dollar accounts are not available.

[14]See Amemiya (1997) for a complete discussion on Markov processes.

[15]Since we have a small data set, the correlations among the X_tY_{t-1} are greater than the correlations among the X_t's because of reduced variance among the variables.

control for are: the growth rate of GDP, the real interest rate (RIR), the growth rate of exports (EXP), the growth rate of inflation (INF), the growth rate of industrial output (OUT) and the growth rate of private credit (PRC). The transitional probabilities were estimated separately for Bolivia, Mexico and Peru.[16] The estimation results are presented in Tables 5, 6 and 7.

Our estimates show that banking crises are persistent over time. The corresponding predicted probabilities for P_{11} in all cases are much larger than P_{01}, always predicting the event of two consecutive crises. Furthermore, the coefficient corresponding to the persistence effect is always positive and significantly different from zero at the 95% level. The effect of the contemporaneous degree of currency substitution is always negative, although it is not significant in all models. On the other hand, the degree of currency substitution in the previous period is always positive and statistically significant. This evidence suggests that the higher the degree of currency substitution today, the lower the probability of a banking crisis today. High dollarization may increase intermediation, thus increasing the response of the banking system in the event of a bad shock, stopping the outflow of capital. On the other hand, once the crisis has occurred, having more dollar-denominated deposits in the banking system increases the probability of a longer crisis in the future, which may correspond to increasing exchange rate exposure in an already weak banking system.

In order to check the robustness of the persistence phenomena, we considered an alternative specification:

$$P(Y_t = 1) = F(X_t\beta + Y_{t-1}\eta)$$

where η captures the significance of persistence when describing the probability of a banking crisis.

As in the previous case, our results show that banking crises have a strong component of persistence. In all models, the persistence effect is positive and statically significant at 90% confidence levels. Similarly, the contemporaneous degree of currency substitution is always negative and is significant in some models. The estimation results for Bolivia, Mexico and Peru are presented in Tables 8, 9 and 10, respectively.

[16] In order to capture periods in which FCD were prohibited we introduce a dummy called $FORCED$.

5 Currency Substitution and Volatility

According to many authors, from Keynes to Friedman, interactions between the conduct of monetary policy and the financial system create considerable scope for endogenous volatility and indeterminacy. In particular, in order for agents to transact with fiat money they must have beliefs about its future exchangeable opportunities, thus allowing room for endogenous volatility. Azariadis (1981) in his classic paper of self-fulfilling prophecies showed that the possibility of sun spot equilibria allows for endogenous fluctuations. Following this argument, introducing another asset —dollar-denominated deposits— into the financial system may induce higher volatility in the macroeconomy.

There are several theoretical models in which the interaction of fiat money and the financial system yields endogenous volatility. This class of models is usually characterized by the rate of return dominance on fiat money, as well as frictions in the economic environment where complete insurance is not possible. For example, Bencivenga, Huybens and Smith (1998) study which policy is "best" for maintaining a constant price level in an open economy.[17] Indeterminacies and endogenous volatility that arise in a nonstochastic model have important consequences because they give us information on how exogenous shocks are transmitted through the economy. Furthermore, if agents are risk averse any policy that reduces volatility, other things equal, will result in a welfare improving situation.

In terms of policy advice, the effect of volatility on macroeconomic aggregates is of paramount importance for a large number of Latin American countries. Many of these countries have adopted stabilization programs designed by the IMF and World Bank that require the targeting of certain macroeconomic variables. Theoretically speaking, there is not a clear understanding of the general equilibrium effects of certain targeting policies. As a result, it would be better to target aggregates that are less volatile.

The previous literature on currency substitution has not provided much empirical evidence linking the degree of dollarization and volatility. The studies that have addressed the issue focus on money demand and money multipliers. Baliño *et al* (1997) argue that money demand appears to be more volatile in highly dollarized economies, since the coefficient of variation on the velocity of money is markedly higher than that of moderately dollarized economies. They find mixed evidence with respect to the volatility of the money multiplier.

In this paper we attempt to provide additional evidence linking volatility and dollarization.

[17] A "good" policy is defined whenever it reduces indeterminacies and endogenous volatility since they all attain the same welfare levels.

In particular, we explore the effects of dollarization on volatility across countries. The measure of volatility we use for each variables is defined as its standard deviation divided by its mean, so cross-country comparisons can be made. The level of dollarization was proxied by the mean of the ratio of FCDs to broad money.[18] As preliminary evidence we computed the correlations between the degree of dollarization (R) and broad money (BM), the exchange rate (EXC), per capita GDP, real interest rates (RIR) and the inflation rate (INF). Our results confirm that volatility increases as the degree of dollarization in the economy rises. Furthermore, the correlations range from 0.43 for broad money to 0.31 for per capita GDP. The correlations corresponding to several macroeconomic variables are reported in Table 11.

Unfortunately, our sample is very small; we just have 13 observations (one for each country) therefore we do not have a robust statistic to test our null hypothesis. In order to avoid the small sample problem, we performed several bootstraps. We randomly choose 13 pairs from our original data set and compute the corresponding correlation repeating the process a thousand times.[19] As a result, we get an empirical distribution of the resulting correlations. We then use the empirical distribution to statistically test the null hypothesis that higher dollarization is associated with higher volatility.

Our results reveal that the variables most closely linked to the banking sector (interest rates and inflation) have a statistically positive correlation with the level of dollarization at the 90% level.[20] The characteristics of the empirical distributions corresponding to the bootstrap correlations are presented in Table 12. This may suggest that some volatility arises whenever the economy becomes more dollarized, although our test does not indicate the direction of causality. Therefore, having a highly dollarized economy may make the targeting of monetary aggregates a rather difficult task.

6 Conclusions

In this paper we study how agents in Latin America allocate their balances between dollar-and domestic-denominated accounts. In particular, we show that the relative movements between these accounts are explained by devaluation expectations of the local currency and GDP. As a

[18]Therefore, our data set consists of thirteen observations, one for each country.

[19]The pairs consisted of the degree of dollarization and the measure of volatility for each macroeconomic variable under study.

[20]Since the inflation rate was computed using the CPI and most of the goods in the basket are purchased using local currency the volatility of the price level may be accentuated.

result, we are able to demonstrate that depositors in Latin America do face some uncertainty and frictions when making their portfolio decisions.

We also explore some of the macroeconomic consequences of a dollarized economy. In particular, we find that past banking crises are good predictors of future crises. Our findings suggest that an increase of dollarization today is associated with a contemporaneous decrease in the probability of a banking crisis. In other words, having a highly dollarized economy increases intermediation, thus increasing the response of the banking system in the case of a bad shock which halts the outflow of capitals. On the other hand, once the crisis has occurred, having more dollar-denominated deposits in the banking system increases the probability of a longer crisis in the future, because it increases exchange rate exposure in an already weak banking system.

Finally, we show that the volatility of macroeconomic variables linked to the financial system increases whenever the economy becomes more dollarized, which in turn makes the choice of monetary targets more difficult.

References

[1] Agénor, P.R. and Khan, M.S. 1992. "Foreign Currency Deposits and the Demand for Money in Developing Countries." *IMF Working Paper.* WP/92/1, Washington, DC.

[2] Amemiya, T. 1997. *Advanced Econometrics.* Ed. Harvard University Press, Cambridge Massachusetts.

[3] Azariadis, C. 1981. "Self-Fulfilling Prophecies" *Journal of Economic Theory.* 25, pp. 380-391.

[4] Baliño, T., Bennett, A. and Borensztein, E. 1997. "Monetary Policy in Dollarized Economies." *Occasional Paper. IMF.*

[5] Bencivenga, V., Huybens, E. and Smith, B. 1998. "What to Stabilize in the Open Economy?: Some Notes on a Problem of Keynes." *Manuscript.* University of Texas.

[6] Bordo, M. and Choudri E. 1982. "Currency Substitution and Demand for Money: Some Empirical Evidence for Canada." *Journal of Money, Credit and Banking.* 14, pp. 48-57.

[7] Calvo, G.A. and Végh, C.A. 1992. "Currency Substitution in Developing Countries: an Introduction." *Revista de Análisis Económico.* 7 (1), pp. 3-28.

[8] Caprio, G. and Klingebiel, D. 1999. "Database of Systemic and Non-Systemic Bank Insolvencies from the 1980s Onwards." *World Bank.*

[9] Chang, R. 1994. "Endogenous Currency Substitution and Inflationary Finance." *Journal Money, Credit and Banking.* 26(4) pp. 903-916.

[10] Clements, B. and Schwartz, G. 1992. "Currency Substitution: the Recent Experience of Bolivia." *IMF Working Paper.* Washington, DC.

[11] Demirgüç-Kunt, A. and Detragaiche, E. 1998. "The Determinants of Banking Crises in Developing and Developed Countries." *IMF Staff Papers.* 45 (1) 1998.

[12] Fischer, S. 1982. "Seigniorage and the Case for a National Money." *Journal of Political Economy.* 90(2), pp. 295-313.

[13] Guidotti, P. and Rodriguez, C. 1991. "Dollarization in Latin America: Gresham's Law in Reverse?" *IMF Working Paper.* Washington, DC.

[14] Handa, J. 1988. "Substitution Among Currencies: a Preferred Habitat Hypothesis." *International Economic Journal.* 2(2), pp. 41-61.

[15] International Monetary Fund. *International Financial Statistics*, IMF, Washington, D.C. Various Issues.

[16] Levine, R, Loayza, N. and Beck, T. 1999. "Financial Intermediation and Growth: Causality and Causes." *Economic Growth Research.* World Bank.

[17] Marquez, J. 1987. "Money Demand in Open Economies: a Currency Substitution Model for Venezuela." *Journal of International Money and Finance.* 6(2), pp. 167-78.

[18] McKinnon, R.I. 1985. "Two Concepts of International Currency Substitution." in Conolly, M.D., and McDermott, J., eds. *The Economics of the Caribbean Basin.* New York, Praeger, pp. 101-13.

[19] Miles, M. 1978. "Currency Substitution, Flexible Exchange Rates, and Monetary Independence" in Michael Bruno and Boris Pleskovic, eds. *Annual World Bank conference on development economics* Washington DC: World Bank, 1996, pp. 29-62.

[20] Mishkin, F. 1996. "Understanding Financial Crises: A Developing Country Perspective" *NBER Working Papers* 5600, pp. 45.

[21] Ortiz, G. 1983. "Currency Substitution in Mexico: the Dollarization Problem." *Journal of Money, Credit and Banking.* 15(2), pp. 174-85.

[22] Ramirez-Rojas, C.L. 1985. "Currency Substitution in Argentina, Mexico and Uruguay." *IMF Staff Papers.* 32(4), pp. 629-67.

[23] Rojas-Suárez, L. 1992. "Currency Substitution and Inflation in Peru." *Revista de Análisis Económico.* 7 (1), pp. 153-76.

[24] Velasco, A. 1987. "Financial Crises and Balance of Payment Crises: A Simple Model of the Southern Cone Experience." *Journal of Development Economics.* 27(1-2), pp. 263-83.

Appendix

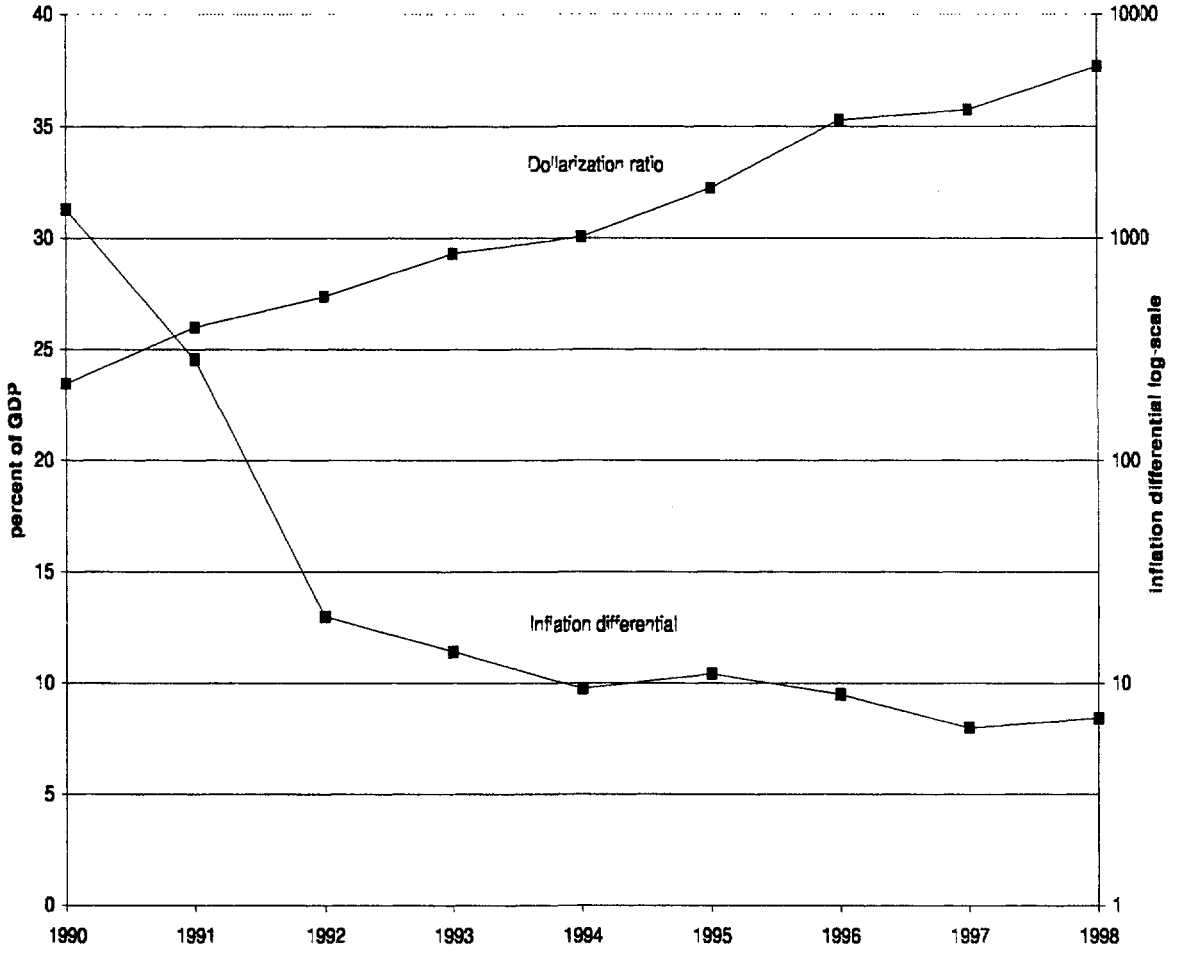

Figure 1: Aggregate degree of dollarization and inflation rate differential for the region.

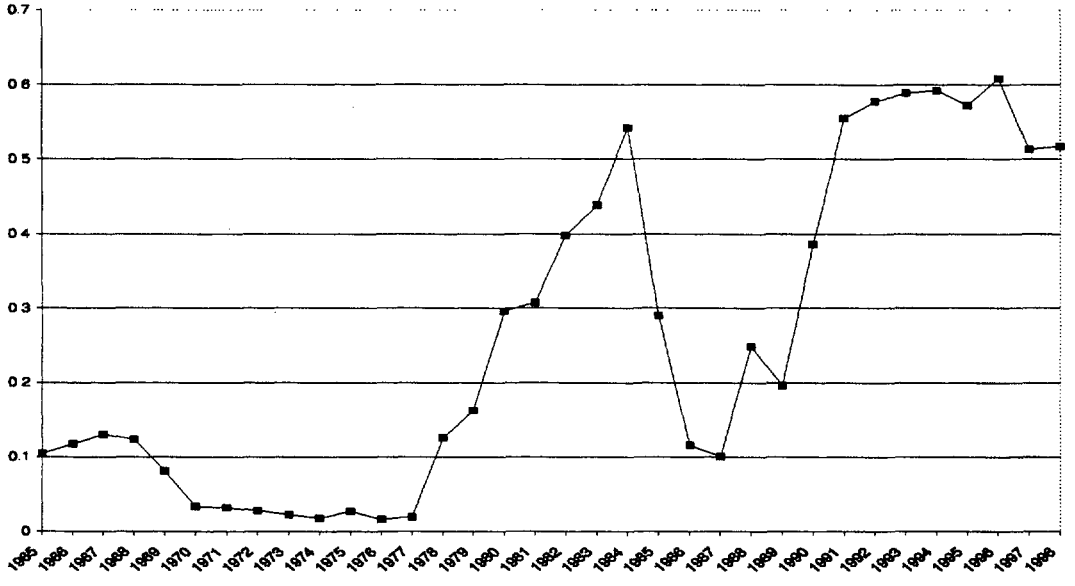

Figure 2: Peru's FCD to broad money for 1965-1998.

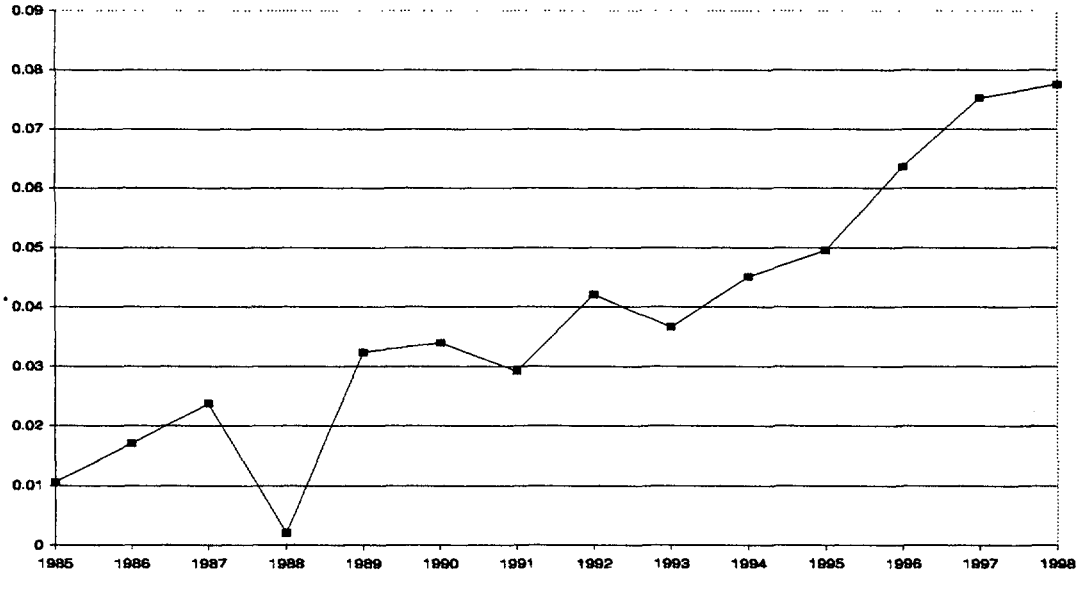

Figure 3: Salvador's FCD to broad money for 1985-1998.

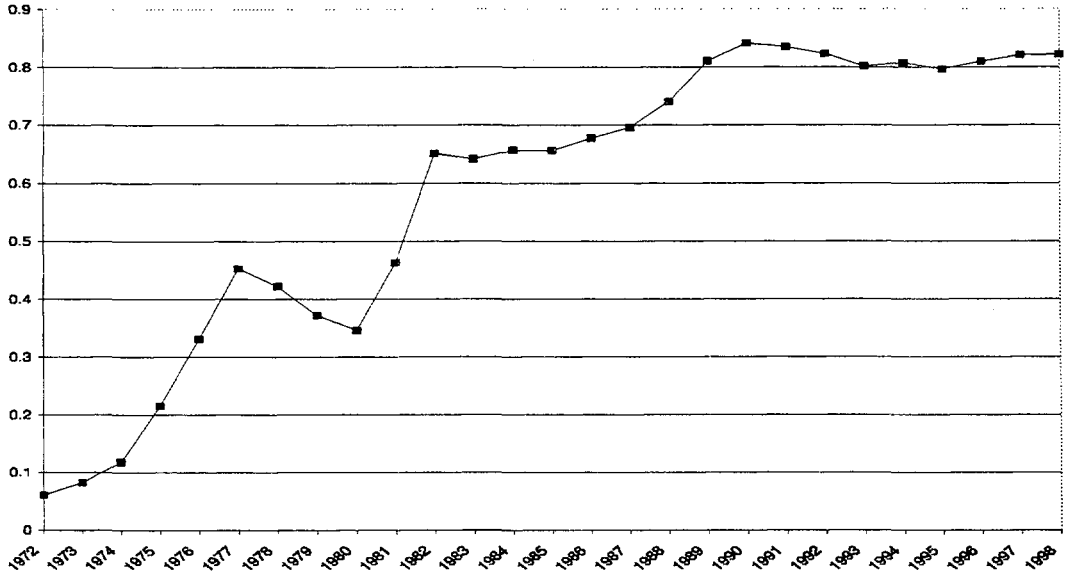

Figure 4: Uruguay's FCD to broad money for 1972-1998.

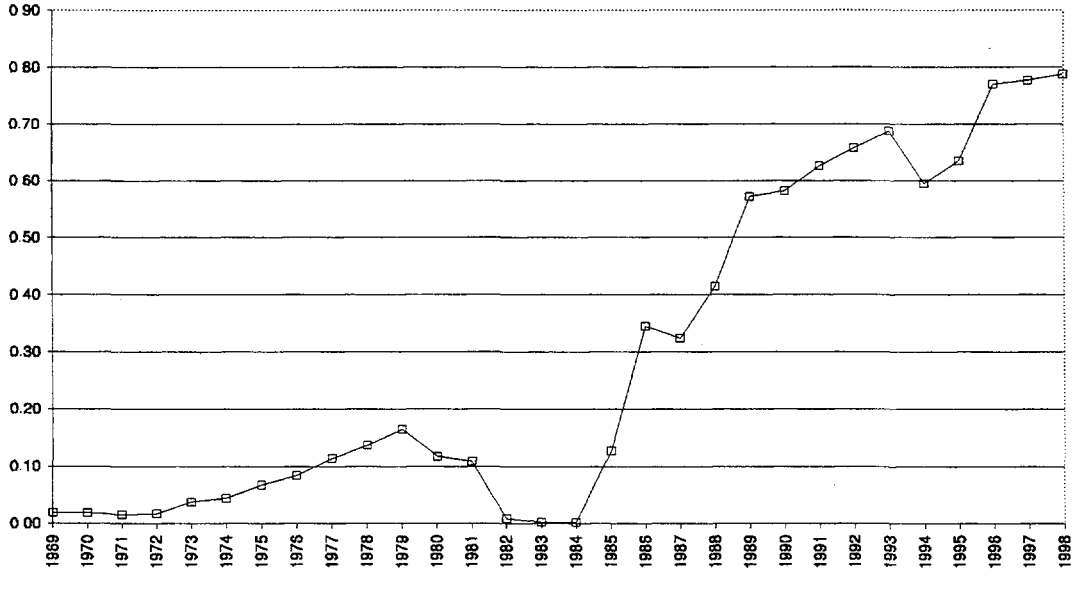

Figure 5: Bolivia's FCD to broad money for 1969-1998.

Table 1: **Summary Statistics by Year**

Year	R (%)	GDP	$\hat{E}$	I^d
1990	23.46	1030.00	1348.20	1555.01
	(24.61)	(731.42)	(2792.29)	(4738.67)
1991	25.99	1214.90	290.40	326.40
	(25.87)	(1046.07)	(804.09)	(757.45)
1992	27.37	1423.68	22.91	37.78
	(25.74)	(1318.28)	(23.81)	(45.11)
1993	29.30	1547.85	16.83	23.04
	(26.36)	(1390.03)	(17.81)	(18.29)
1994	30.05	1508.33	12.06	19.51
	(24.79)	(1332.98)	(12.55)	(12.16)
1995	32.24	1539.13	13.81	17.16
	(25.37)	(1335.08)	(12.90)	(9.77)
1996	35.27	1702.81	11.82	20.16
	(27.06)	(1503.50)	(10.33)	(12.41)
1997	35.73	1916.64	8.62	17.41
	(27.06)	(1688.65)	(9.28)	(9.77)
1998	37.66	1831.59	8.51	14.13
	(27.20)	(1654.12)	(9.59)	(6.23)

Standard deviations are presented in parentheses.

Table 2: **Summary Statistics by Country: 1990-1998**

	Country	R (%)	GDP	$\hat{E}$	I^d
1.	Argentina	41.74	4877.09	277.99	183.28
		(5.76)	(1056.55)	(763.43)	(500.77)
2.	Belize	1.486	1785.73	-0.73	8.64
		(0.88)	(152.50)	(1.83)	(0.47)
3.	Bolivia	67.97	606.22	8.24	19.66
		(8.03)	(92.61)	(4.33)	(3.98)
4.	Costa Rica	30.38	1661.45	14.51	18.42
		(4.53)	(266.75)	(5.66)	(4.85)
5.	Dominica	1.81	213.81	-0.62	4.07
		(0.96)	(30.17)	(1.65)	(0.13)
6.	Ecuador	13.12	868.18	34.47	38.86
		(10.23)	(165.16)	(11.32)	(6.22)
7.	El Salvador	5.03	1017.64	8.63	13.87
		(1.78)	(296.61)	(5.65)	(2.42)
8.	Honduras	13.21	490.85	17.539	13.80
		(9.49)	(155.86)	(7.98)	(4.08)
9.	Mexico	13.77	2495.70	17.73	19.83
		(3.43)	(494.86)	(9.66)	(8.59)
10.	Nicaragua	47.18	307.00	1166.48	11.45
		(14.94)	(43.33)	(2558.20)	(0.90)
11.	Paraguay	32.33	1092.07	14.47	19.78
		(7.49)	(150.84)	(8.46)	(3.59)
12.	Peru	54.57	1353.25	894.19	310.77
		(6.83)	(465.58)	(2471)	(799.86)
13.	Uruguay	77.62	3041.46	50.57	44.99
		(2.81)	(1039.13)	(34.04)	(26.83)

Standard deviations are presented in parentheses.

Table 3: **Estimation Results for Latin American Countries: 1990-1998**

Specification	Variable	Estimates	t-stat	P-value
Fixed Effects (FE)	$\log(y)$	0.614	2.237	[0.027]
		(0.274)		
	I^d	0.514E-03	1.515	[0.133]
		(0.33E-03)		
	$\hat{E}$	-0.18E-03	-2.359	[0.020]
		(0.77E-04)		
Random Effects (RE)	c	-5.561	-3.154	[0.002]
		(1.763)		
	$\log(y)$	0.603	2.481	[0.013]
		(0.243)		
	I^d	0.50E-03	1.530	[0.126]
		(0.328-03)		
	$\hat{E}$	-0.17E-03	-2.295	[0.022]
		(0.76E-04)		

Adjusted R^2=0.901 (FE); and Adjusted R^2=0.887 (RE).
Haussman test for Ho: FE vs RE: $\chi^2(3)$=3.1891.
Standard errors are presented in parentheses.

Table 4: **Auxiliary Regressions**

Specification	Variable	Estimates	t-stat	P-value
Fixed Effects	$\log(y)$	0.410	1.701	[0.091]
		(0.274)		
	$\hat{E}$	-0.187-03	-1.797	[0.075]
		(0.593-04)		

Adjusted R^2=0.899 (FE).
Standard errors are presented in parentheses.

Table 5: **Estimation Results of $F(X_t\beta + X_tY_{t-1}\alpha)$ for Bolivia: 1970-1998**

Variable	(1)	(2)	(3)	(4)	(5)	(6)
R_t	-0.046	-1.406**	-0.055	-0.055	1.612	-0.06
	(0.122)	(0.558)	(0.138)	(0.149)	(1.722)	(0.175)
R_tY_{t-1}	3.692**	2.679**	3.276**	3.763**	3.302**	3.156**
	(1.299)	(1.1)	(1.204)	(1.336)	(1.242)	(1.177)
$FORCED$	1.288	0.329	0.892	1.215	8.269*	0.496
	(1.446)	(1.735)	(1.375)	(1.432)	(4.453)	(1.310)
GDP_t	-2.445**					
	(0.899)					
RIR_t		0.001**				
		(0.004)				
EXP_t			-2.067**			
			(0.791)			
OUT_t				-2.384**		
				(0.896)		
INF_t					-3.519*	
					(2.124)	
PRC_t						-1.761**
						(0.675)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 6: **Estimation Results of $F(X_t\beta + X_tY_{t-1}\alpha)$ for Mexico: 1981-1998**

Variable	(1)	(2)	(3)	(4)	(5)	(6)
R_t	-0.697	-1.403*	-3.947*	-4.104*	-1.574	-2.883
	(1.064)	(0.837)	(2.378)	(2.315)	(1.141)	(1.715.)
R_tY_{t-1}	2.378**	2.393**	2.743*	2.700*	2.422**	2.428*
	(1.150)	(1.186)	(1.494)	(1.426)	(1.218)	(1.243)
$FORCED$	-0.452	-2.058	-3.771	-2.268	-1.586	-1.315
	(1.601)	(1.842)	(2.628)	(1.720)	(1.819)	(1.431)
GDP_t	-0.474					
	(0.814)					
RIR_t		-0.030				
		(0.031)				
EXP_t			1.921			
			(1.319)			
OUT_t				3.132		
				(2.049)		
INF_t					0.009	
					(0.017)	
PRC_t						1.168
						(1.463)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 7: **Estimation Results of $F(X_t\beta + X_tY_{t-1}\alpha)$ for Peru: 1966-1998**

Variable	(1)	(2)	(3)	(4)	(5)
R_t	-3.430*	-3.067**	-3.310	-3.091**	-3.414
	(2.027)	(1.036)	(2.036)	(1.038)	(2.451)
R_tY_{t-1}	4.432**	3.988**	4.395**	3.816**	4.461**
	(1.455)	(1.355)	(1.456)	(1.444)	(1.633)
GDP_t	0.316				
	(1.468)				
RIR_t		-0.78E-3			
		(0.160E-2)			
EXP_t			0.206		
			(1.428)		
INF_t				0.105E-2	
				(0.24E-2)	
PRC_t					0.297
					(1.844)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 8: **Estimation Results of $F(X_t\beta + Y_{t-1}\eta)$ for Bolivia: 1970-1998**

Variable	(1)	(2)	(3)	(4)	(5)	(6)
R_t	-0.045	-1.462**	-0.055	-0.053	1.924	-0.058
	(0.119)	(0.571)	(0.137)	(0.141)	(1.882)	(0.167)
$FORCED$	1.482	0.33	1.013	1.43	9.289*	0.578
	(1.45)	(1.735)	(1.401)	(1.487)	(4.956)	(1.321)
Y_{t-1}	4.411**	3.196**	3.899**	4.514**	3.971**	3.759**
	(1.495)	(1.267)	(1.383)	(1.531)	(1.427)	(1.342)
GDP_t	-2.647**					
	(0.988)					
RIR_t		0.001				
		(0.004)				
EXP_t			-2.196**			
			(0.84)			
OUT_t				-2.613**		
				(0.989)		
INF_t					-4.001*	
					(2.389)	
PRC_t						-1.869**
						(0.705)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 9: **Estimation Results of $F(X_t\beta + Y_{t-1}\eta)$ for Mexico: 1981-1998**

Variable	(1)	(2)	(3)	(4)	(5)	(6)
R_t	-0.639	-1.381*	3.294	-2.592	-1.517	-1.549
	(1.164)	(0.790)	(2.158)	(1.730)	(1.095)	(1.425)
$FORCED$	-1.625	-3.259	-4.606	-3.044	-2.883	-2.468
	(2.070)	(2.298)	(3.068)	(2.113)	(2.349)	(1.843)
Y_{t-1}	3.094**	3.125**	3.216**	3.040*	3.215**	3.102**
	(1.314)	(1.407)	(1.570)	(1.551)	(1.465)	(1.422)
GDP_t	-0.541					
	(0.893)					
RIR_t		-0.023				
		(0.032)				
EXP_t			1.502			
			(1.284)			
OUT_t				1.700		
				(1.824)		
INF_t					0.006	
					(0.018)	
PRC_t						0.365
						(1.457)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 10: **Estimation Results of $F(X_t\beta + Y_{t-1}\eta)$ for Peru: 1966-1998**

Variable	(1)	(2)	(3)	(4)	(5)
R_t	-0.233	-2.511**	-0.313	-3.114**	-0.325
	(1.080)	(0.759)	(1.186)	(1.037)	(1.084)
Y_{t-1}	5.223**	5.478**	5.187**	3.900**	4.766**
	(1.541)	(2.010)	(1.556)	(1.912)	(1.488)
GDP_t	-2.961*				
	(1.515)				
RIR_t		-0.371E-3			
		(0.741E-3)			
EXP_t			-2.752*		
			(1.536		
INF_t				0.660E-2	
				(0.556E-2)	
PRC_t					-2.715*
					(1.480)

Standard errors are in parentheses.

* (**) represents 10% (5%) significance level.

Table 11: **Correlations Between Dollarization and Measures of Volatility**

Variable	Correlation
GDP	0.3218
RIR	0.3728
EXC	0.327
INF	0.3505
BM	0.4298

Table 12: **Empirical Distribution of the Bootstraped Correlations**

Variable	Max	Min	Stdev	Kurtosis	Skewness	Mean
GDP	0.93077	-0.83291	0.30858	0.52412	-0.70223	0.29112
RIR	0.96232	-0.64593	0.19342	1.61774	-0.22124	0.40419**
EXC	0.96547	-0.85496	0.30062	0.42518	-0.59701	0.30457
INF	0.96556	-0.75100	0.22892	1.28906	-0.059062	0.35579*
BM	0.94417	-0.70509	0.23255	0.78703	-0.72988	0.42009

* (**) represents 10% (5%) significance level.

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2314	Technological Leadership and Foreign Investors' Choice of Entry Mode	Beata K. Smarzynska	April 2000	L. Tabada 36896
WPS2315	Investment in Natural Gas Pipelines in the Southern Cone of Latin America	Alejandro Jadresic	April 2000	M. Salehi 37157
WPS2316	Distrubutional Outcomes of a Decentralized Welfare Program	Emanuela Galasso Martin Ravallion	April 2000	P. Sader 33902
WPS2317	Trade Negotiations in the Presence of Network Externalities	Keiko Kubota	April 2000	L. Tabada 36896
WPS2318	Regulatory Reform, Competition, and Innovation: A Case Study of the Mexican Road Freign Industry	Mark A. Dutz Aydin Hayri Pablo Ibarra	April 2000	H. Sladovich 37698
WPS2319	Externalities and Production Efficiency	Gunnar S. Eskeland	April 2000	H. Sladovich 37698
WPS2320	Does More Intense Competition Lead to Higher Growth?	Mark A. Dutz Aydin Hayri	April 2000	H. Sladovich 37698
WPS2321	Algorithms for Purchasing AIDS Vaccines	David Bishai Maria K. Lin C. W. B. Kiyonga	April 2000	P. Sader 33902
WPS2322	Self-Targeted Subsidies: The Distributional Impact of the Egyptian Food Subsidy System	Richard H. Adams, Jr.	April 2000	M. Coleridge-Taylor 33704
WPS2323	Globalization and Firms' Financing Choices: Evidence from Emerging Economies	Sergio Schmukler Esteban Vesperoni	April 2000	E. Khine 37471
WPS2324	Give Growth and Macroeconomic Stability in Russia a Chance: Harden Budgets by Eliminating Nonpayments	Brian Pinto Vladimir Drebentsov Alexander Morozov	April 2000	H. Makarenko 87832
WPS2325	Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?	James R. Barth Gerard Caprio, Jr. Ross Levine	April 2000	A. Yaptenco 31823
WPS2326	How Urban Concentration Affects Economic Growth	Vernon Henderson	April 2000	R. Yazigi 37176
WPS2327	How the Republic of Korea's Financial Structure Affects the Volatility of Four Asset Prices	Hong G. Min Jong-goo Park	April 2000	P. Rathan-Raj 33705

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS2328	Social Transfers and Social Assistance: An Empirical Analysis Using Latvian Household Survey Data	Branko Milanovic	April 2000	P. Sader 33902
WPS2329	Improving Russia's Policy on Foreign Direct Investment	Joel Bergsman Harry G. Broadman Vladimir Drebentsov	May 2000	S. Craig 33160
WPS2330	Reducing Structural Dominance and Entry Barriers in Russian Industry	Harry G. Broadman	May 2000	S. Craig 33160
WPS2331	Competition, Corporate Governance, and Regulation in Central Asia: Uzbekistan's Structural Reform Challenges	Harry G. Broadman	May 2000	S. Craig 33160
WPS2332	Financial Intermediary Distress in the Republic of Korea: Small Is Beautiful?	Paola Bongini Giovanni Ferri Tae Soo Kang	May 2000	K. Labrie 31001
WPS2333	Output Fluctuations in Latin America: What Explains the Recent Slowdown?	Santiago Herrera Guillermo Perry Neile Quintero	May 2000	C. Palarca 35328
WPS2334	Sex Workers and the Cost of Safe Sex: The Compensating Differential for Condom Use in Calcutta	Vijayendra Rao Indrani Gupta Smarajit Jana	May 2000	P. Sader 33902
WPS2335	Inflation and the Poor	William Easterly Stanley Fischer	May 2000	K. Labrie 31001
WPS2336	Endogenous Enforcement and Effectiveness of China's Pollution Levy System	Hua Wang David Wheeler	May 2000	Y. D'Souza 31449
WPS2337	Pollution Charges, Community Pressure, and Abatement Cost of Industrial Pollution in China	Hua Wang	May 2000	Y. D'Souza 31449
WPS2338	The Geography of International Investment	Howard J. Shatz Anthony J. Venables	May 2000	L. Tabada 36896
WPS2339	Building Subnational Debt Markets in Developing and Transition Economies: A Framework for Analysis, Policy Reform, and Assistance Strategy	Michel Noel	May 2000	M. Noel 32581

5/25