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The dollarization process in Mexico: 1983-1997

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THE DOLLARIZATION PROCESS IN MEXICO: 1983-1997

by

Luis J. Del Rivero

**Bachelor of Science
University of Nevada, Las Vegas
1995**

**A thesis submitted in partial fulfillment
of the requirements for the degree of**

Master of Arts

in

Economics

**Department of Economics
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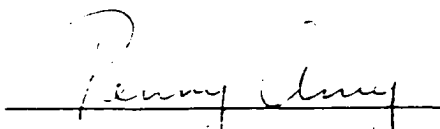
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The Dollarization Process In Mexico: 1983-1997

is approved in partial fulfillment of the requirements for the degree of

Master of Arts in Economics


Examination Committee Chair


Dean of the Graduate College


Examination Committee Member


Examination Committee Member


Graduate College Faculty Representative

ABSTRACT

The Dollarization Process in Mexico: 1983-1997

by

Luis J. Del Rivero

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Professor of Economics

University of Nevada, Las Vegas

The purpose of this study is to analyze the extent of dollarization in the Mexican economy during the period 1983-1997. Dollarization is defined as the replacement of domestic currency for dollars as a store of value or for transaction purposes. In this study, a narrow definition of dollarization will be used as an estimate of the amount of dollars circulating in the Mexican economy. This measure includes only the dollar-denominated demand deposits held by businesses in Mexican banks, since the public is no longer allowed to hold this type of accounts and a better measure for the exact amount of dollars circulating in the Mexican economy is not available. This study will emphasize the effects of expected peso depreciations, peso devaluations, and political changes on the dollarization process.

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CHAPTER 1

INTRODUCTION

Dollarization refers to using dollars instead of domestic currency as a unit of account, store of value, or medium of exchange. High inflation and frequent currency devaluations are factors that diminish the confidence in the domestic currency, creating an incentive for money-holders to maintain their money balances in the currency that depreciates least rapidly. When the confidence in the domestic money declines, money demanders will tend to substitute away from domestic money in favor of more stable foreign money. Because the U.S. dollar is a more stable currency compared to most domestic currencies of Less Developed Countries (LDCs), it serves as an important substitute for those domestic currencies.

The dollarization process usually evolves in a predictable manner. As domestic inflation increases, domestic residents turn to foreign money as a store of value to avoid the rapid depreciation of the domestic currency. As high inflation continues, the next stage of the dollarization process involves using dollars as a unit of account. Some prices of “big-ticket” items begin to be quoted in foreign currency. Shortly after, some transactions are performed in dollars, especially those involving large transfers of funds. Whether or not dollars are ever used as more than a store of value depends on the

government's ability to implement credible macroeconomic policy reforms.

A brief analysis of the economic conditions of Bolivia, Mexico, and Peru in the last two decades exemplifies the dollarization process. A feature common to these countries is that the public was allowed to maintain Foreign Currency Deposits (FCDs) in their domestic financial system. The FCDs (demand deposits of foreign currency, usually dollars, held by the public in domestic banks) were allowed with the objective of inducing the return of capital that had previously left the country due to economic instability. This measure was either accompanied or preceded by a large devaluation and it was intended to restore macroeconomic equilibrium. In particular, Bolivia eliminated all restrictions on holding FCDs in October 1973, a few months after its fixed peg system was interrupted by a 68 percent devaluation; likewise, Mexico eliminated the restrictions in March of 1977, following a 37 percent devaluation in September of 1976; Peru followed in 1978, after the sol was left to float and depreciated by more than 60 percent.

The financial reform that promoted the use of FCDs ended abruptly in the early 1980s. In all three cases the respective authorities converted the FCDs held by the private sector into domestic money. This measure was originated when the dollars reserves held by the three countries started to approach a low critical level. The amounts of dollar reserves held were close to the point where they would not be able to cover all of the FCDs if the investors wanted to convert them into real dollars. As a consequence, the corresponding central banks converted all dollar-denominated debts into the domestic currency at a rate well below the market rate. This occurred in Mexico in August 1982, in Bolivia in October 1982, and in Peru in July of 1985. The reimposition of controls on the FCDs was accompanied by a large devaluation and the reinstitution of a fixed exchange

rate in all three cases. In Mexico, this measure was one of the last taken by President Lopez Portillo, while in Peru it was one measure taken by President Garcia during his first address to Congress. Before 1982, during most of the ten years of reform in Bolivia, the ratio of FCDs to M2 was less than 20 percent, reaching 40 percent in October 1982. In comparison, the ratio of FCDs to M2 in Mexico was less than 5 percent until 1977, and reached 36 percent in June 1982. In contrast, the ratio in Peru grew steadily since 1978 reaching 50 percent by mid-1982 and more than 100 percent by December 1984.

The dollarization process has persisted in the Latin American countries despite wide fluctuations in inflation. According to Guidotti and Rodriguez (1992), when inflation increases, dollarization also increases, but when inflation starts to decrease, dollarization tends to remain constant unless the appropriate credible economic policies are established. In Bolivia, dollarization was relatively low between 1982 and 1985, at a time when a stabilization plan was established to fight hyperinflation. Between 1985 and 1987, following the abandonment of the stabilization plan, inflation was high and dollarization increased by 50 percent. But when inflation dropped to about 3-4 percent a quarter in the mid-1990s, dollarization continued. Conversely, dollarization and inflation in Mexico were both relatively stable in the early 1970s; however, inflation increased in 1976-77 after the 1976 devaluation while the process of dollarization accelerated. But when inflation fell back, the level of dollarization did not follow. It remained stable until 1981, when inflation and dollarization rose again. In Peru, even though inflation fluctuated widely, dollarization continued to increase from less than 5 percent in 1978 to over 50 percent by the end of 1984.

In this study, the focus will be on the dollarization process in the Mexican economy in the period after the forced de-dollarization of 1982. The impact of inflation, currency devaluation, and political instability on the degree of dollarization will be analyzed. Following previous studies, a narrow definition of dollarization will be used that includes the dollar-denominated demand deposits held by businesses only, since the public is no longer allowed to hold this type of accounts and no other measure exist of the amount of dollars circulating in the economy.

The remainder of this study is organized as follows, Chapter 2 provides a historical perspective of the Mexican economy. Chapter 3 contains a review of the literature. Chapter 4 provides the empirical model and the data used. Chapter 5 provides the empirical results, and the final chapter provides concluding remarks and policy recommendations.

CHAPTER 2

HISTORICAL PERSPECTIVE

Throughout the twentieth century the Mexican economy has been subject to many economic transformations. Economic events ranging from stagnation, triple-digit inflation, double-digit unemployment, frequent devaluations, and foreign capital flights, to steady growth, single-digit inflation and single-digit unemployment, currency appreciations, and capital accumulation, have all occurred in Mexico, sometimes even in the same year. This chapter presents a brief historical review of the economic events of the last few decades and their association with the process of dollarization.

Foreign currency deposits have coexisted with peso deposits in Mexico even before the creation of the Banco de Mexico in 1925. The ratio of dollar to peso demand deposits fell consistently during the first fixed exchange rate period from 1933 to 1938. At the end of 1937, less than 6 percent of the checking deposits were in dollars. In March of 1938, President Lazaro Cardenas nationalized the oil industry and allowed the peso to float. The dollar to peso deposit ratio reached over 15 percent in 1940 and it did not decline until 1944 when it reached 6 percent following the establishment of the fixed exchange rate. Inflation averaged over 10 percent between 1940 and 1954 (the ‘take-off’ period), entailing a more than doubling of the peso-dollar exchange rate, affected by two

devaluations in 1948 and 1954. During this period, the dollarization ratio increased from 7.5 to 11.5 percent. The exchange rate of 8.65 pesos per dollar lasted until 1954 when the peso was devaluated again 45 percent.

From 1954 to 1970 (the “stabilizing growth” period), the Mexican economy was characterized by the highest rate of output growth and lowest rate of inflation in Mexican history. The exchange rate remained unchanged at 12.5 pesos per dollar throughout this period. Domestic capital formation was favored by direct government involvement in major industries, as well as fiscal incentives for both domestic and foreign private investment. During this period, after the devaluation of 1954, the dollarization ratio increased and stabilized around 20 to 25 percent in 1956. It increased again in 1957 reaching 30 percent at the end of 1958. The ratio declined in 1959 all throughout the sixties and early seventies. In 1973 inflation accelerated, the external deficit increased, and by the end of the Echeverria presidency in 1976 the exchange rate had to be devaluated. Once more the dollarization ratio increased.

Throughout the Presidencies of Lopez Portillo and De La Madrid Hurtado, 1977-1988 (the “Tragic Dozen” period), the government embarked on a policy of aggressive deficit spending and monetary expansion. Accelerating inflation and a fixed nominal exchange rate entailed a rapid real appreciation of the peso. As oil prices weakened, foreign bank lending to Mexico shrank rapidly and private capital flight increased in anticipation of another devaluation. As a result, the process of dollarization accelerated. From 1977 to 1981, the ratio of dollars to pesos in Mexican banks fluctuated between 25 and 35 percent. It remained stable until 1981 when inflation and dollarization climbed again. In 1982 it reached a peak of 58 percent followed by a precipitous drop at the end

of the year. This drop was mainly due to the forced de-dollarization policy.

In August 1982, Mexico froze dollar-denominated deposits in Mexican banks and required that they be converted into Mexican pesos at a controlled exchange rate (70 to the dollar, well below the market rate). These government restrictions increased the costs of transacting in dollars which caused a higher demand for domestic money than otherwise would exist. Nevertheless, the government was not able to effectively prohibit domestic citizen's use of dollars. Dollars have continued to circulate, even if only clandestinely.

Dollar-denominated deposits were allowed in Mexico once again after the period of forced de-dollarization, but only in special cases like for example large exports and imports business who needed to deal in dollars. Besides these special cases, private individuals were not allowed to have dollar-denominated deposits.

At the end of 1982, the annual inflation rate approached 100 percent accompanied by large fiscal and trade deficits and high interest rates in international markets. With the establishment of several stabilization programs, inflation was reduced to about 60 percent in 1984 (see Figure 1). However, international oil prices dropped dramatically in late 1985, rapidly increasing peso prices of imports and depressing real incomes. This led to accelerating inflation above 100 percent (160 percent in 1987), and negative real deposit rates. When the U.S. and Mexican stock market crashed in October 1987, the Mexican currency suffered again, a devaluation and a massive outflow of capital were the consequences. Starting in 1988, a crawling peg was implemented with a preannounced rate of peso depreciation. Inflation fell from three-digit levels in 1988 to about 7 percent in 1994. It was accompanied by large capital inflows from 1990 to 1994, and by a significant appreciation of the real exchange rate (see Figure 2).

INFLATION DIFFERENTIAL, MEXICO-U.S. (1983-1997)

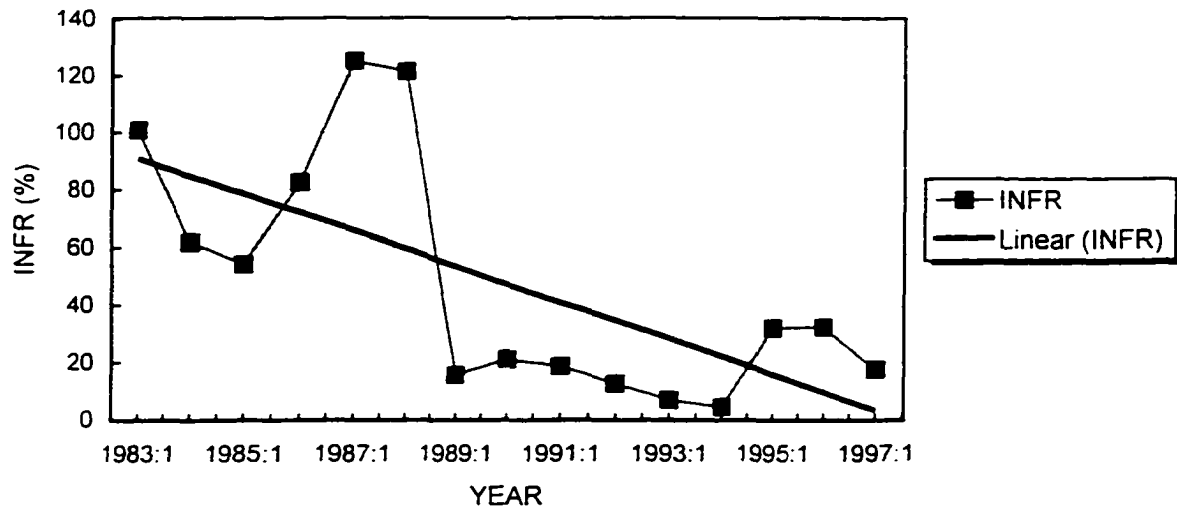


Figure 1. Inflation Differentials Between Mexico and the U.S.

REAL EXCHANGE RATE (1983-1997)

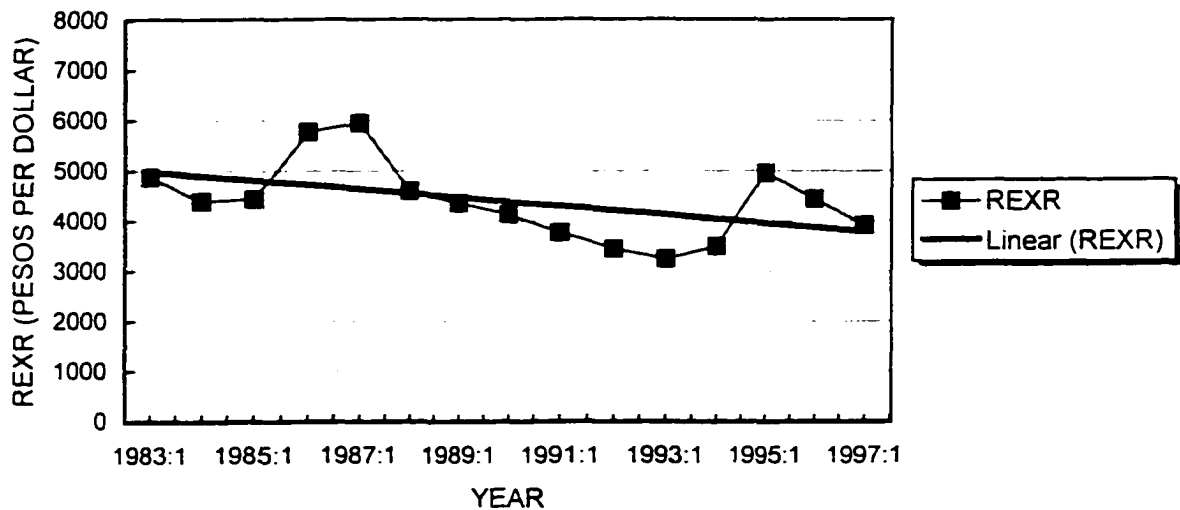


Figure 2. Real Exchange Rate (Pesos per Dollar).

In December 20, 1994, large current account deficits, real appreciation of the peso, and political instability forced the government to devalue the peso 15 percent. Two days later the peso was allowed to float freely, falling 30 percent more. Although, data on the amount of dollars circulating in the Mexican economy during these later periods of

economic instability is not available, one can assume that the ratio of dollars to pesos in the economy increased after the peso crisis. Figure 3 shows the changes in the ratio of dollar-denominated to peso-denominated demand deposits as an estimate for the true dollarization ratio.

The previous historical review shows an interesting coincidence. The different dates in which large increases in dollarization were experienced, 1940, 1952, 1958, 1976, 1982, and 1994 correspond also to the last year of a presidential administration, while peso devaluations also occurred in 1954, 1976, 1982, 1987, and 1994. It seems that besides inflation, both devaluation expectations and perceptions of possible political instability associated with the replacement of the administration are important factors in explaining the historical development of the Mexican dollarization process.

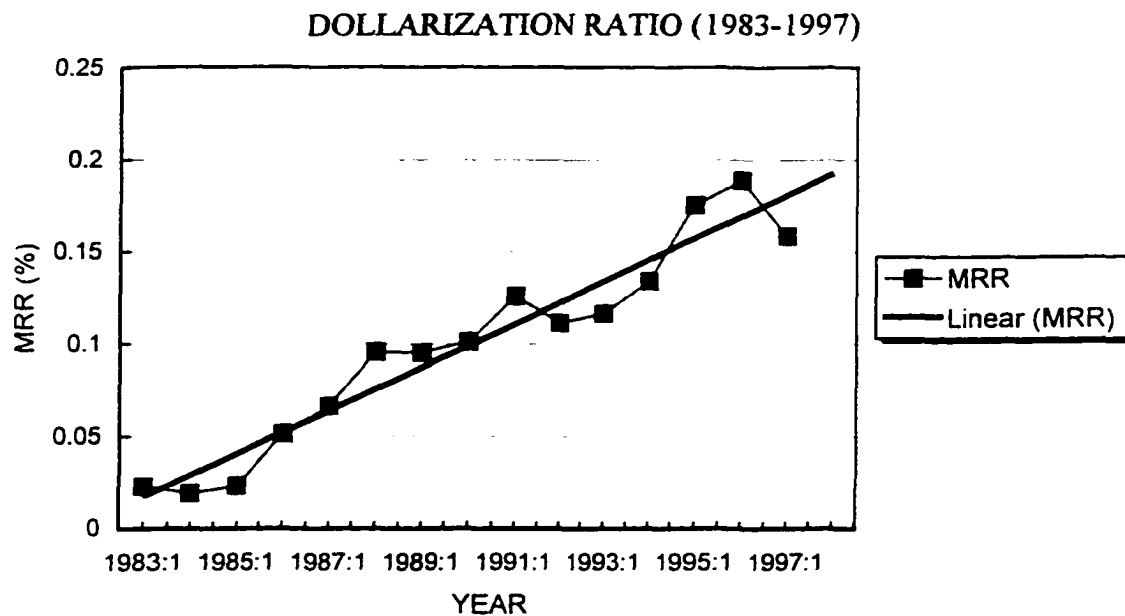


Figure 3. Dollarization Ratio.

CHAPTER 3

REVIEW OF LITERATURE

The phenomenon of dollarization has been extensively analyzed in the literature. A common characteristic of previous studies is the use of the ratio of dollar-denominated to peso-denominated currency deposits in peso terms as an estimate of the degree of dollarization during the years when these deposits were allowed. Some of these studies include Clements and Schwartz (1993), Rojas-Suarez (1992), Rogers (1992), Ortiz (1983), and Savastano (1992).

Savastano (1992), provided an overview of the main features of the “dollarization” process experienced by Bolivia, Mexico, Peru, and Uruguay in the past two decades. He concluded that the creation of Foreign Currency Deposits (FCD) with the objective of improving the external position of the central bank or encouraging financial intermediation tends to increase the flight of domestic money which eventually reduces the residents’ holdings of domestic money balances making more difficult the conduct of monetary policies. Furthermore, Sahay and Vegh (1995), showed that fighting dollarization with artificial measures, such as forcing the conversion of foreign assets into domestic assets, merely contributes to magnifying the eventual inflationary explosion. Dollarization is one of the consequences and not the cause of existing fiscal and monetary disequilibria that are

manifested in chronic fiscal deficits and accommodative monetary and exchange rate policy.

Additionally, studies by Ramirez-Rojas (1985) and Ortiz (1983) concluded that the ratio of Mexdollars (dollar-denominated demand deposits) to pesos demand deposits increases as depreciation expectations begin to aggravate. In contrast, Rogers (1992) estimated the demand for U.S. dollars relative to domestic currency in both Mexico and Canada. He found that in the Mexican case a negative and significant correlation exist between the ratio of Mexdollars to pesos-denominated demand deposits, as a restrictive measure of the degree of dollarization, and the expected rate of depreciation of the peso. This correlation is explained by the investors' understanding that when dollar reserves approach a low critical level, the government expects the investors to withdraw from their Mexdollar accounts, so it reacts by converting Mexdollars into pesos. The investors then precipitate a run on Mexdollars as central bank reserves run low. Because this process corresponds to periods in which the peso is expected to devalue, higher expected depreciation is associated with a lower relative demand for Mexdollars. These conflicting results might be explained by looking at the time period in which the studies were conducted. Ramirez-Rojas (1985) and Ortiz (1983) used samples that included data previous to the forced de-dollarization of 1982 when money holders did not expect the de-dollarization policy to ever happen. In contrast, Rogers (1992) included data of several years after the forced de-dollarization, when money holders were already aware that the de-dollarization policy could happen again if the government considered to be appropriate and inflation was high enough.

Using a different approach, Melvin and Ladman (1991) investigated whether dollarization of some Latin American countries can be attributed to the illicit drug trade where business is conducted using dollars. Using the data on informal loans of the Cochabamba Upper Valley in Bolivia, they found that the effects of the term and size of loans is consistent with the financial needs of the drug industry which is highly dollarized. This demonstrates that the seasonality of the coca harvest and the production of coca paste is likely to be an important determinant of the availability of dollars to loan in important coca-producing valleys of Bolivia.

Guidotti and Rodriguez (1992) stated that an economy may become more dollarized over time in response to a high inflation level, rather than just in response to increasing inflation. Likewise, Clements and Schwartz (1993) found that in Bolivia, dollarization is likely to persist even if substantial policy efforts are made to reduce inflation or increase interest rates. This occurs because of inertia factors which suggest an asymmetry where dollarization increases rapidly with macroeconomic instability, but is difficult to reverse even after years of macroeconomic stability. Transactions costs are incurred by economic agents when they substitute one currency for another. Because of these transactions costs, dollarization may not be reduced after inflation rates fall from a period of high inflation.

In addition, Melvin and Peiers (1996) analyzed the costs of large seigniorage losses facing domestic governments. They concluded that high transaction costs of switching monies, dollar revenues related to illegal commercial activities, and network externalities associated with foreign currency usage are the explanations for the observed inertia in de-dollarization following domestic stabilization policies.

Regarding the effects of expectations and credibility on the process of dollarization, Rojas-Suarez (1992) found that for the case of Peru, it is appropriate to consider if the existence of dollarization may constitute “good news” for governments dealing with inflation by reducing the fiscal deficit and the expansion of domestic money supply. This would depend on the credibility of the announced economic program and on the perception of economic agents regarding the durability of the adjustment efforts. If the deceleration of money growth is perceived as permanent, an increase over time of the relative holding of domestic money is expected. In contrast, lack of credibility may account for the persistence of the dollarization process. Likewise, Bien (1990) concluded that confidence in the national currency is an important factor when dealing with dollarization. If little faith exists in the national currency, foreign currencies become an object of intensified stocking up, not only as a result of high inflation but also because the person saving such currency is in a much better position than one who holds that national currency.

Fasano (1986), cites relatively higher inflation rates and foreign exchange risk effects as causes for holding dollars instead of the domestic currency. Exchange risk increases when the exchange rate is floating. In the Mexican case, the relatively short periods of floating exchange rate and the constant intervention of the Banco de Mexico have prevented the dollarization process from increasing to even higher levels compared to other Latin American countries. Still, the process of dollarization continues to occur to a certain level.

Finally, Calvo and Vegh (1992), concluded that regarding dollarization there are no simple policy prescriptions. On the one hand, motivating the use of the domestic

currency gives the government extra leeway to collect taxes and to react to exogenous shocks. This extra freedom creates excess reliance on inflation tax. On the other hand, measures against the use of domestic currency, like full dollarization , may at least provide temporary relief against inflation. However, full dollarization without a lender of last resort may make the domestic banking system fragile to capital flight and may lead to possibly deep financial crisis.

CHAPTER 4

EMPIRICAL MODEL AND DATA

In theory, high inflation, frequent currency devaluations, and the perceptions of “political risk” (uncertainty associated with political regime changes), are expected to diminish the confidence on the domestic currency and create incentives for money holders to substitute domestic currency for more stable foreign currency. The effect of these variables is measured empirically in this chapter. The following reduced-form model is based on a simple structural model proposed by Ortiz (1983) and Clements and Schwartz (1993).¹ It was estimated by ordinary least squares using quarterly data from 1983:1 to 1997:4.

$$MRR = f(TREND, VALUE_{-1}, VALUE_{-2}, INFR_{-1}, INFR_{-2}, INFR_{-3}, PRES, MRR_{-1}, MRR_{-2})$$

where the dependent and independent variables are defined as follows:

MRR: Is the dollarization ratio, measured as the ratio of the portion dollar-denominated

¹The model in this study was calculated in linear form instead of semi-log form as in Ortiz (1983). Based on Davidson R. and J. MacKinnon (1981) a test was performed concluding that the linear form was more appropriate for this regression.

demand deposits to the peso-denominated demand deposits.^{2 3} One-period and two-period lags of this variable are also considered to account for the dynamic effects of the independent variables on the dollarization ratio.

TREND: Is a linear time trend.

VALUE: Represents an estimation for the expected value of the peso with respect to the dollar (overvalued or undervalued), measured by the deviations of the real exchange rate from trend.⁴ If the change in value is perceived as temporary, this variable is expected to have a negative effect on the level of dollarization. As the real exchange rate rise above its trend, the peso becomes temporarily undervalued, so that it becomes more attractive to hold pesos instead of dollars. This variable was obtained by using the residuals of the following equation:

$$REXR = B_0 + B_1 TREND + E$$

where REXR is equal to the real exchange rate obtained by the ratio of the United States consumer price level to the Mexican consumer price level,⁵ times the

²Since the public is no longer allowed to have dollar-denominated accounts and an effective measure of the amount of dollars circulating in the Mexican economy does not exist, the dollar-denominated demand deposits includes mainly dollar-denominated accounts held by businesses, used only for businesses purposes and not for private use. As a result, this variable tends to underestimate the actual extent of dollarization. However, the fluctuations of this variable should approximate the fluctuations of the real dollarization ratio.

³Other studies have used the money demand as the dependent variable when dealing with currency substitution; however, when dealing with dollarization, the ratio of MRR is a more appropriate variable.

⁴Ortiz (1983) used this variable as a proxy for foreign exchange risk.

⁵For estimation purposes, CPI and the inflation rate are used for both Mexico and the U.S. with 1994 as a base year.

nominal exchange rate of pesos per dollar. TREND is the time trend and E is the residual.⁶ After some experimentation, a two-period lag structure was found to perform adequately.

INFR: Is the expected depreciation of the exchange rate, measured by the differential between the Mexican inflation rate and the United States inflation rate.^{7 8} The effect of this variable on MRR is ambiguous. As the inflation differential increases between Mexico and the United States, the peso is expected to depreciate more, causing money holders to increase their holdings of dollars. However, when the depreciation of the domestic currency is expected to increase, money holders may withdraw from their dollar denominated accounts, because of the fear that dollar reserves held by the central bank will drop forcing the domestic government to convert the dollar-denominated accounts to domestic currency at a below market rate. A three-term lag structure of this variable was found to perform adequately.

PRES: Is a binary dummy variable that accounts for the “political risk” factor already mentioned. It takes the value of 1 for each of the four quarters before and the four quarters after a Presidential election and a 0 for all other quarters. This

⁶The results from this regression are: $REXR = 5.0366 - 0.0213TREND$; $R\text{-squared} = 0.2188$, standard errors in parenthesis. (0.1861)*** (0.0053)***

⁷Ideally, the measure of expected nominal depreciation would be the difference between the spot and the forward exchange rates. However, this measure was not used for the period analyzed in this study because since 1985, Mexico no longer has a forward exchange rate. This proxy was also used by Ramirez-Rojas (1985), Ortiz (1983), and Guidotti and Rodriguez (1992).

⁸The changes in the CPI, are used to measure the rate of inflation for both Mexico and the U.S.

variable was chosen because Mexican economic history has shown that economic changes including devaluations are more likely to occur in the year after and in the year before a new President is elected. Hence, PRES is expected to have a positive effect on the level of dollarization. Uncertainty regarding the political and economic policies of the new administration increase the risk of holding domestic currency.

The data on Mexico (CPI, exchange rate, demand-deposits in dollars and pesos, and the price level) were obtained from the Banco de Mexico, *Indicadores Economicos*, 1997, and the data on the United States (CPI and the price level) were obtained from various issues of International Monetary Fund's *International Financial Statistics*.

Table 1 provides a brief description of the variables, the expected signs, and the summary statistics. Between 1983 and 1997, the ratio of dollar-denominated demand deposits to peso-denominated demand deposits (MRR) averaged 9.9%. The average deviation of the real exchange rate from trend (VALUE) in Mexico is close to zero pesos per dollar, and the average inflation differential between Mexico and the U.S. (INFR) is 47.13%.

Table 2 shows the correlation between the variables. In brief, the dollarization ratio MRR tends to increase when the real exchange rate of the peso is temporarily undervalued (an increase in VALUE). Also, the dollarization ratio tends to decrease when the peso is expected to depreciate (an increase in INFR). Finally, if the quarter in mention is one of the four quarters before or after a Presidential election (PRES) the dollarization ratio tends to increase.

Table 1. Variables Description, Expected Signs, and Descriptive Statistics

Variables (expected signs)	Definition	Mean (standard deviation)
Dependent Variable MRR	Ratio of dollar-denominated to peso-denominated deposits. A one and two lag terms of this variable are also included as independent variables.	0.099013 (0.05341)
Independent Variables		
TREND (?)	Time trend.	30.50000 (17.46425)
VALUE (?)	Deviation of real exchange rate from trend. A one and two-lag terms of this variable are also included.	0.000000 (0.706023)
INFR (?)	Inflation differential between Mexico and the U.S. A one through four lag terms of this variable are also included.	47.137000 (42.78300)
PRES (+)	=1 for the 4 quarters before and after a Presidential election.	0.333333 (0.475383)
REXR	Real exchange rate, pesos per dollar.	4.38588 (0.798327)

Table 2. Correlation Matrix

Variable	MRR	TREND	VALUE	VALUE-1	VALUE-2	INFR	INFR-1
MRR	1.0000						
TREND	0.9480	1.0000					
VALUE	0.1131	-0.0184	1.0000				
VALUE-1	0.1301	-0.0165	0.8924	1.0000			
VALUE-2	0.1464	-0.0143	0.7545	0.8924	1.0000		
INFR	-0.4543	-0.5815	0.5438	0.6425	0.6854	1.0000	
INFR-1	-0.4506	-0.5883	0.4269	0.5394	0.6382	0.9533	1.0000
INFR-2	-0.4604	-0.6007	0.3142	0.4194	0.5316	0.8450	0.9532
INFR-3	-0.4899	-0.6173	0.2033	0.3049	0.4098	0.7071	0.8456
INFR-4	-0.5248	-0.6310	0.1102	0.1972	0.2986	0.5687	0.7107
PRES	0.2574	0.1565	0.0782	0.0312	0.0187	0.0002	0.0668
MRR-1	0.9860	0.9551	0.0705	0.1148	0.1304	-0.4791	-0.4624
MRR-2	0.9657	0.9625	0.0247	0.0730	0.1155	-0.5159	-0.4867

Table 2. Continuation.

Variable	INFR-2	INFR-3	INFR-4	PRES	MRR-1	MRR-2
INFR-2	1.0000					
INFR-3	0.9539	1.0000				
INFR-4	0.8491	0.9552	1.0000			
PRES	0.1247	0.1755	0.2228	1.0000		
MRR-1	-0.4647	-0.4788	-0.5051	0.2209	1.0000	
MRR-2	-0.4759	-0.4824	-0.4939	0.1737	0.9864	1.0000

CHAPTER 5

EMPIRICAL RESULTS

Table 3 presents the results of four different specifications of the model discussed in Chapter 4. Since the signs and magnitude of the coefficients are consistent across specification, F-test were conducted on the different regressions helping to conclude that the MODEL (1) was the better one to use. Therefore, the focus will be on this first regression. The results from this regression are consistent with the predictions of the dollarization theory.⁹ Nevertheless, since the regression includes one and two lagged terms of the dependent variable as independent variables, the effect of changes in the independent variables on MRR will persist longer than the period in which they occur.

The variable VALUE represents changes of the real exchange rate from its long-term trend. An increase in this variable means the peso is temporarily undervalued. VALUE-1 has a negative sign and it is statistically significant at the 10% level. In addition, VALUE-2 has positive sign and it is statistically significant at the 1% level.

⁹Unit root tests were performed on the data series. The null hypothesis of nonstationarity could not be rejected at the 5% level of significance. However, since the sample size is relatively small and the regression used in this study is similar to the standard regression used in the literature, this regression was not modified to deal with nonstationarity.

Table 3. Empirical Results

VARIABLE	MODEL (1) (Standard Error) ¹⁰	MODEL (2) (Standard Error)	MODEL (3) (Standard Error)	MODEL (4) (Standard Error)
CONSTANT	0.011614 (0.005063)**	0.013637 (0.005623)**	0.014514 (0.006221)**	0.004706 (0.006402)
TREND	0.000953 (0.000285)***	0.000903 (0.000295)***	0.000433 (0.000291)	0.000642 (0.000296)**
VALUE				0.005731 (0.003278)*
VALUE-1	-0.006046 (0.003331)*	-0.005961 (0.003483)*	-0.001433 (0.003584)	-0.012906 (0.004618)***
VALUE-2	0.015426 (0.004140)***	0.015657 (0.004346)***	0.008914 (0.004319)**	0.012143 (0.004338)***
INFR				0.000235 (0.000111)**
INFR-1	-0.000423 (0.000119)***	-0.000426 (0.0000121)***	-0.000221 (0.000118)*	-0.000574 (0.000158)***
INFR-2	0.000503 (0.000163)***	0.000457 (0.00176)**	0.000190 (0.000175)	0.000422 (0.000174)**
INFR-3	-0.000241 (0.0000887)***	-0.000145 (0.000163)	-0.00000727 (0.000175)	-0.0000936 (0.000156)
INFR-4		-0.0000665 (0.0000914)	-0.000115 (0.000100)	-0.0000503 (0.0000870)
PRES	0.005781 (0.002215)*	0.006310 (0.002330)***	0.007494 (0.002553)***	0.004561 (0.002303)*
MRR-1	1.207205 (0.135834)***	1.178948 (0.141455)***	0.767946 (0.088052)***	1.178864 (0.134196)***
MRR-2	-0.602668 (0.154275)***	-0.568272 (0.161774)***		-0.428905 (0.161581)**

¹⁰Level of significance: ***=1%; **=5%; *=10%.

Table 3. Continuation.

	MODEL (1)	MODEL (2)	MODEL (3)	MODEL (4)
R-squared=	0.9837	0.9831	0.9788	0.9854
Adj. R-squared=	0.9809	0.9796	0.9750	0.9817
D-W=	2.0719	1.9825	1.3708	1.9755
Durbin-h=	0.0282***	0.0683***	2.55*	2.04*
SEE=	0.002885	0.002841	0.003713	0.002449
F-stat.=	343.8579***	285.4252***	282.6008***	265.2624***
Breusch-Godfrey=	4.9898**	5.0436**		2.2325*
Observations=	60	61	60	60

The explanation behind the negative coefficient of VALUE-1 is that if the peso is undervalued temporarily in the previous quarter, MRR will decrease by 6.046% in the present quarter, holding everything else constant. However, it is more difficult to attach a sensible interpretation to the coefficient of VALUE-2, because of the inclusion of MRR lagged one and two periods as independent variables. Therefore, to gauge the impact of VALUE on MRR, consider Figure 4.

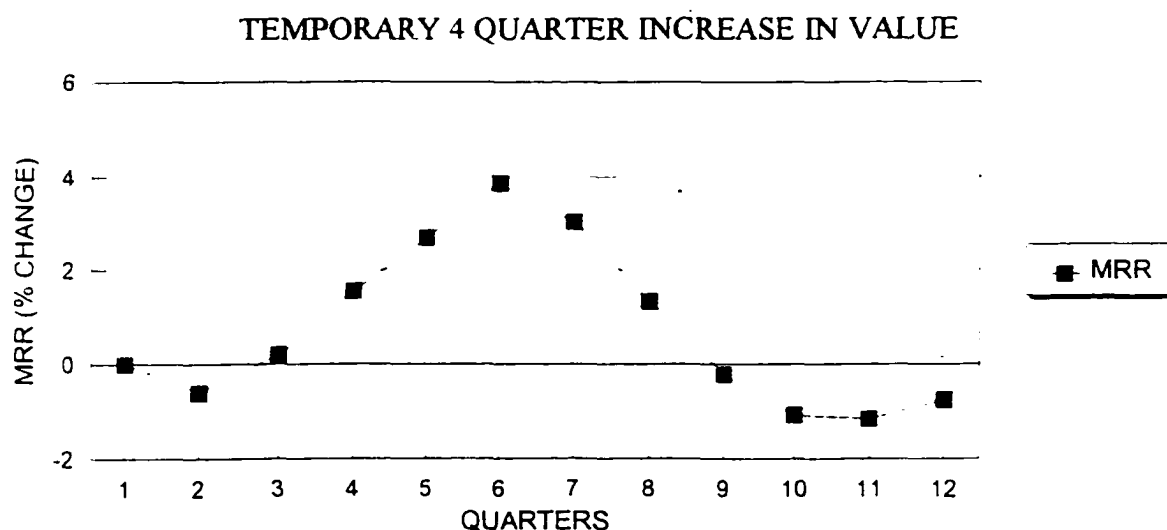


Figure 4. Effect of a Four Quarter Temporary Increase in the Deviation of the Real Exchange Rate from Trend on the Dollarization Ratio.

Figure 4 presents the effects of a four quarter one peso per dollar increase in deviation of the real exchange rate from its long-term trend (VALUE) on MRR.¹¹ The vertical axis represents the impact on MRR and the horizontal axis represents the quarters over which the effect spreads. The VALUE variable has a negative effect on MRR in the first quarter of the increase, but the effect is positive after that for several quarters. In fact, it takes over twelve quarters for the effect on MRR to decrease to zero. The theory behind the negative effect on MRR in the first quarter is that when the peso devaluates temporarily, it becomes more attractive to money holders which leads to a decrease in MRR. Furthermore, the intuition that supports the positive effect on MRR, after the first quarter of the temporary devaluation, is explained by the money holders' reaction to uncertainty regarding how long the peso is going to be undervalued. Therefore, if the deviation from trend lasts longer than a quarter, money holders become more cautious about holding pesos. The peso becomes less attractive than before and this leads to an increase in MRR, which last for several more quarters.

The inflation differential between Mexico and the U.S., as a proxy for expected peso depreciation (INFR), has a negative total effect on MRR. An increase in this variable means that the peso is expected to depreciate in relation to the dollar. The coefficient of INFR-1 is negative and it is statistically significant at the 1% level. However, the coefficient of INFR-2 is positive and it is also statistically significant at the 1% level. The interpretation of the coefficient of INFR-1, is that if the inflation differential increases by

¹¹This graph is constructed from the estimated coefficients on VALUE-1, VALUE-2, MRR-1, and MRR-2, similar to an impulse response function in time series analysis.

1%, MRR would decrease by 0.423%, holding everything else constant. The intuition is that as the inflation differential increases, money holders become suspicious about the government's reaction towards the inflation increase. Therefore, as a precaution, afraid that the government might exchange their dollar-denominated deposits for pesos at a rate below market as it previously did in 1982, money holders reduce their dollar-denominated deposits. This action leads to a decrease in MRR. Because of the form in which the regression is constructed, it is more difficult to assign a specific interpretation to the coefficient of INFR-2. Therefore, it is necessary to look at Figure 5 and Figure 6 to measure the total long-term impact of INFR on MRR.¹² The effect of a 40% four quarter temporary increase in the inflation differential between Mexico and the U.S. is presented in Figure 5.

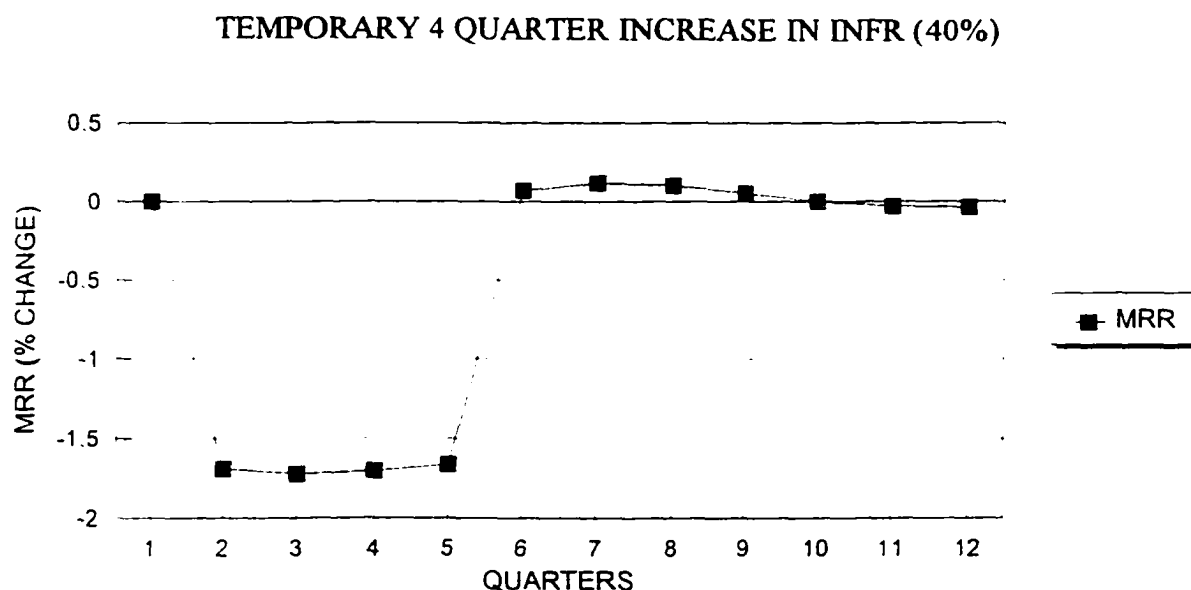


Figure 5. Effect of a Four Quarter Forty Percent Temporary Increase in the Inflation Differential on the Dollarization Ratio.

¹²A 40% increase is used because this number is close to the standard deviation of INFR.

According to Figure 5, the effect of a four quarter 40% increase in the inflation differential on MRR is spread over several quarters. The effect is negative over the first four quarters after the increase, but then it is positive to a smaller extent over the next four quarters. In sum, it takes over ten quarters for the effect on MRR to be reduced to zero. The theory behind the negative effect of the increase in INFR is that money holders reduce their dollar-denominated deposits as a precautionary reaction to the uncertainty regarding the government's policies towards the inflation increase, which leads to a decrease in MRR (though not necessarily a decrease in the dollar holdings outside the banks). Additionally, the theory behind the positive effect of the increase in the inflation differential on MRR after four quarters, is that after the increase in INFR has continued for a few quarters, the peso has depreciated, and if the government has not reacted with a de-dollarization policy, pesos become less attractive and money holders start to exchange back their peso holdings for dollars which leads to an increase in MRR. In similar manner, the effect of a 40% permanent increase in INFR is presented in Figure 6.

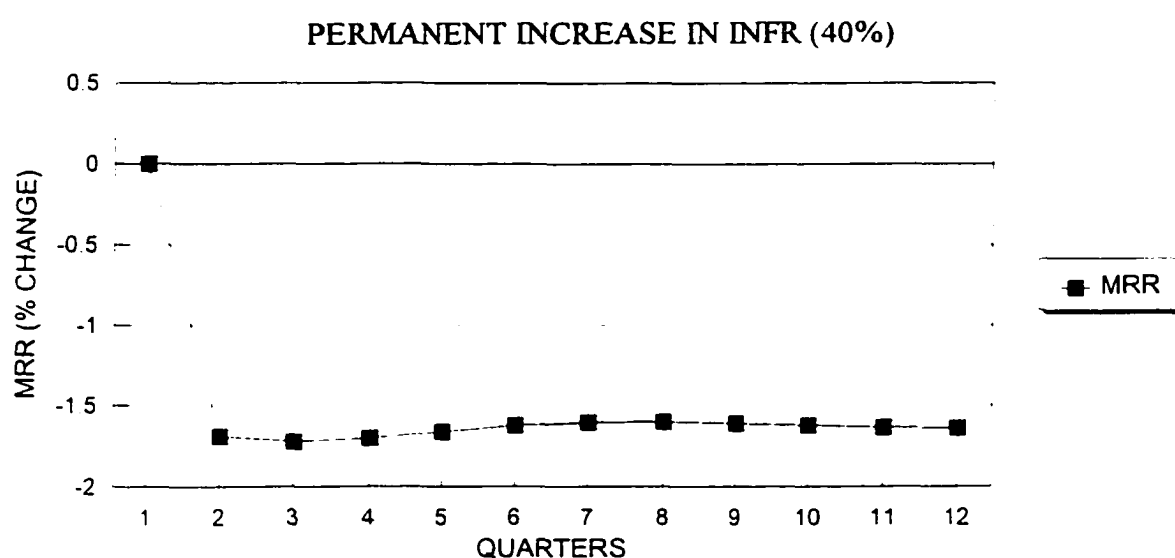


Figure 6. Effect of a Forty Percent Permanent Increase in the Inflation Differential on the Dollarization Ratio.

The effect of a permanent increase of 40% in the inflation differential, as shown in Figure 6, is a permanent decrease in MRR of about 1.5%. The results from the increase in the inflation differential are not consistent with the dollarization theory. The dollarization ratio was expected to increase as the inflation differential increases. However, when the inflation in Mexico increases in relation to the inflation in the U.S., dollar holdings decrease permanently due to a precautionary reaction by the money holders, which leads to a decrease in MRR. This does not mean that the true dollarization ratio has declined.

As expected, the effect of a Presidential election (PRES) as a measure of ‘political risk’, on MRR is positive and statistically significant at the 10% level of significance. In this case, it is also necessary to refer to Figure 7 to better judge the long-term impact of PRES on MRR.

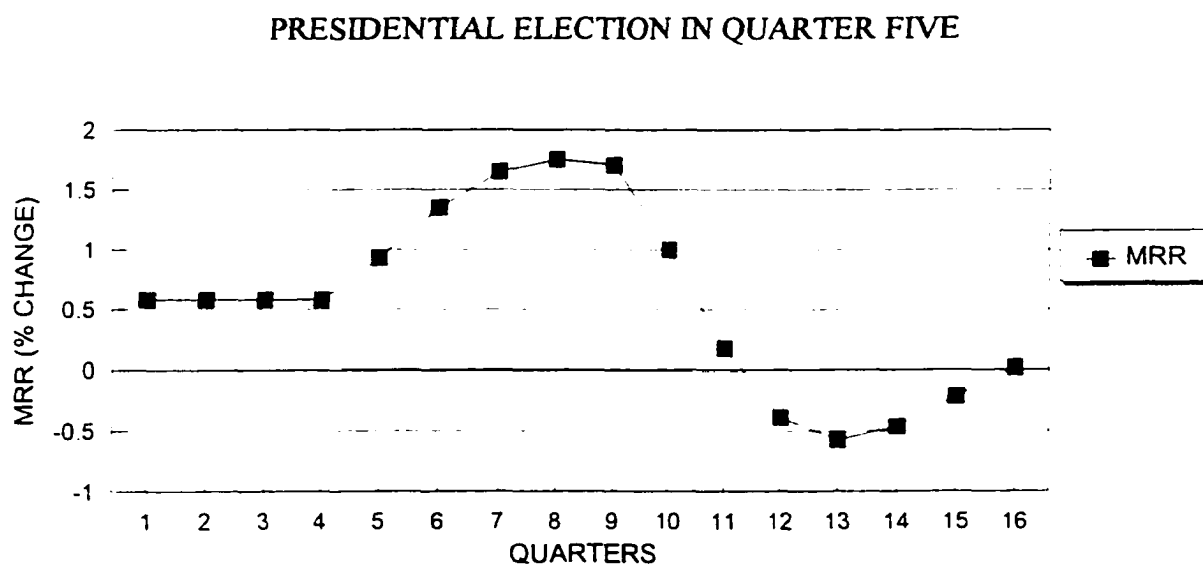


Figure 7. Effect of a Presidential Election on the Dollarization Ratio.

Figure 7 shows that when a Presidential election has occurred or is going to occur, MRR increases starting four quarters before the election, and increases even more for four quarters after the election. The effect decreases for several quarters after, but it does not

decrease to zero until more than twelve quarters after the election quarter. This positive effect on MRR is due to the uncertainty regarding governmental changes and the new political policies which can affect the domestic currency.

CHAPTER 6

CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

The purpose of this study was to analyze the impact of inflation rates, exchange rates, and political instability on the process of dollarization with respect to the Mexican economy. The findings suggest that money demanders are sensitive to changes in inflation, risk of forced de-dollarization, the degree of over or undervaluation of the peso, and political changes. This phenomenon is common in Latin America.

Although, in theory Mexico ended the use of dollar denominated bank accounts to the public in August 1982, the use of dollar currency is still prevalent. As long as inflation rates continue to be higher relative to the inflation in the United States, and fears that the peso might lose its value exists in the money holders' mind, along with political instability, dollarization will continue to be an issue in Mexico, even though it cannot be measured with complete precision.

Reversing the dollarization process requires domestic currency to be a better alternative. Credible economic reforms that provide a manageable inflation rate and prevent continuous currency devaluations are needed along with programs that can help to increase the confidence in the political system. These will help to reduce the dollarization process and also give the control of monetary policy back to the domestic government.

The model of dollarization presented here is still exploratory and can be improved for future research. Future research should focus on understanding the microfoundations of currency substitution and expectation formation. Additionally, the nonstationarity of the available data should be explored further for even better results. Similarly, the lack of data on the amount of dollars circulating in the Mexican economy is in itself a great obstacle to measure with accuracy the effects that the variables already mentioned have on the true dollarization ratio.

Dollarization is a rational response by economic agents to continuous instability in the value of the domestic currency. Hence, central bank policies aimed at restricting or increasing the cost of dollarization may delay the process, but are unlikely to end it.

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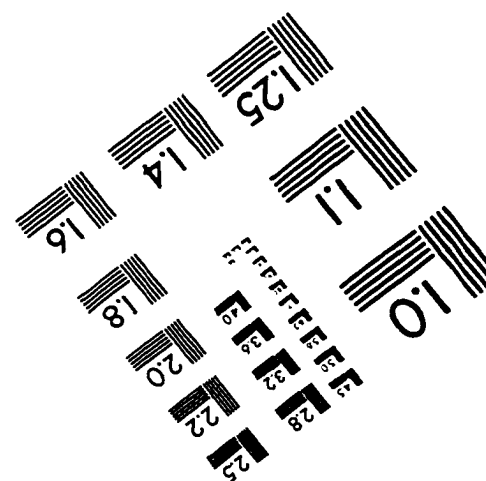
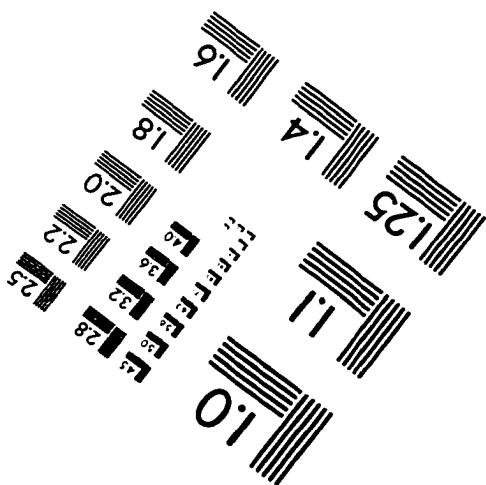
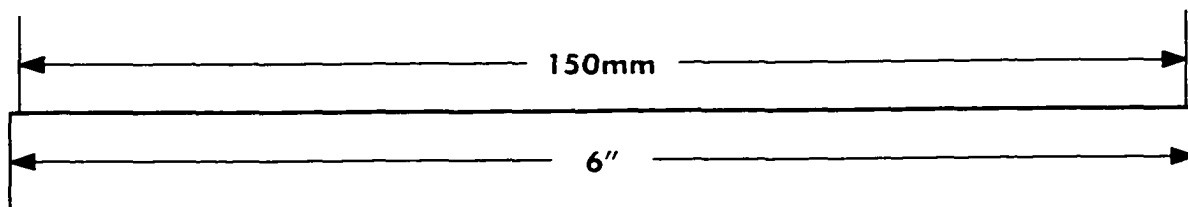
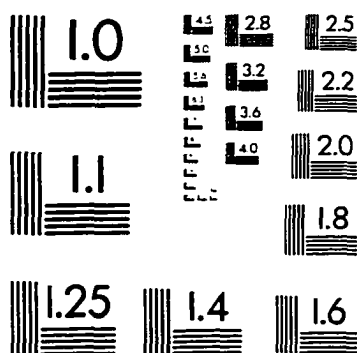
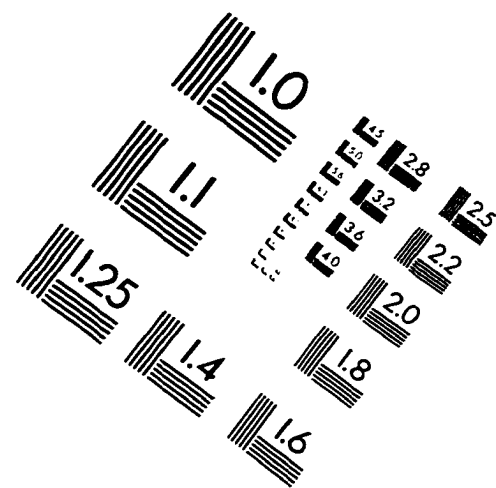
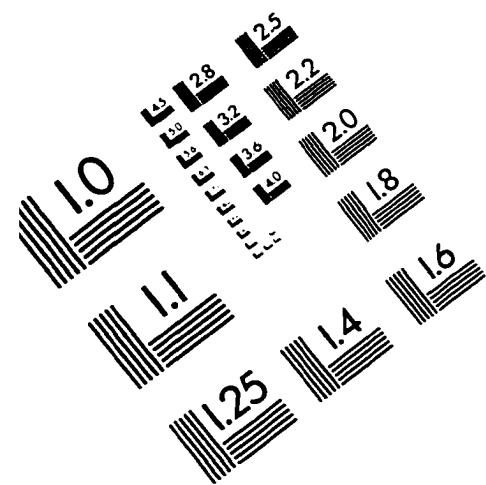
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