TESTING FOR CAUSALITY OF INFLATION IN LATIN AMERICA FROM THE U.S. ECONOMY

by

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ABSTRACT

During the last two decades, Latin America has been struggling to attract Foreign Direct Investment (FDI). Several authors have discussed the macroeconomic conditions of the region as the main drivers of FDI. For this reason, this thesis evaluates the possibility of identifying some cause-effect relationships between price variations in Latin American economies and those of the United States.

The Latin American economies throughout the 1980s could be characterized by Ill-defined fiscal policies; High degree of price indexation, lack of independence and leverage by the central banks, growth highly dependent on government spending as opposed to stimulating private consumption, etc.. All of these problems led to the fluctuation of prices in these economies.

Specifically considering the causality evaluation from the U.S. to Latin America, the results prove that the U.S. has no causal effect on the inflation of any of these countries. This supports the argument that inflation is a domestic phenomenon characteristic of every economy.

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CHAPTER ONE

INTRODUCTION

During the last two decades, Latin America has been struggling to attract Foreign Direct Investment (FDI). Several authors have discussed the macroeconomic conditions of the region as the main drivers of FDI. In an effort to better understand the regional macroeconomics, many studies have focused on investigating the relationships that might exist between exchange rates and other variables such as prices, wages, and balance of payments. Most of these studies have focused on explaining the consequences of high inflation and the large disparities among the external sectors of particular countries, all the while ignoring the increasing dependency of Latin America on the global environment.

For this reason, this thesis evaluates the possibility of identifying some cause-effect relationships between price variations in Latin American economies and those of the United States. A better understanding of these relationships could form the basis for explaining the economic performance of Latin American prices over time.

A. Development

In accordance with the objectives of this thesis, and taking into account the varied economic conditions of Latin American economies, the research has been divided in two

parts. The first part presents some of the theories that try to explain inflation as an economic phenomenon. The second part defines causality as it defined by C.W. Granger (1939). Once the method of analysis has been defined, the model applies Granger's concept to determine the causality between inflation in Latin America and some of the leading U.S. indicators. Granger's definition of causality is based on the assumption that X is said to cause Y if X's history could be utilized to predict Y in a more efficient and simple manner than just using Y's historic data.

B. Variables of Analysis

Considering the availability of data and its relevance with respect to price variation in the countries being analyzed, the thesis covers the following variables:

1- Interest Rates

2- Exchange Rate

3- Inflation

4- International Reserve

It is important to note that according to the definition of causality previously mentioned, the variables have to be stationary.

C. .Development Platform

The development and analysis of the model has been done in a software dedicated to evaluate and calculate regression models (RATS).

CHAPTER TWO

INFLATION AND SOME TRADITIONAL THEORIES

This chapter discusses general arguments developed by C.A. Sims (1977b) about different limitations of econometric models and the convenience of using an alternative method. The method Sims proposed uses time series analysis to design economic models. The time series analysis methodology considers several competing theories to explain inflation. The methodology then evaluates some of the variables of these competing theories as part of the development of macroeconomic models.

A. The Econometric Focus

Since the 1930s, economists have struggled to build economic models. The interest in developing these models is to describe, in mathematical terms, the different relationships between economic agents. These relationships are established such that they could be explained statistically. The objective of this thesis is to make predictions based on the different variables involved and then use those findings to improve or establish economic policies.

In order to do hypothesis testing the following process was developed. First, a group of variables is defined. Then behavioral relationships between these variables and establish

identities are specified. Using statistical measures, it is then possible to evaluate the feasibility of the models and their capacity to predict. Consequently, the success of econometric prediction is highly dependent on the precision in formulating the economic relationships.

B. Macroeconomics and Reality

In 1977, Sims (1977a) evaluated different economic models known at that time. He compared the prediction capabilities of these models with observed data and determined that the predictive capacity of these models was relatively poor. He also concluded that different basic theories on which econometricians have built their models are not good predictors. Sims' argument was that none of the theories explaining the macroeconomic field are significantly superior.

Considering these findings, Sims proposed a different method of developing economic models. Instead of specifying a theory to be evaluated later with empirical data, the econometricians should first start with the data and then try to establish statistical relationships between the variables, using these relationships to formulate economic theory.

The "ambiguity" of economic theory, on which Sims based his position, did not change in the 1980s, and can best be understood from the following comments by Dornbush and Fisher (1987):

> Taking into account that macroeconomics is intimately related to the economic problems of our times, it doesn't offer great satisfactions to those whose main interest is purely theoretical. The need to arrive at a compromise between the theory and its manageability makes that inevitably the macroeconomic theory has some ambiguity in its frontiers.

Sims also suggested that due to frequent changes in economic policies, it is necessary to look for relationships in the data without any *a priori* consideration (Sims, 1977b).

C. The Phillips Curve: Development and Apparent Contradictions

The development of the Phillips curve and the different theories about inflation can be used to illustrate the kinds of limitations and contradictions referred to by Sims.

The Great Depression of the 1930s gave birth to macroeconomic analysis. Several authors, such as Keynes with his *General Theory*, tried to explain the event and the steps that should have been taken to prevent it. The Keynesian theory placed special emphasis on fiscal policy, and his theory predominated until the inflationary phenomenon went out of control.

Modern neoclassical theories that were developed later were a synthesis of Keynesian and Walrasian economic theories. The Walrasian economic theory discussed wages and macroeconomic equilibrium.

In the early 1950s, Alban Phillips, an electrical engineer, became interested in exploring possible changes that occurred in the economy. He designed an economic model using the same principles found in system dynamics and control systems that had been applied in the analysis of electrical circuits. After his initial studies, Phillips (1954) described a relationship between the level of production and the exchange rate of the prices for goods. This relationship can be explained as follows:

> Suppose that in Y_e the economy was in equilibrium. Phillips defined this equilibrium as a stable price level. His assumption was: considering companies make *a priori* estimates of how much to produce in relation to estimated demand and that such estimates are always inaccurate, the economy could easily fall into a disequilibrium state.

According to this phenomenon Samuelson and Hansen defined the following linear model:

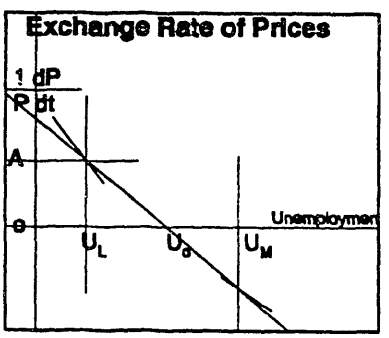

Figure 1: Phillips Curve

$$\dot{P} = v(Y_e - Y_a)$$

where:

$\dot{P}$ = Rate of change of prices of goods

Y_a=Observed production

Y_e=Level of equilibrium in the production

According to this equation, the rate of change of price is proportional to the deviation of the production from its equilibrium level. A change in price would induce changes in the same direction of the interest rate or in the opposite direction to real salaries.

Later, Phillips perceived an inverse relationship between inflation and unemployment. In his 1958 article, Phillips proposed the theory of inflation on demand, where he obtained the curve shown in Figure 1, today known as the Phillips curve.

Arthur Brown (1955), who used Philip's data, arrived at very different conclusions. He emphasized the fact that the relationship between inflation and unemployment varies significantly between different periods. Brown perceived that the changes in the costs associated with aggregate demand, were the biggest cause of inflation during the periods following the First and Second World Wars. For this reason Brown, proposed a different theory to explain inflation. To Brown, inflation was not a demand problem but rather an imbalance in the aggregate of supply.

This conflict between Phillips and Brown illustrates how different theories of inflation in their origins can be relatively contradictory. It could be argued that even though both authors based their discussions on *a priori* assumptions, they arrived at opposite conclusions.

D. The Monetary Theory of Inflation

The monetary theory of inflation emerges from Friedman's quantitative theory of money. This theory is based on the following:

> The expansion of the money supply at a higher rate than the growth of real production capacity in the country, is a necessary condition to generating inflation. (Surrey, 1989)

Inflation is the result of excessive growth in the supply of money over the real demand for money.

Monetarists claim that an exogenous increment in the money supply causes an excess in real monetary balances in relation to an appropriate level of real resources in the economy. In other words, any attempt to reduce liquidity in real terms will be offset by an increase in prices that will not stop until equilibrium is achieved.

According to Surrey, the most obvious criticism of this theory is the role of rational expectations. Another point dealt with the exogenous factors that affect the money supply. Every change in the money supply induced by the monetary authorities should be associated with a change in income level and a change in the value of financial assets. Consequently, the prices of these financial assets should also change, i.e., interest rates.

All of this criticism highlights the fact that the monetarist theory of inflation is not accepted by everyone, even though it has been supported by many mathematical models over the years.

E. The Estructuralists

Estructuralists propose several causes of inflation:

1. Low mobility of economic factors in the short term;
2. Indivisibility of the factors;
3. Relative flexibility in price reduction;
4. Relatively high inflexibility of the country's fiscal budget.

The fiscal deficit is one of several mechanisms proposed by various authors (Kiguel, 1986) as a cause of inflation. The following is their argument:

1. Different changes in the fiscal deficit impact aggregated demand. Considering that this deficit is not financed totally through domestic flow, any increase could affect the aggregated demand and consequently generate inflationary pressures on the economy.
2. A feedback effect between inflation and fiscal deficit has also been identified in high inflation economies. Due to the automatic increase in fiscal deficit with inflation, tax resources are offset by the diminishing value of money, which make the deficit larger each time.
3. In smaller economies, such as Latin America, where the countries do not have a mature capital market sufficiently large enough to finance the deficit through issuance of debt, governments are often tempted to abuse the country's monetary instrument. This creates a dynamic relationship between the fiscal deficit and the money supply, thereby generating more inflation.

There are many other theories that suggest the external sector as one cause of inflation in underdeveloped economies. These theories emphasize the role that the exchange rate plays in the economy. Authors such as Liviatan (1986) believe that depreciation in the exchange rate generates an increment in the inflation rate. Consequently, the government should adjust salaries using an indexing system. Other authors such as Dornbush (1986) suggest that forces adverse to the balance of payments hurt a country's inflation and the budgetary execution of the government. He also states that in a scenario where money is a passive entity, any changes in the exchange rate will cause inflation.

In this chapter I have given a sample of several theories that attempt to explain the inflationary process. Among the many economists, there does not seem to be any consensus on which theory is more applicable. As is well known, the Keynesians were criticized when they could not explain the U.S. inflation predicament in the 1960s. The Philip's curve lost its credibility when it was found that it did not explain the phenomenon accurately. The monetarist theories that rely exclusively on monetary phenomenon have been also neglected.

Considering all of this, Sims would argue that instead of using *a priori* theories to explain the inflation phenomenon, it is possible to arrive at good conclusions using the time series methodology. The next step would be to determine what variables should be included in the analysis. In order to do this, it is important to summarize the different theories and the variables they use (see Table 1).

Table 1. Theories about Inflation

Theories	**Main Variables**
Keynesians	Wages, Production, Fiscal Deficit, Interest Rates
Neoclassics	Wages, Interest Rates
Monetarists	Money Supply, Interest Rates, Fiscal Deficit
Estructuralists	Production Costs, Fiscal Deficit, Money supply, Interest Rates, International Reserves

In this thesis research, my intent was to use Granger's concept of causality (1988) as a way to determine causality channels between some of the macroeconomic variables of the U.S. and inflation in four Latin American economies.

CHAPTER THREE

GRANGER CAUSALITY, STATIONARITY, AND MODELING VARIABLES

Granger (1969) proposed that model specification could be improved if the techniques of time series analysis were used. The objective is to let the analysis of empirical data suggest possible relationships between the data without adding any *a priori* considerations. One of the goals that could be reached by using the time series analysis methodology is the establishment of causality among the variables. This causality could be defined in a very limited sense. Granger's concept of causality could be used to determine a statistical measurement depending on the information set chosen.

A. Causality

Causality could be defined as the capacity to predict according to a set of laws. Granger's concept of causality is this prediction capacity. He argues that if there are two processes, A and B, and the history of B could be used to predict A with better accuracy than only using A's historical data, then it could be concluded that B causes A.

Based on the principle just mentioned above and assuming that U represents the Universe of all the information needed, Granger argues that causality could be presented in three ways:

1. A process Y_t is said to cause another process X_t if in predicting X_t it is more important to use all of the information of Y_t than if it was not used at all. This could be represented as:

$$\sigma^2(X|U) < \sigma^2(X \mid \overline{(U-Y)})$$

2. Feedback: When two processes X and Y cause each other, as in:

$$\sigma^2(X|U) < \sigma^2(X \mid \overline{(U-Y)})$$

$$\sigma^2(Y|U) < \sigma^2(Y \mid \overline{(U-Y)})$$

3. Instant Causality: Occurs when X_t could be better predicted if the contemporaneous value of Y_t is used in the prediction model.

$$\sigma^2(X|U,Y) < \sigma^2(\overline{X \mid U}))$$

B. Testing for Causality

Based on these restricted definitions of causality, several authors have proposed several tests. One idea is to express X as an autoregressive process such as:

$$X_t = \Sigma\, d_{1j}\, X_{t-j} + \Sigma\, d_{2j}\, Y_{t-j} + \varepsilon_{1t}$$

where ε_{1t} is white noise. The hypothesis that Y does not cause X would be represented by having $d_{2j}=0$ for all values of j.

Sims proposed another test that is based on a regression with infinite lags on both sides:

$$X_{2t} = \Sigma\, b_j\, X_{1t,t-j} + V_t \text{ with j going from } -\infty \text{ to } +\infty$$

In this case X_{2t} does not cause X_{1t} if and only if $b_{(-j)}=0$ for (j=1,2,3,....)

Granger and several other authors (Granger, et al., 1980) have argued that these tests do not follow exactly his definition of causality for the following reasons:

1. According to the definition, the causality test should be done over the prediction period and not over the same period used to build the model. This emphasizes the idea that in order to build the prediction model there should not be any a priory knowledge of the prediction period.
2. By having extensive models with the autoregressions, the principle of parsimony is violated. This principle could be expressed as the following:
   a. the lower number of parameters to estimate, the better the judgment that could be done on the model; and
   b. the Time series models have been designed to evaluate the different properties of serial correlation in the data, not to explain the data itself. Then the objective is to describe the data with the lowest number of parameters possible.

In light of the discussion presented above, I evaluated several alternatives to test for causality. These are the econometric test, the cointegration test, and the post-sample test.

1. **Econometric Test**: Considering the definiton of causality presented above, a process Y_t is said to cause another process X_t if to predict X_t it is more important to use all of the information of Y_t than if it was not used at all. From the previous definition, it is inferred that by including Y_t, the error term should be significantly lower than by not including Y_t.

The purpose of this test is to compare the sum of the squared residuals of two models. One model is X_t as a function $(X_{t-1}, X_{t-2},...,X_{t-p})$ and the other is X_t as a function of $(X_{t-1}, X_{t-2},...,X_{t-p}, Y_{t-1}, Y_{t-2},...,Y_{t-p})$.

To implement this test, a particular autoregressive lag (p) is assumed, and then using OLS the following model is estimated:

$$X_t = C_1 + \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + ... + \alpha_p X_{t-p} + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + ... + \beta_{t-p} Y_{t-p} + \mu_t$$

We then conduct a test of the Null Hypothesis:[1]

$$H_0 : \beta_1 = \beta_2 = ... = \beta_p = 0$$

The next step is to calculate the sum of squared residuals RSS_1 for the model described above, and compare this with the sum of squared residuals RSS_0 of X_t as a function $(X_{t-1}, X_{t-2},...,X_{t-p})$.

We then conduct an F-test comparing the sum of squared residuals for both models:

$$S_1 = \frac{(RSS_O - RSS_1)/p}{RSS_1/(T - 2p - 1)}$$

[1] Time Series Analysis text.

If S_1 is > 5% critical value of an F(p, T-2p-1) distribution, then the null hypothesis can be rejected. Meaning that Y_t does Granger Cause X_t.

2. **Cointegration Test**: Cointegration means that although many developments can cause permanent changes in the individual elements of Y_t, there is some long-run equilibrium relationship tying the individual components together in the form of a linear combination. More formally, a vector time series Y_t is said to be cointegrated if each of the series taken individually are nonstationary while some linear combination of the series is stationary.[2] This approach is used to test the null hypothesis that there is no cointegration among the elements of an (n x 1) vector Y. The rejection of the null hypothesis is then taken as evidence of cointegration.

One economic hypothesis that lends to a natural cointegration interpretation is the theory of purchasing power parity. This theory holds that, excluding transportation costs, goods should sell for the same effective price in two countries. The following expression is a mathematical representation of this theory:

$$z_t = p_t - s_t - p_t^*$$

where

p_t = log (index of price level in the U.S.)

s_t = log (exchange rate $/peso)

p_t^* = log (price index in Mexico or any other country)

---

[2] Time Series Analysis text.

Consequently for cointegration to occur, Z_t has to be stationary, even though the individual elements (p,s and p*) are all non-stationary. For purposes of this thesis, the index price levels are the inflation index of the respective countries compared to the U.S.

3. **Post Sample Test** (Ashley, et al, 1980): Granger, along with other authors, has argued that these tests do not follow exactly his definition of causality. As mentioned above, the causality test should be done over the prediction period and not over the same period used to build the model.

Assuming that Y causes X, the proposed methodology could be carried out by applying the following steps:

1. The first step is to split the data in two periods. The first period should be used to calculate the best model. The second period (predictive period) is used to evaluate the predictive capacity of the model. For purposes of this thesis, the modeling period extends from March, 1980 to December, 1993, and the forecasting period extends from January, 1994 to January, 1995.
2. Once the best parsimonious model has been calculated, it is necessary to evaluate the predictive capacity of the model with the sum of the squared residuals.
3. The next step is to eliminate Y from the initial Model. With this new model, we calculate the sum of the squared errors for the predictive period.

4. Then, if the sum of the squared errors obtained to predict X including Y is significantly smaller than the sum of the squared errors without Y, it could be argued that Y causes X. The next presents a brief presentation of the test:

Considering the following two sets of information (J_t, and J_t') where:

$J_t : X_{t-j}, Y_{t-j}$, for $j>0$

J_t': X_{t-j} for $j>0$

From Granger's definition of causality, if Y_t Granger causes X_t, then X_{t+1} is better predicted if the variable Y_{t-j} is included in the model than in the case that Y_t is not present. The significance test outlined by the authors (Ashley, et al., 1980) is based on the variables Dif_t and Sum_t defined as:

$$Dif_t = e_{1t} - e_{2t}, \text{ and}$$

$$Sum_t = e_{1t} + e_{2t}.$$

Then if the following regression is applied:

$$Dif_t = \beta_1 + \beta_2 (Sum_t - \text{Sample Mean } (Sum_t))$$

where:

$\beta_{1,2}$ are proportional to the difference in the variance of the error prediction of the two models specified in (J_t and J_t').

Then by testing the reduction in the forecasting squared error with respect to J_t (the restricted model) is equivalent to testing the null hypothesis:

$$Ho: \beta_1 = \beta_2 = 0$$

C. Stationarity

A series is stationary when both the mean and the variance are constant, and independent of time. There are several possible methodologies for transforming a non-stationary series to stationary. One method is to apply filters ad-hoc; another is to apply successive differences, etc. This thesis considers only the successive differences to transform the non-stationary variables into stationary variables.

Given the case that a series is not stationary, its structure would vary over time leading to erroneous results when calculating causality. There are several tests to evaluate the stationarity of a series. One of the most well-known is the test developed by Evans and Savins (1981); another test has been developed by Dickey and Fuller (1981).

Evans and Savin's test is based on the following model:

$$Y_t = \alpha\, Y_{t-1} + \epsilon_t \sim N(0,\sigma^2)$$

The null hypothesis states that:

$$H_0: \alpha = \alpha_0, \text{ for } \alpha_0 \sim 1$$

Evan and Savins conclude that the model for Y_t presented above observes the following:

$$\lim_{T \to \infty} \quad P\left(\frac{T}{\sqrt{2}}(\hat{\alpha} - \alpha) \leq x\right) = F(x, \alpha)$$

where:

P is the probability,
T the Number of observations,
$\hat{\alpha}_t$ is the regression coefficient, $\alpha = 1$, and
$F(x,\alpha)$ is the cumulative distribution function.

Then, for every model, the value obtained is compared with a table developed by them, to determine the significance level of the test. This test is used in the cointegration procedure described above.

Another very well-known test was developed by Dickey and Fuller. They developed the following models:

Model 1: $Y_t = \alpha + \rho Y_{t-1} + \epsilon_t \; (t=2,3,\ldots,n)$

$H_0: (\alpha,\rho) = (0,1)$

$\tau_{\alpha,\mu} = (1/S_{\alpha,\mu})\, \hat{\alpha}_\mu$

$\Phi_1 = (1/2S^2_{\varepsilon\mu})\,[\,(n-1)\,\hat{\alpha}_0 - (n-3)\,S^2_{\varepsilon\mu}\,]$

Model 2: $Y_t = \alpha + \beta T + \rho Y_{t-1} + \epsilon_t \; (t=2,3,\ldots,n)$

$H_0: (\alpha,\beta,\rho) = (0,0,1)$

$\tau_{\alpha,\tau} = \hat{\alpha}_\tau \sqrt{C11\; S^2_{\alpha,\tau}}$

$\Phi_2 = (1/3S^2_{\varepsilon\tau})\,[\,(n-1)\,\hat{\alpha}^2_0 - (n-4)\,S^2_{\varepsilon\tau}\,]$

Model 3: $Y_t = \alpha + \beta T + \rho Y_{t-1} + \epsilon_t \ (t=2,3,\ldots,n)$

$H_0: (\alpha,\beta,\rho) = (0,0,1)$

$\tau_{\alpha,\mu} = \beta_\tau (C22\ S^2_{\alpha,\tau})^{-1/2}$

$\Phi_3 = (2S^2_{\varepsilon\tau}) [\ (n-1)\ \{\hat{\alpha}^2_0 - (y_{(0)} - y_{(-1)})^2\} - (n-4)\ S^2_{\varepsilon\tau}\ ]$

To test the null hypothesis for the three models, the statistics Φ_1, Φ_2, and Φ_3 are used. To reject the null hypothesis it is required that those statistics (Φ_1, Φ_2, and Φ_3) be below certain parameters calculated by Dickey and Fuller.

D. Information Set

As mentioned in the Chapter One, and taking into account the different restrictions on gathering appropriate information with the required periodicity, a database was built with the variables shown in the following table:

Table 2: Variables of evaluation in the study

Error! Bookmark not defined.VARIABLE	NOTATION	PERIODICITY	SOURCE
Inflation	INF	1980:03 - 1996:01 Monthly	IMF - Data Base
Nominal Exchange Rate	XCH	1980:03 - 1995:03 Monthly	IMF - Data Base
International Reserves	RESERV	1980:03 - 1996:04 Monthly	IMF - Data Base
Effective Int. Rates/CDs	CDS	1980:03 - 1995:12 Monthly	IMF - Data Base
US Inflation	US INF	1980:03 - 1995:05 Monthly	IMF - Data Base
US T-Bills	T-BILL	1980:03 - 1995:06 Monthly	IMF - Data Base

E. Stationarity Procedure and Tests on the Information Set

Considering that these variables (shown in the Appendix) have a very non-stationary behavior, I have first transformed the series into stationary series and then applied the test devised by Dickey and Fuller.

1. Transformation of the variables:

The transformation of the variables was done by taking the first or second logarithmic differences. In case the variable only needed one differentiation, a "V" (for velocity) was added to the variable's name; if the series needed another differentiation, an "A" (for acceleration) was added to the variable's name. Once the transformation was done for every country, the new transformed series was tested using Dickey and Fuller's coefficients. The resulting coefficients were later compared to the authors' tables in order to evaluate the degree of stationarity of the series and in case the test was not significant according to the authors' tables, the series underwent another differentiation.

The following table presents the test results for all of the variables in the study.

Table 3: Stationarity Test

VARIABLES	Type V: Vel A: Accel	Φ_1	Φ_2	Φ_3
Argentina				
- Inflation	Velocity	18.451	12.405	18.608
- Exchange Rate	Acceleration	370.79	247.21	370.82
- Int. Rates(CDs)	Velocity	77.654	51.321	76.982
- Reserves	Acceleration	273.85	182.57	273.86
Brasil				
- Inflation	Acceleration	116.25	77.89	116.74
- Exchange Rate	Acceleration	120.41	80.43	120.64
- Int. Rates(CDs)	Velocity	69.51	46.079	69.118
- Reserves	Acceleration	264.66	176.44	264.66
Chile				
- Inflation	Velocity	32.543	21.479	32.218
- Exchange Rate	Acceleration	335.31	223.55	335.32
- Int. Rates(CDs)	Velocity	112.84	74.474	111.71
- Reserves	Acceleration	308.34	205.67	308.51
Colombia				
- Inflation	Velocity	46.22	30.538	45.808
- Exchange Rate	Acceleration	272.59	181.73	272.6
- Int. Rates(CDs)	Acceleration	68.171	45.187	67.781
- Reserves	Acceleration	341.63	227.76	341.63
Mexico				
- Inflation	Acceleration	106.90	71.675	107.51
- Exchange Rate	Acceleration	294.68	196.59	294.89
- Int. Rates(CDs)	Velocity	20.861	13.845	20.662
- Reserves	Acceleration	528.03	352.92	529.38
U.S.				
- Inflation	Velocity	32.056	21.166	31.749
- T-BILLS	Acceleration	131.86	87.909	131.86
Venezuela				
- Inflation	Velocity	37.677	24.87	37.305
- Exchange Rate	Acceleration	260.05	173.37	260.06
- Int. Rates(CDs)	Velocity	84.695	55.902	83.852
- Reserves	Acceleration	313.72	209.15	313.72

By comparing these statistics with the tables presented by Dickey and Fuller, it can be noticed that they are significantly greater than those presented by them at a significance level of 99% for a sample size between 100 and 250. Then it can be concluded that the transformed series are stationary.

CHAPTER FOUR

TESTING FOR CAUSALITY - METHODOLOGIES AND RESULTS

Considering the three types of causality tests described in Chapter Three, this chapter presents the results of applying the tests. In addition, to better understand the inflationary phenomenon of the economies listed in Table 3, along with the causality test from the U.S. inflation and interest rates, a multivariate model was constructed for every country in the sample.

Each of the variables in the model is represented using the following guide:

The first letter indicates if the variable had to be transformed to its Velocity (first difference) or Acceleration (second difference); the next part of every variable indicates the name of the variable; and the last part contains the value of the lag.

For example: $Vinf_{t-1}$ represents the velocity of inflation lagged for one period. In order to simplify the model, the corresponding t statistic has been placed underneath each variable, and to complement the results of the model, the coefficient R^2 has also been stated.

Recognizing that Latin America, as well as other parts of the world, has integrated its markets, this chapter also analyzes the inflation of the new economic regions that have developed in the last few years. These are the Andean Pact countries which include

Colombia, Venezuela, Peru and Ecuador, and Mercosur currently consisting of Argentina, Brasil, Uruguay and Paraguay. A better understanding of the various dynamics between the countries in these two regions could provide some valuable insight in terms of understanding the causality of inflation in the regions.

A. Causality Tests and Results

The following table lists the different causality tests that are being applied in this study.

Type of Test	Methodology
1. Econometric Test	1. Estimate Model for X_t, $X_t = C_1+\alpha_1 X_{t-1}+\alpha_2 X_{t-2}+ \dots +\alpha_p X_{t-p}$ RSS_0= Sum of Squared Residuals 2. Estimate Model including Y_t $X_t = C_1+\alpha_1 X_{t-1}+ \dots +\alpha_p X_{t-p}+\beta_1 Y_{t-1}+\dots+\beta_{t-p} Y_{t-p}+ \mu_t$ Null Hypothesis: $H_0 : \beta_1 = \beta_2 =\dots= \beta_p = 0$ RSS_1= Sum of Squared Residuals Bivariate Model 3. Calculate (S_1) $$S_1=\frac{(RSS_O - RSS_1)\,p}{RSS_1(\,T - 2p - 1\,)}$$ 4. If S1 > 5% critical value of an F(p, T-2p-1) distribution. Then Null Hypothesis can be rejected, meaning that T does cause Granger X.
2. Cointegration Test A vector time series Y_t is said to be cointegrated if each of the series taken individually are nonstationary while some linear combination of the series is stationary.	1. Check for non stationarity of the series p_t, s_t, p_t^* 2. Calculate the following expression: $$z_t=p_t - s_t - p_t^*$$ Where p_t = log (index of price level in the US) s_t = log (exchange rate US$/peso) p_t^* = log (price index in Mexico or any other country) 3. Determine if the resulting series(Z_t) is stationary. 4. Consequently for cointegration to occur, Z_t has to be stationary, even though the individual elements (p, s and p*) are all non-stationary.

Type of Test	Methodology
Out of Sample Performance Forecasting	1. The first step is to split the data in two periods. The first period should be used to calculate the best model. The second period should be used to evaluate the predictive capacity of the model. For purposes of this thesis, the modeling period extends from March 1980 to December 1993, and the forecasting period from January 1994 to January 1995. 2. Once the best parsimonious model has been calculated, it is necessary to evaluate the predictive capacity of the model by considering the sum of the squared errors. $J_t : X_{t-j}, Y_{t-j}$, for $j>0$ 3. The next step is to eliminate Y from the initial Model. With this new model, we calculate the sum of the squared errors for the forecasting period. $J_t^{'}: X_{t-j}$ for $j>0$ 4. Then, if the sum of the squared errors obtained to predict X including Y is significatively bigger than the sum of the squared errors without Y, it could be argued that Y Causes X. $Dif_t = e_{1t} - e_{2t}$, and $Sum_t = e_{1t} + e_{2t}$ 5. Then if the following regression is applied: $Dif_t = \beta_1 + \beta_2 (Sum_t - \text{Sample Mean}(Sum_t))$ β_2 is proportional to the difference in the variance of the error prediction of the two models specified in (J_t and $J_t^{'}$). 6. Then to test the significant reduction in the forecasting squared error with respect to J_t(the restricted model) is equivalent to test the null hypothesys: $Ho : \beta_1 = \beta_2 = 0$

1. Econometric Test

The first step in this methodology is to develop the univariate and bivariate models of inflation for every country in the study. Considering the data, all of the univariate and bivariate models are calculated for the sample ranging from 1980:3 until 1994:12.

Argentina:

Initial Model:

	Coefficient	Variable	t-statistic
VINF =	0.705	$VINF_{t-1}$	12.50
	-0.119	$VINF_{t-3}$	-2.04
	+0.220	$VINF_{t-6}$	4.18
	-0.209	$VINF_{t-12}$	-3.84

$R^2 = 0.551$, SSR = 89.53

Model Including US data:

	Coefficient	Variable	t-statistic
VINF =	0.67	$VINF_{t-1}$	12.40
	+0.22	$VINF_{t-6}$	3.97
	-0.24	$VINF_{t-12}$	-4.35
	-0.04	$ATBILL_{t-1}$	-0.76
	+0.007	$ATBILL_{t-6}$	0.12
	+0.04	$ATBILL_{t-12}$	0.79

$R^2 = 0.55$, SSR = 87.52. US Data not significant. Consequently there is not evidence of causality

Brasil:

Initial Model:

	Coefficient	Variable	t-statistic
AINF =	-0.450	$AINF_{t-12}$	-6.58

$R^2 = 0.197$, SSR = 154.08

Model Including US data:

	Coefficient	Variable	t-statistic
AINF =	-0.454	$AINF_{t-12}$	-6.68
	-0.125	$VUSinf_{t-3}$	-1.89

$R^2 = 0.212$, SSR = 151.01

Causality Test:

$S_1 = 0.23 < F(12, 141) = 1.8$, The Null Hypothesis can't be rejected, consequently there is ——————> NO CAUSALITY FROM US Inflation to Brasil's Inflation

Chile

Initial Model:

	Coefficient	Variable	t-statistic
VINF =	0.434	$VINF_{t-1}$	6.99
	-0.329	$VINF_{t-12}$	-5.20

$R^2 = 0.355$, SSR = 127.14

Model Including US data:

1. US Inflation is not significant
2. Causality Test on US T-Bills:

	Coefficient	Variable	t-statistic
VINF=	0.479	$VINF_{t-1}$	7.614
	-0.292	$VINF_{t-12}$	-4.619
	-0.101	$ATBILL_{t-1}$	-1.666
	-0.187	$ATBILL_{t-12}$	-3.060

$R^2 = 0.406$, SSR = 111.77

Causality Test:

$S_1 = 1.61 < F(12, 141) = 1.8$, The Null Hypothesis can't be rejected, consequently there is—> NO CAUSALITY FROM US T-BILLS to Chilean Inflation

Colombia

Initial Model:

	Coefficient	Variable	t-statistic
VINF =	0.327	$VINF_{t-1}$	5.347
	-0.459	$VINF_{t-12}$	-7.700

R^2= 0.344, SSR = 91.19

Causality Test:

S_1 = 0.445 < F(12 , 141)=1.8, The Null Hypothesis can't be rejected, consequently there is-->

NO CAUSALITY FROM US T-BILLS to Colombian Inflation

Model Including US data:

	Coefficient	Variable	t-statistic
VINF=	0.326	$VINF_{t-1}$	5.141
	-0.454	$VINF_{t-12}$	-7.292
	+0.092	$ATBILL_{t-12}$	1.70

R^2= 0.36, SSR = 87.86

Model Including US data:

	Coefficient	Variable	t-statistic
VINF=	0.312	$VINF_{t-1}$	4.881
	-0.456	$VINF_{t-12}$	-7.36
	+0.099	$USVINF_{t-1}$	1.787
	+0.069	$USVINF_{t-12}$	1.21

R^2= 0.36, SSR = 87.43

S_1 = 0.50 < F(12 , 141)=1.8, The Null Hypothesis can't be rejected, consequently there is-->

NO CAUSALITY FROM US Inflation to Colombian Inflation

Mexico

Initial Model:

	Coefficient	Variable	t-statistic
AINF=	-0.108	$AINF_{t-3}$	-1.707
	-0.525	$AINF_{t-12}$	-8.355

R^2= 0.286, SSR = 95.154

Causality Test:

S_1 = 0.31 < F(12 , 141)=1.8, The Null Hypothesis can't be rejected, consequently there is-->

Model Including US data:

	Coefficient	Variable	t-statistic
AINF=	-0.102	$AINF_{t-1}$	-1.707
	-0.531	$AINF_{t-12}$	-7.88
	-0.078	$VUSINF_{t-12}$	-1.99

R^2= 0.299, SSR = 92.73

NO CAUSALITY FROM US Inflation to Mexican Inflation

Venezuela

Initial Model:

	Coefficient	Variable	t-statistic
VINF =	0.356	$VINF_{t-1}$	5.627
	0.123	$VINF_{t-6}$	1.981
	-0.367	$VINF_{t-12}$	-5.873

R^2=0.324, SSR = 127.443

Model Including US data:

	Coefficient	Variable	t-statistic
VINF =	0.282	$VINF_{t-1}$	4.03
	+0.129	$VINF_{t-6}$	1.93
	-0.395	$VINF_{t-12}$	-5.72
	+0.175	$USVINF_{t-1}$	2.48

R^2=0.354, SSR = 119.36

Causality Test:

S_1 = 0.796 < F(12 , 141)=1.8, The Null Hypothesis can't be rejected, consequently there is--> NO CAUSALITY FROM US Inflation to Mexican Inflation

2. Cointegration Test

Argentina

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	0.738	Non Stationary
LINF(LOG INFLATION RATE):	0.730	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t=p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	1.00854	Non Stationary
ZINT	0.74230	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Argentina's inflation.

Brasil

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	1.4368	Non Stationary
LINF(LOG INFLATION RATE):	0.4147	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t = p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	1.6838	Non Stationary
ZINT	1.8787	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Brasil's inflation rate.

Chile

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	0.6367	Non Stationary
LINF(LOG INFLATION RATE):	0.3088	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t = p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	-0.147	Non Stationary
ZINT	-3.7	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Chile's inflation.

Colombia

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	0.799	Non Stationary
LINF(LOG INFLATION RATE):	-4.92	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t = p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	0.683	Non Stationary
ZINT	0.746	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Colombia's inflation.

Mexico

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	0.739	Non Stationary
LINF(LOG INFLATION RATE):	-0.044	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t = p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	0.3647	Non Stationary
ZINT	0.4117	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Mexico's inflation.

Venezuela

1st. Step: Stationarity Test using Evans and Savins procedure:

VARIABLE	Test Result	
LXCHG (LOG EXCHG RATE):	1.282	Non Stationary
LINF(LOG INFLATION RATE):	0.421	Non Stationary
LTBILL(LOG US T-BILLS):	-2.544	Non Stationary
LUSINF(LOG US INFLATION):	-1.035	Non Stationary

2nd. Step: Test to see wether $z_t = p_t - s_t - p_t^*$ is stationary.

Where p_t = log (index of price level in the US)
s_t = log (exchange rate US$/peso)
p_t^* = log (price index in Mexico or any other country)

VARIABLE	Test Result	
ZXCHG (z_t)	1.1731	Non Stationary
ZINT	0.9807	Non Stationary

COINTEGRATION TEST: Considering that the resulting Z for the exchange calculation, and the interest rate estimate proves that there is **no cointegration** between US inflation, US interest rates, and Venezuela's inflation.

3. Post Sample Performance Testing:

As described in the previous section, the evaluation of the post-sample forecasting performance of the models fitted to the original series is done by evaluating the null hypothesis:

$$Dif_t = \beta_1 + \beta_2 (Sum_t - \text{Sample Mean}(Sum_t))$$

$$\text{Null Hypothesis: } H_0 = \beta_1 = \beta_2 = 0$$

All of the models considered are based on the statistical significance of including U.S. T-bills or U.S. inflation in the bivariate models of the local country's inflation.

The following table presents the results of this test. For the case of Argentina, the inclusion of U.S. T-bills or U.S. inflation is not statistically significant. In this case it can be concluded that there is no causality from U.S. T-bills and U.S. inflation toward Argentina's inflation.

Brazil

From the bivariate models presented above, the following model tests the post-sample forecasting of Brazil's inflation as a function U.S. inflation. From 1994:1 until 1994:12.

FROM 1994:1 UNTIL 1994:12

$R^2 = 0.0373$, DURBIN-WATSON 2.998

$$Dif_t = -0.00048 - 0.00011\ (Sum_t - \text{Sample Mean}\ (Sum_t))$$
$$\qquad\quad (-1.43) \qquad (-0.623)$$

From the resulting model it can be seen that both β_1 and β_2 are not significant, and consequently there is no significant improvement from the bivariate model versus the univariate model.

Chile

From the bivariate models presented above, the following model tests the post-sample forecasting of Chile's inflation as a function U.S. T-bills. From 1994:1 until 1994:12.

$R^2 = 0.1949$, DURBIN-WATSON 1.135

$Dif_t = -0.000328 - 0.00781\ (Sum_t - \text{Sample Mean}\ (Sum_t))$
(0.0413) (-1.55)

Similar to the previous model, there are problems in the specificity of the resulting model and consequently there is no feasibility in accepting the null hypothesis.
These problems are also present in the cases of Mexico and Venezuela.

Colombia

From the bivariate models presented above, the following model tests the post-sample forecasting of Colombia's inflation as a function U.S. T-bills. From 1994:1 until 1994:12.

$R^2=0.305$, DURBIN-WATSON= 1.2

$Dif_t = -0.0024 - 0.0052\ (Sum_t - \text{Sample Mean}\ (Sum_t))$
(-1.214) (-2.09)

As opposed to the previous case, there is evidence of causality considering the signficance level of the difference. Consequently there is evidence that supports the no feasibility in rejecting the null hypothesis.

B. Summary of Causality Results

The results for the causality using Granger's methodology that are summarized in the following Table 5. These findings clearly show that for the period ranging from 1980 to 1995 there is no causality from U.S. inflation and U.S. T-bills toward inflation in the largest economies of Latin America.

Table 5: Causality Results

Country	Granger Test	Cointegration	Post Sampling
Argentina	None	None	None
Brasil	None	None	None
Chile	None	None	None
Colombia	None	None	Accepted
Mexico	None	None	None
Venezuela	None	None	None

C. Other Models for Inflation

Considering the previous findings of no causality from the U.S. to Latin American inflation, this phenomenon should be caused by each country's domestic forces. The following models consider every country in the study and estimate the best model that would explain inflation.

1. Argentina

The best explicative and parsimonious models for inflation in Argentina were evaluated by considering inflation's own lags and the other variables in the universe previously defined. After having eliminated any collinearity problems in every model, it

was decided to leave only those variables with a significance value greater than 90%. Based on this, the resulting model for Argentina is the following:

	Coefficient	Variable	t-statistic
VINF=	0.61	$VINF_{t-1}$ in Arg	(12.92)
	+0.24	$VINF_{t-6}$ in Arg	(5.19)
	-0.22	$VINF_{t-12}$ in Arg	(-4.87)
	-0.11	$AXCH_{t-1}$ in Arg	(-2.60)
	-0.17	$AXCH_{t-1}$ in Arg	(-3.83)
	-0.07	$AXCH_{t-6}$ in Arg	(-1.74)
	+0.29	$VCDS_{t-1}$ in Arg	(6.71)
	+0.13	$VCDS_{t-3}$ in Arg	(2.77)
	-0.07	$ARESERV_{t-6}$ in Arg	(-1.70)
	-0.13	$ARESERV_{t-12}$ in Arg	(-2.99)

R^2= 0.724

As mentioned before, this model was developed for the period from March, 1980 to December, 1993. This is a period with structural changes in the country's economy. During most of the 1980's, Argentina's economic policy was adjusted to withstand the foreign debt crisis, high inflation, and high fiscal deficits. All of these factors combined disrupted the country's financial markets and eventually led to hyperinflation at the end of the decade. This is partially explained in the model if we consider the high degree of inertia of the Inflation.

The Argentinean government tried several plans to control this phenomenon, but it was only after the country began to control its fiscal spending and promoted deregulation and privatization that the first serious attempts to reduce inflation were successful. Before the country established the Convertibility Plan in 1991, its exchange rate, combined with a very tight monetary policy, led to a substantial overvaluation of the country's domestic

currency. The government then decided to reduce its domestic costs to partially compensate for the appreciation of the peso. These initiatives brought down producer costs, but increased the dependency of inflation to foreign investment in the country.

During the period from 1990 to 1994, a strict fiscal policy coupled with privatization of the government's public utilities, earned the government a total of $17.5 billion pesos, enough money to drive the expansionary phase until the early 1990s. All of these factors boosted the economy and led to real GDP growth of 34% during the period from 1990 to 1994. Domestic demand was fueled by the increase of capital inflows of foreign capital into the country. The 1990-1994 expansion was accompanied by rapidly falling inflation, from 4,900% in 1989 to 3.4% in 1995. Considering that the period of this analysis is from 1980 to 1994, the inflation model reflects most of the inflationary processes in Argentina.

One important issue in Argentina is that its growth became more dependent on exports and investment. In 1993 interest payments abroad fell to $3.2B, the lowest amount since the 1980s. On the other hand, Argentina's export growth averaged 2% in the early 1990s but expanded to 26% in 1994, fueled primarily by demand from Brazil. In recent years Brazil has become the largest single buyer of Argentinean products.

With the advent of Mercosur and trade liberalization between Argentina and Brazil, the Argentine economy has become more dependent on Brazil's, as exports to the U.S. and Europe have stagnated.

Considering the traditional ties between the Argentine and Brazilian economies, a model to explain Argentina's inflation as a function of Brazil's data was developed. The results of this model is shown in the following:

	Coefficient	Variable	t-statistic
VINF =	+0.69	$VINF_{t-1}$ in Arg	(13.80)
	+0.21	$VINF_{t-6}$ in Arg	(3.89)
	-0.23	$VINF_{t-12}$ in Arg	(-4.62)
	-0.14	$AXCH_{t-1}$ in Brasil	(-2.08)
	-0.10	$AXCH_{t-6}$ in Brasil	(-1.90)
	-0.23	$VINF_{t-1}$ in Brasil	(-4.1)
	+0.16	$VINF_{t-6}$ in Brasil	(2.79)
	+0.09	$VCDS_{t-1}$ in Brasil	(1.40)
	+0.20	$VCDS_{t-3}$ in Brasil	(4.05)
	+0.11	$VCDS_{t-12}$ in Brasil	(1.98)
	-0.09	$ARES_{t-1}$ in Brasil	(-1.89)
	-0.09	$ARES_{t-3}$ in Brasil	(-2.00)

R^2= 0.67050726

This model clearly shows the high degree of interdependence between the two countries. Argentina's inflation can be explained in part by Brazil's inflation. Historically, even before the creation of Mercosur, in the late 1980s and early 1990s, Brazil had become Argentina's biggest trading partner. In the period from 1991 to 1995 Argentina's exports to Brazil was double the amount of exports to the U.S.

2. Brazil

Considering the same assumptions described in Argentina's model, Brazil's resulting model is the following:

	Coefficient	Variable	t-statistic
VINF =	0.77	$VINF_{t-1}$ in Brasil	(17.61)
	-0.18	$VINF_{t-12}$ in Brasil	(-4.38)
	-0.19	$AXCH_{t-1}$ in Brasil	(-3.52)
	+0.20	$VCDS_{t-1}$ in Brasil	(3.96)
	+0.07	$VCDS_{t-3}$ in Brasil	(1.76)
	-0.24	$VCDS_{t-12}$ in Brasil	(-5.58)
	-0.08	$ATBILL_{t-24}$ in the US	(-2.20)

$R^2 = 0.75$

In the early 1980s, the Brazilian economy faced a dramatic decline, and strong growth financed by external borrowing came to a stop due to the rise in international interest rates in 1982. Debt service on the country's debt was equivalent to 97% of the country's earnings from exports. This situation, combined with the Mexican and Argentinean debt crisis, generated a lack of confidence from the international finance community and subsequently many banks refrained from providing any more financing to the country. The consequence was an increase in government expenditure that destabilized the economy and generated big inflationary problems in the country.

Several administrations tried unsuccessfully to stabilize the economy, some with policies intended to control the country's hyperinflation. Major stabilization attempts, such

as the Cruzado Plan, the Summer Plan, or the Collor plan, were based on the idea that the main cause of inflation was the indexation of prices, so they attempted to reduce the public sector deficit. The indexation of the prices before 1993 are captured in the country's inflation model presented above. This model accurately shows that Brazil's inflation variable still has a strong inertial component from its lags for one month and twelve months.

These plans were not successful in controlling the inflationary phenomenon, and created an indexation problem that was out of control. During 1993, the government embarked on a plan to reduce the fiscal deficit and eliminate price indexing. To accomplish this task, the government proposed the creation of a Social Emergency Fund (SEF) that Congress approved in 1994. This plan established a link between revenues and expenditures under which the government would cover its expenses from the revenues it generated. To de-index prices, the government introduced a transactional unit, the Unit of Real Value (URV), and all prices were converted to URV. These measures were also applied to contracts by eliminating any indexation of contracts and wages. These measurements resulted in a balanced budget by 1994 and reduced the country's inflation rate to 18% by mid-1996.

Another consequence of Brazil's inflation was the tremendous rise in Brazil's foreign debt to finance the country's needed growth during the 1970s. This high indebtedness left the country exposed to high interest rates. The 1980s were characterized by repeated debt renegotiations and rescheduling of commercial debt in 1983, 1984 and 1988. The aftermath

of these negotiations reduced the debt service reserve from 97% to 24% of earnings from exports.

The country also reached an agreement on interest rates with the Bradi Plan deal in 1992. This plan was intended to restructure the debt of all long-term public debt owed to commercial banks. After several rounds of debt refinancing, Brazil suddenly found itself with a large surplus of capital which prompted an increase of capital flows in the form of direct investment and portfolio investment that was attracted by high domestic interest rates. These capital inflows grew so strong that the government imposed several restrictions on short-term capital in order to reduce the pressure that this phenomenon caused on monetary expansion and the exchange rate.

All of these factors occurring during the 1980s and the first half of the 1990s are very well captured in the inflation model and explain why Brazil's inflation is partly explained by the U.S. T-bills.

In the external sector, in contrast to Argentina's case, the major proportion of Brazil's imports and exports are traded with the European Union and the U.S. After the creation of Mercosur in 1994, Argentina became the second largest single trading partner with Brazil, accounting for 9.5% of the country's exports by the end of 1994.

3. Chile

	Coefficient	Variable	t-statistic
VINF=	0.50	$VINF_{t-1}$ in Chile	(8.04)
	-0.29	$VINF_{t-12}$ in Chile	(-4.62)
	+0.19	$AXCH_{t-1}$ in Chile	(3.22)
	-0.18	$ATBILL_{t-12}$ in US	(-3.07)

$R^2 = 0.40$

The Chilean economy, like the other economies in the region, suffered the same hyperinflation problems. During the period from 1972 until 1978, the country experienced an average inflation rate of 211% per year. This was followed by a tightening of the fiscal deficit and a privatization effort led by the government of General Pinochet. After coming to power, the new government brought open market policies to the country and reduced tariffs to a uniform 10% by 1980, forcing industry and public sector companies to reduce their costs in order to compete internationally. The government was determined to reduce the high inflation problem left over from previous decades. Pinochet's policies were aimed at reducing the fiscal deficit and balancing the budget as major factors to controlling the country's inertial inflation.

Due to the economy's high dependence on copper, coupled with a fall in the international price of copper, in 1983 the country was forced to renegotiate its foreign debt. During the latter part of the 1980s when the government reprivatized public companies, the public sector deficit was eliminated entirely. Private sector investment rose sharply in this period, and the country began to grow at a tremendous rate (5% per year). High investment

and high consumption caused economic growth to accelerate again, and as of 1995 Chile had completed 11 years of unimterrumped economic expansion with an average GDP growth of 6.4% per year.

After the return of democracy in Chile in the early 1990s, the country increased its debt level an average of 5% per year. This phenomenon is reflected in the inflation model because at higher debt levels, the exchange rate and the inflation become affected by the whole phenomenon.

4. Colombia

	Coefficient	Variable	t-statistic
VINF =	0.34	$VINF_{t-1}$ in Colombia	(5.56)
	-0.43	$VINF_{t-12}$ in Colombia	(-7.14)
	+0.16	$ARESERV_{t-3}$ in Colombia	(3.03)
	+0.09	$ATBILL_{t-12}$ in US	(1.74)
	+0.09	$VUSINF_{t-1}$ in US	(1.77)

$R^2 = 0.40$

The Colombian economy has behaved differently than most of its neighbors. Thanks to relatively cautious management during the 1970s, was able to weather the debt crisis of the 1980s without the problems experienced by other countries. Colombia sustained its debt payments, as opposed to most of the other Latin American countries which did not. The region's negative image with regard to lending affected Colombia's abilit to get loans to expand the economy during the 1980s. Creditors demanded that the IMF approve

Colombia's economic development programs and its performance before any new debt would be arranged. Ever since the IMF approved the country's economic performance in 1985, the government began to acquire the needed loans to finance economic expansion. In the early 1990s Colombia's excellent creditworthiness was used to replace its debt with cheaper financing available on the international markets. Even after the Mexican crisis, multilateral lenders have been the source of funds for social development.

The country's success in restructuring its high interest rate debt for lower and better terms in the international capital markets has been one of the reasons why the economy has not suffered the high inflation rates that other countries in the region have maintained. Since 1980, annual inflation has typically held between 18% and 30%. Although several governments have tried to attack the problem, the growing fiscal deficit and high degree of price indexation have created economic stagnation.

As in other countries, Colombia's inflation is dependent on U.S. interest rates, and for this reason it is important to evaluate whether this dependency could be classified as a causal effect. With this in mind, the next step is to determine the causality using Granger's definition of U.S. to Colombian inflation using the methodology described in the previous chapter.

5. Mexico

	Coefficient	Variable	t-statistic
VINF =	0.80	$VINF_{t-1}$ in Mexico	(19.28)
	-0.22	$VINF_{t-12}$in Mexico	(-5.45)
	+0.11	$AXCH_{t-6}$ in Mexico	(2.67)
	-0.12	$AXCH_{t-12}$ in Mexico	(-2.82)
	+0.13	$VCDS_{t-6}$ in Mexico	(2.64)
	-0.10	$VUSINF_{t-1}$ US	(-2.19)
	-0.09	$VUSINF_{t-12}$ US	(-2.17)

$R^2 = 0.751$

The Mexican economy has faced many different challenges during the last two decades. During the Salinas government, the country reduced its inflationary levels from 52% to 7% by 1994. The government's liberalization policies, as well as the reduction of the public deficit, were significant factors in accomplishing this endeavor. Historical pressure on prices from high interest rates was reduced due to the liberalization of the financial markets.

This positive trend was reversed due to an incoherent exchange rate. For many years, the country had a double exchange rate against the dollar: a controlled rate and a free rate. The two rates were unified in November, 1991, and the abolition of exchange controls on the peso allowed it to float within a specified band. This policy increased the pressure on interest rates, and soon the government was forced to keep rates high in order to ensure that capital inflows were maintained.

In 1992 the effects of U.S. inflation, combined with the weak peso and high interest rates, depressed private consumption by 12.9% and the economy shrunk, reducing GDP by 6.9% in 1995. Zedillo's administration focused on maintaining a strict fiscal policy and tight monetary controls. These policies generated a reduction in the inflation rate from 52% in 1994 to 20.5% at the end of 1995.

In the early 1990s as a result of trade liberalization, imports grew by an average of 16% between 1991 and 1994. This generated a trade deficit of $18,5 billion. The situation changed completely as a result of the 1994 devaluation and the tight measures taken by the government that depressed demand.

The Mexican economy is highly dependent on the U.S. The U..S not only takes more than three-quarters of the country's exports but also controls most of the debt through restructuring via the Brady Plan. This plan gave creditors an option between exchanging their existing debt for 30 year bonds with a 35% lower face value or yielding 13/16 over LIBOR.

All of the factors previously discussed explain why Mexican inflation has a big inertial component, is dependent on interest rates, and is impacted by the U.S. economic performance. The next step in this analysis is to perform a causality test to evaluate the real impact of the U.S. into the Mexican inflation.

6. Venezuela

	Coefficient	Variable	t-statistic
VINF =	0.21	$VINF_{t-1}$ in Ven.	(3.11)
	+0.12	$VINF_{t-6}$ in Ven.	(2.09)
	-0.36	$VINF_{t-12}$ in Ven.	(-5.98)
	+0.30	$VCDS_{t-1}$ in Ven.	(4.62)
	+0.14	$ARESERV_{t-6}$ in Ven.	(2.27)
	+0.18	$VUSINF_{t-1}$ in US	(2.87)

$R^2 = 0.44$

Petroleum has been the backbone of the Venezuelan economy since the early 1920s which has influenced the development of the country's economy. During the 1970s the economy grew but with the recession in the next decade, fixed investment dropped from 42.5% of GDP in 1978 to 16% in 1984. In the following years, the economy showed some signs of recovery but time after time during the 1980s and 1990s, the economy fell into a depression with disastrous consequences that led to contracting demand, climbing interest rates, and higher inflation. This situation led to annual inflation rates of 100% one year and 7% the next during the late 1980s and early 1990s, and most importantly, to a dramatic reduction of the country's reserves. The loss of confidence in the country's economy led to an acceleration of capital flight. Government reaction was to impose controls that halted capital flight in an effort to rebuild reserves.

The structural reforms required by the government did not receive Congressional support, and it was only in 1993 that Congress allowed the President to implement a package of fiscal reforms. Even though these reforms were applied, they were not strong

enough to reduce public expenditure and control debt service costs. Unlike most economic reforms in Latin America where the countries have empowered the Central Bank with a position of independence, in Venezuela the Central Bank's functions has been transferred to the Finance Ministry, thus further weakening the Central Bank's ability to control the skyrocketing inflation rates.

Venezuela's main trading partner is the U.S., which takes more than 50% of the country's imports and exports. The state oil company has built a strong position in the U.S. market, and it supplies the U.S. with crude oil and refined products. This is one reason why U.S. inflation is a significant factor in explaining Venezuela's inflation.

CHAPTER FIVE

CONCLUSIONS

ANALYSIS OF CAUSALITY RESULTS

The development of this analysis of inflation in Latin America is a good exercise understanding the economic situation of the region. The Latin American economies throughout the 1980s could be characterized by the following factors:

1. Ill-defined fiscal policies;
2. Lack of independence and leverage by the Central Banks;
3. Reduced portfolio of products and partners (except Brazil);
4. Imprudent management of the capacity to acquire external and internal debt by the governments;
5. Growth highly dependent on government spending as opposed to stimulating private consumption;
6. Lack of continuity in maintaining a stable economic policy; and
7. High degree of price indexation.

All the above characteristics led to fluctuations in these economies, with disastrous consequences which led to erosion of the region's credibility. Another consequence was the

the weakening of the private sector which is still far behind and trying to become competitive in the worldwide arena.

During the second half of the 1990s, as Latin America began to realize the importance of maintaining stable prices, all of the countries in this study embarked in governmental programs to solve the structural problems of their economies. At different times during the 1990s, the governments focused on reducing their fiscal deficits and empowering the Central Bank as the key driver of monetary policy. Only in Venezuela has this situation not been resolved. Deregulation has also played an important factor in the development of these economies.

Specifically considering the causality evaluation from the U.S. to Latin America, the results prove that the U.S. has no causal effect on the inflation of any of these countries. This would suggest that inflation is a domestic phenomenon that is characteristic of every economy. As mentioned previously, the causality results are directly related to the universe of information used in the model. The better and more comprehensive the model, the more reliable are the results. This points to an area of further study where other variables such as fiscal deficit and the flow of capital, among others, could have been included to improve the results.

The findings also indicate that although South America is highly in debt to U.S. commercial banks and the multilateral banks, the countries' structural problems, high fiscal deficits, and price indexing problems are the real causes of inflation in the region. This

argument demonstrates how Latin America still has to improve its current domestic economic policies in order to control inflation.

The appearance of U.S. inflation or T-bills as significant variables in the models for inflation of the different economies is only related to the economy itself. An example of this situation is Brazil. Interestingly enough, by looking at Table 6 on Causality Results Table 64444, there is no distinction between any of the methodologies used. The next step is to consider the countries' economies independently.

In the case of Argentina, neither U.S. inflation nor U.S. T-Bills appeared to be significant variables in their inflation model. In this case the inflationary analysis would be complemented with the inclusion of Brazil's inflation as part of the information set. The results confirmed Brazil's high dependency on the Argentinean economy. Historically, during the 1980s and later with the introduction of Mercosur, Argentina's exports are more and more sold to Brazil. This high dependence could conceal any effect that the U.S. could have on the country's prices.

This argument implies that a causality analysis should not only be done domestically, but further studies could evaluate the phenomenon on a regional basis such as Mercosur, the Andean Pact, NAFTA, etc.

METHODOLOGICAL CONCLUSIONS

Causality depends on the types of variables included in the information set of the analysis. The smaller the universe employed in the analysis, the lower the degree of meaning in the causality results. The causality tests indicate the need to include in the analysis other variables such as: Fiscal Deficit, Private Consumption, Government Monetary Operations, etc.

It is important to note that by applying the strict definition of causality proposed by Granger, the results obtained by the different methodologies were the same. Although this is a reassuring result, it is heavily dependent on the different subsets of data analyzed. This implies that further analysis on the modelling and forecasting periods should be done to evaluate the effectiveness of the test for numerous modelling and forecasting periods.

APPENDIX

International Reserves (Mil. of SDRs)

Country	Argentina	Brasil	Chile	Colombia	Mexico	Venezuela	United States
1980.01	7502139100	6018723400	1630876200	3088606900	1785338700	5609387900	16722454000
1980.02	7615909700	5967609900	1701472600	3162903400	1786194700	5496074600	16712114000
1980.03	7740630700	5986053500	1962699900	3299122800	1873685700	5460815000	17508434000
1980.04	7130324300	5171155800	1875889800	3268868300	1866837600	5086758900	17349784000
1980.05	6658038500	4474412900	1968131900	3208257600	1903055000	5617513600	17455306000
1980.06	6300449100	4306374200	2014196400	3176534200	1952438800	5450090700	17393844000
1980.07	7118997600	4753745400	2110688800	3436167400	2007988500	5807988500	17395630000
1980.08	7343891400	4507288500	2196661600	3426105800	2050257000	6582843800	18018746000
1980.09	6587289300	4109179100	2335780600	3610686100	2113515300	6360105500	18268856000
1980.1	6202120100	4380607400	2330509100	3719425000	2201952800	5610238200	19178101000
1980.11	5657661900	3977497700	2446236200	3753588300	2322765200	5575614200	20618131000
1980.12	5421491100	4589168600	2508437100	3885210900	2392900400	5578997100	21479390000
1981.01	4732047500	4518315600	2648209200	3970392200	2527322500	5839080400	23040200000
1981.02	3862926700	4632584000	2613712300	3995737300	2610940300	6147733700	24392030000
1981.03	3210398300	4549691900	2654942300	3953402700	2663425500	6500245900	24920012000
1981.04	4493706800	4480565800	2806103600	4030931900	2809967200	7491432000	24713231000
1981.05	3664134700	4680408100	2963968400	4075125900	2992949300	8236202000	24834730000
1981.06	3471225400	4590856500	2882512800	4114663200	2342309700	8147282300	25262061000
1981.07	3412161100	4811552000	3102573200	4153042000	2681043000	8037179300	24959617000
1981.08	3464733900	4874132300	3066827600	4044184000	3317701800	7516890500	25235173000
1981.09	3487123800	4840969400	3017269700	3954290400	2539288800	7094957200	25462640000
1981.1	3169809500	4826095700	2940967800	4076427400	2483164900	7106102900	25832334000
1981.11	2965020600	4866858400	2807338200	4071987700	2742648700	7139599300	26055439000
1981.12	2960985800	5750463100	2820269000	4190557000	3579398600	7415402400	25501756000
1982.01	3109799500	5655875300	2690299400	4195739600	2475507300	6966779300	25749936000
1982.02	3244841700	5608151900	2705790200	4173338700	2058031700	6927251000	26024194000
1982.03	3053151900	5732269300	2717436800	4052185400	2427717800	6471054500	26126886000
1982.04	2636889400	5600575400	2529227200	3962682500	1453472200	6918650500	27306846000
1982.05	2861863300	5490319000	2621620700	3839548400	2965306700	6787876600	26825367000
1982.06	2842794400	5697523800	2570138400	4062656200	1487528400	6378002800	27115452000
1982.07	3038141200	5725358300	2387719000	3940947000	1554440600	5906060300	27626559000
1982.08	2627893600	5719870100	2197329300	3843573600	1276056300	5615831600	27785006000
1982.09	2930456900	3979403800	2005579400	3660287600	1138596700	4622144100	27746951000
1982.1	3045662800	3424751500	1910410000	3650275700	942873350	6872929800	28597265000
1982.11	2876970500	3297286400	1600686600	3612759500	829667710	6720703600	30414909000
1982.12	2425136100	3566078100	1705253000	3634070900	828237290	6364729300	29918393000
1983.01	3203838600	2777243400	1633042000	3520545000	1225682900	5930703800	30215360000
1983.02	3693645200	2821358100	1470257800	3363112200	1414747000	5314342600	30421524000
1983.03	3273337500	3149142100	1276614000	3064248500	2021537300	5298192100	30668548000
1983.04	3058486200	3250990700	1185578300	2893829500	2103792100	5540561900	30530024000
1983.05	2774665200	3093209500	1255753200	2851730700	2301458000	5866846700	30390155000
1983.06	3127076400	3521393800	1300391800	2737063800	2442609800	6027087600	30517113000

Country	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1983.07	3119924000	3581713200	1336620300	2499674200	3123253900	6465575500	30295970000
1983.08	2738704000	3967385100	1554490700	2333209300	2385983600	7007747700	29802553000
1983.09	2376660000	3655234200	1765730800	2052054100	2977335700	7236137800	29983126000
1983.1	2398772300	3481086500	1831328400	1874077900	2852971700	7525310800	30130518000
1983.11	2488260700	3917931900	1960441300	1948277500	3974292100	7814382700	30667857000
1983.12	1272802200	4178717000	1998510200	1963482100	3818227300	7701200500	30830653000
1984.01	1674039500	4248265500	2037147600	1651072500	4291580700	7777275800	31235108000
1984.02	1661385600	4823036600	2054491700	1443146400	4409409400	7472118900	31572594000
1984.03	1536278600	5307572900	2072774300	1327829800	4513724300	7524582500	31634311000
1984.04	1793645600	6254377500	2129472300	1130995400	4788927700	7960372500	31627943000
1984.05	2028530100	6571088600	2033811900	1009193300	5106126700	8179348200	31874631000
1984.06	1840508200	7377005800	2278198300	1031868900	5977376300	8506714200	31939300000
1984.07	1334506400	7902205600	2219396300	958315150	6162977800	8706707500	32186481000
1984.08	1483444000	8858655800	2270717200	874458560	6298111300	8977997000	32474804000
1984.09	1506899800	9284554700	2286555000	864577020	7101472000	9092080600	32432042000
1984.1	1646754000	9540186600	2243454600	952281510	7060248800	9362418600	32760815000
1984.11	1408008900	10251658000	2246627800	1028447900	8224101300	9217223900	33083899000
1984.12	1420725400	11791676000	2403213400	1439453500	7503623700	9481912600	33516712000
1985.01	1377868000	10213287000	2210364900	1150608700	7176395500	9559522100	33078885000
1985.02	1049744900	10383779000	2127690600	1277448400	6462963100	10066990000	33355780000
1985.03	973530000	10845826000	2075778400	1253684300	7006562500	9948888200	33810329000
1985.04	1116468300	10791321000	1932791400	1096619500	6820068600	10375940000	33813247000
1985.05	1385033400	10714671000	1896778800	965574350	6617256600	10320608000	34060182000
1985.06	1869301400	10875661000	1799386600	1094852100	6210402800	10327029000	34233422000
1985.07	2086817000	10795463000	1648670800	1024894800	4786739700	9813149300	34238103000
1985.08	2003934100	10952911000	1705081300	1111732000	4593284600	9910697900	34366451000
1985.09	2909063200	10382168000	1639855900	1161804400	4697423700	9618175500	34871772000
1985.1	3003700500	10208988000	1634601600	1151257400	4773451300	9829107900	37716141000
1985.11	3188444000	10046433000	1679770400	1314393600	4572751600	9727938900	38246098000
1985.12	3132754500	9762861500	2283907300	1516565700	4549457300	9733392000	38412404000
1986.01	3017940900	8048409400	1991197800	1589021200	4826694700	9670096800	38516321000
1986.02	2699850200	7546034600	1815638000	1394758400	4685639800	9224419100	38967407000
1986.03	2526378700	7994914900	2016790400	1393121400	4483730800	9151866000	38912478000
1986.04	2986250300	7937248400	1995761300	1312022700	4515151500	8742667500	39296789000
1986.05	3190394800	8232919500	2173473500	1320757900	4017428800	8652460600	39075070000
1986.06	3718560300	7964464200	2032253400	1487377600	3027722000	8182971500	39343775000
1986.07	3495447300	7043099600	1917914600	1518259600	2516466000	7629749900	39383241000
1986.08	3360714500	6654696100	1954168200	1503705000	2943984200	7590585500	39909621000
1986.09	3264395900	6453537900	1808872800	1546139400	2836565900	6938824300	39682817000
1986.1	3101861000	5670043200	1878247700	1877446600	3218475800	6697537800	39530730000
1986.11	2596250900	5172749800	1972538100	1924963200	3509747700	5995495200	39544452000
1986.12	2375113700	4829282600	1985090300	2274243100	4725142800	5663928300	39790007000
1987.01	2140085800	3622213100	1884286300	2204476300	5112003700	5472241000	39404095000
1987.02	1870626100	3242162200	1903893400	2243532600	5421734600	5357751700	39465184000
1987.03	2171061500	3132577500	1769123000	2135607900	6110762500	5164105200	38542985000

Country	Argentina	Brasil	Chile	Colombia	Mexico	Venezuela	United States
1987.04	1683686000	3280700600	1720045700	2166937900	8867673300	4996835300	36370061000
1987.05	1612331600	3758268400	1824984700	2151936600	9182171400	4824998700	36262913000
1987.06	1319346000	3610634200	1962301600	2214143000	9909109300	4961269100	35834094000
1987.07	1352127900	4250640000	1819929600	2286972600	10111606000	5015992300	35413581000
1987.08	1233026200	4815858200	1816023500	2310890600	10379892000	5122144700	36122749000
1987.09	958388880	4861766000	1805138800	2136766200	10492939000	5088295400	35746716000
1987.1	1243338000	4669776600	1714097500	2104445600	10047041000	5075955100	35769576000
1987.11	1383228500	4936407300	1821866400	2149993600	9498568200	4838747600	35171210000
1987.12	1292863000	4525390500	1828592300	2199259900	8874589200	4604128600	33657287000
1988.01	1176898300	4239116400	1820257000	2171324300	9101053200	4402900800	32510648000
1988.02	1083246500	4237125200	1958941700	2162043800	9302589300	4420318600	32683058000
1988.03	1211002300	3958600200	1868112000	2046540700	10558211000	4124767900	32325568000
1988.04	1263483000	4572218200	1971571900	2011445000	10845941000	4215594500	32048616000
1988.05	1244184500	5151253500	1931687800	2460944000	10545559000	4110855700	31799975000
1988.06	1570538400	4670326100	2100155100	2753967900	9900550800	4231722400	32034247000
1988.07	1618458100	4876083700	2214081600	2701297300	8172542900	3891068600	34479544000
1988.08	2281693200	5794429400	2191024300	2675877200	8565478200	3883456800	37672829000
1988.09	2508986900	5791356500	2131154500	2455169500	6750942100	3449524400	37631496000
1988.1	2300512400	5512621000	2121531400	2363570900	5774163600	3102954500	38252289000
1988.11	2335088100	5613769800	1974085700	2377111900	4106207900	2776228000	36893986000
1988.12	2652466100	5276230900	2412442100	2452015200	4012038600	2698455300	36470729000
1989.01	2600799400	5594959000	2550433600	2509699300	4259233500	2612054200	37491623000
1989.02	1821226600	5642282400	2570003500	2509049100	4342714900	2703944500	38159846000
1989.03	1398819900	6594677600	2664015800	2337556600	4011664800	2970511900	39177868000
1989.04	1152038400	6053557800	2443909300	2343096600	3985166800	2808703800	39456290000
1989.05	1336696300	5446120100	2759115500	2303963700	3532230200	3031474800	44453058000
1989.06	904023800	5331840600	2669127900	2359684800	3928402700	2878474300	48837188000
1989.07	1436948500	5864280500	2625507300	2328004500	4302142300	2917137600	49869809000
1989.08	1716607900	6573564900	2695253200	2476313600	4431911300	3121152700	50325935000
1989.09	1924411700	6292834300	2475003400	2226911700	5397010100	3312549900	53985463000
1989.1	1985299400	6429388200	2651986500	2823489300	5369480800	3083785400	55927032000
1989.11	1605475300	5758335200	2864030400	2851008800	5058539700	3421461300	56926863000
1989.12	1266543700	5838165000	2822448400	2773166200	4851968200	3525821200	57525113000
1990.01	1152956100	5286438900	2735887600	2597876700	4230801700	3709155100	57785399000
1990.02	898908370	5184214700	2879888900	2783869700	6050636200	3765578400	57097395000
1990.03	1087157800	4030328900	2956506600	2710786500	3353811500	3507744600	59322824000
1990.04	1418407900	5245328200	3025098500	2625316300	3893415200	3714155200	59244767000
1990.05	1943837000	5961559400	3143001500	2685503900	4215667000	3811625600	59449308000
1990.06	2381527700	6077572700	3364565500	2736295000	4947992300	3812979200	59202632000
1990.07	2193524500	6127684300	3616622000	2701364000	5030817400	3156364000	58116860000
1990.08	2124865400	5918192200	3779691300	2960050300	5179452400	3395632300	58124030000
1990.09	2492001900	5614282100	3612011100	2865277300	5474094500	4023433100	58691458000
1990.1	2428842400	5307194300	4053338500	2813945500	5747049900	4633779800	59345225000
1990.11	2804284500	4531619300	4369464200	2836507100	6640661600	4991548400	59631240000

Country	Argentina	Brasil	Chile	Colombia	Mexico	Venezuela	United States
1990.12	3376147600	5389995300	4330618100	2982217100	6964892200	6249663700	59957800000
1991.01	3018358900	5269853300	4322888600	3002891500	7394484300	5892603100	60708562000
1991.02	2655890900	5520562100	4523752300	3008863500	8112507800	6603560700	59669018000
1991.03	1901319900	4960058000	4857802200	3121718900	8636339200	6994985200	58890549000
1991.04	1973389500	5281626200	4778947400	3222491700	9846735300	7082963900	59314414000
1991.05	2374761800	5912748900	4734210600	3374111100	10219855000	7174954700	59287939000
1991.06	2630928000	6505807600	4741631600	3651114400	10682020000	7106613200	57763814000
1991.07	2758617100	6211446200	4654036500	3800384000	10826762000	7099115500	56961839000
1991.08		5594227600	4659476800	4150724200	10451480000	7097541000	55881432000
1991.09	3222864100	4627176200	4549062800	4194553600	12054021000	7227525300	55711687000
1991.1		4826592700	4648062200	4419950100	12689247000	6829255400	55598635000
1991.11		4760449100	4865632000	4365404700	14295455000	6773054500	55224708000
1991.12	4342099200	5686595500	4987691500	4245269800	12424063000	7857813800	55769242000
1992.01	4475250500	7379575200	5148412400	4345176200	12883916000	7915264800	55546876000
1992.02	4370388900	9209351800	5108982300	4514814100	13852337000	7905975500	55535145000
1992.03	4901948400	11233693000	5261979900	4732971100	13528206000	7668672000	55530180000
1992.04	5316755400	12328736000	5409475700	4878080600	14173471000	7704458200	55637722000
1992.05	5730703400	13679499000	5652313000	4938125300	13533143000	7585359000	54663670000
1992.06	5667442400	14401017000	5870434400	4936987300	13263332000	7420674700	55307026000
1992.07	6057103400	15004708000	5937678200	4928314500	13156271000	7344759400	55084673000
1992.08	6011439000	14910920000	5859090000	4821223300	12730883000	7258372300	54630884000
1992.09	6055895800	14194772000	6111691600	4850790000	13068616000	7036447100	54975375000
1992.1	6562022300	16366929000	6412639200	5113938200	13246363000	7078434600	54082100000
1992.11	6392580000	16957614000	6493785200	5315737400	13740933000	7304201200	53528503000
1992.12	7418311400	16457250000	6732734100	5390995500	13800066000	7355564100	52995395000
1993.01	7598597200	16063341000	7127182900	5531364800	15379709000	6795870800	53239983000
1993.02	7748716200	15732239000	7220135900	5589515500	15696044000	6683776200	54067559000
1993.03	7668239100	15049426000	7023931500	5508061600	15238828000	6540002400	54468784000
1993.04	7160661500	15043343000	7005064900	5515184400	17251061000	6645399600	54541581000
1993.05	7132529500	15921654000	7111120000	5570736600	16983347000	6614963900	55126504000
1993.06	7235305800	16535304000	7139079200	5653575100	16391884000	6975447700	53987605000
1993.07	8237754500	17652703000	7202762500	5682447300	16513314000	7001854600	54525086000
1993.08	9163164600	18271519000	7147048500	5654914100	16340274000	6756179400	54756843000
1993.09	8372782000	18011398000	7072586700	5728147700	16279403000	6921912700	54835113000
1993.1	8646500100	19823453000	7102316100	5440333000	16690382000	6959280400	54746995000
1993.11	8797544500	21389770000	7155641300	5445048500	13887176000	6887391500	54678812000
1993.12	10193475000	22383103000	7083741100	5508712100	18297618000	7110531100	54557550000
1994.01	10155707000	24563669000	7280988200	5535713300	19303877000	6544122100	54930098000
1994.02	9916246700	25108325000	7268697200	5583430800	20966843000	5996576600	55408707000
1994.03	9516626600	26078293000	7298711100	5566668600	18340975000	5733061800	55712566000
1994.04	9178966000	26006284000	7224214500	5361678100	12447170000	5093118900	55252426000
1994.05	9441988600	28252509000	7290026800	5329837900	12315949000	4400183200	53871054000
1994.06	9299155900	28626213000	7498114500	5338763600	11413205000	4144320200	53818204000
1994.07	9722295500	28851132000	7490405800	5341219900	11592767000	4641631100	53776813000
1994.08	9537769200	28647884000	7439363100	5325175800	11811371000	5403518300	53844985000
1994.09	9059366300	28526858000	7712289500	5101027500	11174030000	5737516700	53785607000
1994.1	8900904600	27780417000	7827284100	5289569400	11915426000	5915270600	54373791000

Country	Argentina	Brasil	Chile	Colombia	Mexico	Venesuela	United States
1994.11	9029438300	27684121000	8583460800	5091473100	8862529000	6121668800	52372832000
1994.12	9967064800	25522588000	9030259300	5318891900	4315504900	5927213500	52510156000
1995.01	8312722800	24890020000	8929150400	5205825600	3021503100	5776653400	53161995000
1995.02	7747436200	24397788000	9070816700	5248484700	6421861100	5651694600	56262274000
1995.03	5568126700	20590436000	8895464400	5161487400	4463504200	5366097200	57678294000
1995.04	6354889400	19228767000	9232616200	5235525900	5741296500	5372758900	58559848000
1995.05	5958610600	20306821000	9322558300	5249079100	6995195600	5412095300	59606581000
1995.06	7065366100	20253948000	9563106100	5325679400	6436887900	4932473500	59526891000
1995.07	7236049000	25671357000	9575486100	5345220800	9145408700	4670988900	60768435000
1995.08	6570986100	30700095000	9777889700	5421481300	10623938000	4640951800	59812575000
1995.09	7572678900	31042001000	9492485600	5407134300	10953930000	4229532100	59681958000
1995.1	7200766100	31912887000	9107572900	5473389800	9750589700	4138627800	59458408000
1995.11	7255675500	33155659000	9187405100	5437607900	9855930300	4350861200	59428252000
1995.12	9764867400	33599979000	9577362600	5459577100	11351271000	4627895200	59467071000
1996.01	9126364300	35602331000	9037531100	5485388200	11076634000	4999405000	58528654000
1996.02	9534118000	36708868000	8896344000	5305420000	11248400000	5058328200	59014248000
1996.03	10023244000	36842944000	9337824900	5234482200	11567977000	4878742700	59229488000
1996.04	9[illegible]698300	37851514000	9475714800	5269965900	11310359000	4839059700	59268642000
1996.05	99[illegible]875100	39870058000	9658865100		11708973000	5034068800	59374537000
1996.06	10998738000	40273555000	9899198600		11429794000	5436706700	59324702000
1996.07	9944715000	39346878000	10055843000		12251622000	6117785400	59686360000
1996.08	10181179000				11981612000	6336873000	54253281000

Inflation Rate (%)

	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1980.01	128	76	39	28	22	21	14
1980.02	123	75	39	27	23	22	14
1980.03	119	75	39	24	24	22	15
1980.04	118	77	39	27	24	22	15
1980.05	115	82	39	28	25	23	14
1980.06	108	84	38	28	26	23	14
1980.07	103	86	36	27	28	23	13
1980.08	88	86	33	26	29	22	13
1980.09	84	84	30	25	29	20	13
1980.1	90	87	31	27	28	21	13
1980.11	89	87	32	26	29	20	13
1980.12	88	86	31	26	30	20	12
1981.01	84	93	31	26	28	21	12
1981.02	82	99	29	28	28	19	11
1981.03	82	101	26	29	28	18	11
1981.04	85	105	24	27	29	17	10
1981.05	88	105	23	26	29	17	10
1981.06	94	106	21	28	28	17	10
1981.07	105	108	19	29	27	17	11
1981.08	114	112	18	29	27	17	11
1981.09	119	113	17	28	27	16	11
1981.1	115	110	14	27	28	12	10
1981.11	121	107	11	26	29	12	10
1981.12	131	101	10	26	29	11	9
1982.01	147	98	9	26	31	10	8
1982.02	149	97	7	25	33	10	8
1982.03	146	97	7	25	35	10	7
1982.04	138	95	6	25	39	10	7
1982.05	128	100	4	25	45	12	7
1982.06	125	102	4	24	49	11	7
1982.07	137	101	6	24	54	10	6
1982.08	152	96	8	23	68	10	6
1982.09	175	95	11	24	74	9	5
1982.1	193	96	16	25	79	9	5
1982.11	205	96	20	25	85	9	5
1982.12	210	102	21	24	99	8	4
1983.01	221	105	22	23	108	7	4
1983.02	245	106	23	22	113	6	3
1983.03	266	113	25	22	115	7	4

	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1983.04	287	118	29	22	117	8	4
1983.05	310	116	31	22	115	5	3
1983.06	340	126	32	20	112	5	3
1983.07	326	137	32	20	112	5	2
1983.08	335	144	32	18	98	6	3
1983.09	351	157	29	17	94	6	3
1983.1	368	170	26	17	90	7	3
1983.11	402	175	24	17	92	7	3
1983.12	434	178	23	17	81	7	4
1984.01	418	180	21	17	75	7	4
1984.02	436	190	21	17	73	8	5
1984.03	479	192	21	17	72	8	5
1984.04	522	192	20	15	69	9	5
1984.05	568	199	20	14	67	11	4
1984.06	580	195	19	15	67	11	4
1984.07	615	190	18	16	64	12	4
1984.08	650	195	15	16	63	13	4
1984.09	688	196	16	17	63	14	4
1984.1	704	198	22	15	63	14	4
1984.11	675	204	22	16	59	15	4
1984.12	688	209	23	18	59	16	4
1985.01	776	218	27	19	61	17	4
1985.02	804	223	30	21	59	16	4
1985.03	851	225	30	23	58	15	4
1985.04	939	220	31	24	57	14	4
1985.05	1010	214	32	28	55	11	4
1985.06	1129	217	35	28	53	11	4
1985.07	1003	222	36	26	54	10	4
1985.08	826	231	37	25	56	10	3
1985.09	640	227	34	24	58	8	3
1985.1	532	221	26	25	58	8	3
1985.11	463	232	27	24	60	9	4
1985.12	385	249	26	22	64	9	4
1986.01	300	256	26	24	66	10	4
1986.02	237	286	24	24	66	11	3
1986.03	179	249	23	23	68	10	2
1986.04	125	230	22	23	71	9	2
1986.05	87	210	20	16	76	10	2
1986.06	50	182	18	13	83	12	2
1986.07	51	153	17	14	86	12	2
1986.08	59	126	17	16	92	13	2

	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1986.09	67	109	17	17	96	12	2
1986.1	74	94	17	18	100	13	2
1986.11	79	76	17	20	104	13	1
1986.12	82	64	17	21	106	13	1
1987.01	90	62	16	21	104	13	1
1987.02	99	52	18	20	110	15	2
1987.03	106	73	18	20	114	18	3
1987.04	103	108	19	20	121	21	4
1987.05	103	158	20	23	125	25	4
1987.06	110	226	19	25	127	28	4
1987.07	117	253	20	27	133	34	4
1987.08	126	272	21	25	134	33	4
1987.09	136	302	21	25	135	35	4
1987.1	166	340	22	25	141	35	4
1987.11	178	392	23	25	144	37	5
1987.12	175	432	21	24	159	40	4
1988.01	179	464	20	24	177	38	4
1988.02	189	481	18	26	180	32	4
1988.03	206	509	19	26	176	29	4
1988.04	248	499	17	28	161	28	4
1988.05	286	468	16	28	148	25	4
1988.06	322	438	15	30	136	25	4
1988.07	381	497	14	30	122	25	4
1988.08	440	583	13	30	107	27	4
1988.09	440	683	12	29	95	27	4
1988.1	392	796	11	29	82	30	4
1988.11	372	904	11	28	70	31	4
1988.12	388	1006	13	28	52	36	4
1989.01	387	1170	13	28	35	36	5
1989.02	383	1118	13	27	26	44	5
1989.03	393	984	13	26	21	74	5
1989.04	460	854	13	25	19	94	5
1989.05	765	812	15	25	19	103	5
1989.06	1471	870	16	24	18	100	5
1989.07	3610	974	18	24	17	95	5
1989.08	3910	1077	18	26	17	95	5
1989.09	3826	1161	20	27	17	98	4
1989.1	3703	1282	21	27	18	95	4
1989.11	3731	1474	21	27	18	90	5
1989.12	4923	1759	21	26	20	81	5
1990.01	8164	2211	23	27	22	83	5

	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1990.02	12087	3322	23	27	24	81	5
1990.03	20266	5747	24	28	24	52	5
1990.04	16903	6407	25	28	24	37	5
1990.05	10724	6198	24	28	25	32	4
1990.06	5648	5448	25	29	26	32	5
1990.07	2048	4654	25	29	27	34	5
1990.08	1697	3922	26	29	28	35	6
1990.09	1801	3293	29	30	29	33	6
1990.1	1838	2691	30	31	29	32	6
1990.11	1832	2140	29	31	30	34	6
1990.12	1344	1658	27	32	30	36	6
1991.01	768	1119	25	32	27	36	6
1991.02	582	785	25	32	26	36	5
1991.03	287	422	23	31	26	36	5
1991.04	267	383	23	31	25	36	5
1991.05	232	372	24	32	25	36	5
1991.06	201	368	24	31	23	35	5
1991.07	178	362	24	32	22	34	4
1991.08	144	373	23	31	21	33	4
1991.09	115	388	19	30	20	33	3
1991.1	102	431	18	29	20	33	3
1991.11	91	470	18	28	20	32	3
1991.12	84	494	19	27	19	31	3
1992.01	76	522	19	27	18	30	3
1992.02	42	535	19	27	17	31	3
1992.03	30	619	18	27	17	31	3
1992.04	25	695	17	27	17	31	3
1992.05	22	815	16	27	16	31	3
1992.06	20	909	14	28	16	32	3
1992.07	19	972	14	28	16	32	3
1992.08	19	1056	14	28	15	32	3
1992.09	18	1147	15	27	15	32	3
1992.1	18	1173	13	26	15	32	3
1992.11	18	1147	14	26	13	32	3
1992.12	18	1156	13	25	12	32	3
1993.01	15	1200	12	25	11	34	3
1993.02	13	1248	13	25	11	34	3
1993.03	12	1302	13	24	10	34	3
1993.04	12	1423	13	23	10	35	3
1993.05	12	1506	13	22	10	35	3
1993.06	12	1633	13	21	10	36	3
1993.07	11	1782	13	20	10	36	3
1993.08	9	1951	14	21	10	37	3
1993.09	9	2103	12	22	9	39	3
1993.1	8	2262	14	22	9	43	3
1993.11	8	2542	12	23	9	44	3
1993.12	7	2829	12	23	8	46	3

	Argentina	Brazil	Chile	Colombia	Mexico	Venezuela	United States
1994.01	7	3112	13	23	7	48	3
1994.02	6	3451	13	24	7	47	3
1994.03	5	3953	14	24	7	48	3
1994.04	4	4422	13	25	7	48	2
1994.05	3	4903	13	25	7	52	2
1994.06	3	5517	13	25	7	60	2
1994.07	4	5591	12	24	7	65	3
1994.08	4	4268	11	23	7	69	3
1994.09	4	3173	10	23	7	70	3
1994.1	3	2373	8	23	7	70	3
1994.11	4	1758	9	23	7	71	3
1994.12	4	1259	9	23	7	71	3
1995.01	5	867	9	21	10	69	3
1995.02	5	595	9	21	14	70	3
1995.03	4	398	8	21	20	70	3
1995.04	5	252	8	21	29	72	3
1995.05	4	150	7	21	34	71	3
1995.06	4	75	8	22	38	61	3
1995.07	3	36	8	22	40	56	3
1995.08	3	31	8	21	42	53	3
1995.09	2	30	9	21	43	52	3
1995.1	2	28	9	20	46	51	3
1995.11	2	25	8	20	48	53	3
1995.12	2	26	8	19	52	57	3
1996.01	1	27	8	21	52	64	3
1996.02	3	27	8	21	49	73	3
1996.03	0	24	8	20	44	78	3
1996.04	0	22	8	19	37	86	3
1996.05	0	22	9	19	34	100	3
1996.06	0	18	9	19	32	108	3
1996.07	0		8	19	31	113	3
1996.08	0				31	115	3

Interest Rates (%)

	Argentina	Brasil	Chile	Colombia	México	Venezuela	United States
1980.01	96	42	57	30	19	11	12
1980.02	83	34	52	30	19	11	13
1980.03	76	52	47	30	21	12	16
1980.04	69	26	35	30	22	15	14
1980.05	70	27	32	30	22	12	9
1980.06	87	34	31	30	22	12	7
1980.07	102	46	32	30	21	10	8
1980.08	80	43	33	30	21	10	9
1980.09	66	50	31	30	23	10	10
1980.1	66	59	30	30	25	10	12
1980.11	72	61	31	30	26	13	14
1980.12	89	93	42	30	28	13	16
1981.01	93	86	40	30	29	13	15
1981.02	116	76	50	30	29	13	15
1981.03	155	81	46	30	29	11	13
1981.04	138	70	39	30	28	11	14
1981.05	152	94	38	30	28	11	16
1981.06	219	75	46	30	28	11	15
1981.07	243	92	47	30	31	11	15
1981.08	223	99	39	30	33	14	16
1981.09	162	92	31	30	34	14	15
1981.1	124	102	36	30	34	14	14
1981.11	135	90	33	30	33	14	11
1981.12	124	121	47	30	33	14	11
1982.01	132	102	46	30	34	14	12
1982.02	129	86	38	30	36	14	14
1982.03	121	114	32	30	35	14	12
1982.04	157	99	29	30	38	14	13
1982.05	136	104	34	29	44	14	12
1982.06	98	104	35	29	51	14	12
1982.07	80	116	52	29	53	14	12
1982.08	80	140	46	29	56	14	9
1982.09	125	119	53	29	50	13	8
1982.1	125	133	70	29	43	13	8
1982.11	166	156	79	27	51	13	8
1982.12	166	174	71	27	57	13	8

	Argentina	Brasil	Chile	Colombia	México	Venezuela	United States
1983.01	231	125	40	27	60	13	8
1983.02	214	119	30	27	61	13	8
1983.03	214	195	29	27	64	13	8
1983.04	214	251	29	27	63	13	8
1983.05	214	250	31	27	63	11	8
1983.06	178	267	28	27	62	11	9
1983.07	231	237	25	27	61	11	9
1983.08	269	219	25	27	57	11	9
1983.09	387	186	25	27	56	11	9
1983.1	408	203	25	27	54	11	9
1983.11	408	194	25	27	54	11	9
1983.12	408	194	24	27	54	11	9
1984.01	269	224	20	27	53	11	9
1984.02	214	295	15	27	50	11	9
1984.03	214	260	12	27	46	11	9
1984.04	333	218	16	27	47	11	10
1984.05	333	206	18	27	50	11	10
1984.06	333	220	18	27	51	11	10
1984.07	464	292	19	27	51	11	10
1984.08	464	243	18	27	50	11	10
1984.09	464	285	15	27	49	11	10
1984.1	558	328	47	27	48	11	10
1984.11	558	245	92	27	48	11	9
1984.12	558	272	41	27	49	11	8
1985.01	594	379	25	27	48	11	8
1985.02	629	288	35	27	49	11	8
1985.03	792	338	38	27	56	10	9
1985.04	1772	346	50	27	58	10	8
1985.05	2625	303	41	27	60	9	8
1985.06	643	240	37	27	66	9	7
1985.07	99	215	45	27	70	9	7
1985.08	100	195	24	27	72	9	7
1985.09	89	230	19	27	69	9	7
1985.1	70	238	22	27	66	8	7
1985.11	73	230	23	27	69	8	7
1985.12	75	380	25	27	74	8	7
1986.01	76	536	23	24	74	8	7
1986.02	79	410	27	24	76	8	7
1986.03	75	15	17	24	78	8	7
1986.04	67	16	21	24	81	8	6
1986.05	64	16	19	24	80	8	6
1986.06	64	18	13	24	84	8	6

	Argentina	Brasil	Chile	Colombia	México	Venezuela	United States
1986.07	67	26	18	24	91	8	6
1986.08	107	36	15	24		8	6
1986.09	121	42	11	33		8	5
1986.1	136	26	21	33	107	8	5
1986.11	138	32	21	34	104	8	5
1986.12	142	89	21	34	106	8	5
1987.01	141	250	23	34	105	8	5
1987.02	131	757	28	32	105	8	6
1987.03	52	288	25	32	102	8	6
1987.04	108	452	24	32	100	8	6
1987.05	118	1304	30	32	98	8	6
1987.06	150	630	23	32	98	8	6
1987.07	187	178	14	32	97	8	6
1987.08	255	154	25	33	96	8	6
1987.09	365	152	23	33	95	8	6
1987.1	212	196	29	33	96	8	6
1987.11	154	330	34	34	111	8	6
1987.12	237	401	25	35	133	8	6
1988.01	276	543	10	33	154	8	6
1988.02	296	655	12	35	153	8	6
1988.03	389	531	13	36	96	8	6
1988.04	441	814	24	37	65	8	6
1988.05	501	678	13	37	51	8	6
1988.06	646	807	10	37	40	8	7
1988.07	858	1312	8	37	40	8	7
1988.08	226	1057	8	37	41	8	7
1988.09	172	1540	14	34	42	8	7
1988.1	174	2185	17	34	45	8	7
1988.11	199	1910	25	34	50	8	8
1988.12	284	2282	27	34	52	8	8
1989.01	268	1096	27	34	51	8	8
1989.02	428	702	18	35	49	23	8
1989.03	685	830	13	35	48	30	9
1989.04	2980	270	27	36	50	30	9
1989.05	59702	266	20	36	52	32	8
1989.06	140317	1709	31	36	57	37	8
1989.07	582	3005	30	36	47	37	8
1989.08	328	3727	28	36	35	34	8
1989.09	122	4917	24	36	34	34	8
1989.1	100	10679	36	36	38	38	8
1989.11	149	11317	44	37	39	38	8
1989.12	1169	38341	33	37	41	45	8

	Argentina	Brasil	Chile	Colombia	México	Venezuela	United States
1990.01	1555	49023	42	36	41	45	8
1990.02	3939	132335	45	36	45	41	8
1990.03	9722	4181	26	37	47	33	8
1990.04	530	64	42	38	45	33	8
1990.05	242	94	36	38	37	33	8
1990.06	329	173	32	38	32	33	8
1990.07	398	371	40	40	31	43	8
1990.08	187	270	33	39	30	43	7
1990.09	752	447	45	40	30	43	7
1990.1	280	524	73	46	29	43	7
1990.11	148	777	51	46	25	43	7
1990.12	132	1083	17	46	26	43	7
1991.01	148	887	13	44	24	43	6
1991.02	196	121	9	43	23	43	6
1991.03	193	181	9	44	22	43	6
1991.04	23	203	21	46	21	43	6
1991.05	23	199	29	45	20	43	6
1991.06	28	225	35	45	18	43	6
1991.07	29	306	28	45	18	43	6
1991.08	25	478	25	46	17	43	5
1991.09	19	772	21	47	18	43	5
1991.1	18	1494	25	46	18	43	5
1991.11	18	2810	36	46	17	43	5
1991.12	20	2494	16	45	17	43	4
1992.01	18	2036	18	41	15	43	4
1992.02	16	1977	13	37	15	43	4
1992.03	16	1637	4	36	12	43	4
1992.04	16	1211	13	35	12	43	4
1992.05	16	1099	21	32	14	43	4
1992.06	15	1258	17	30	15	43	4
1992.07	15	1534	14	29	16	43	3
1992.08	15	1447	20	32	16	43	3
1992.09	16	1774	26	32	18	43	3
1992.1	16	1867	32	35	19	43	3
1992.11	18	1563	24	34	18	49	3
1992.12	25	1489	18	34	17	52	3
1993.01	20	1931	7	33	17	53	3
1993.02	16	2004	8	33	18	51	3
1993.03	13	1901	11	34	17	62	3
1993.04	12	2346	16	34	16	61	3
1993.05	11	2431	24	33	15	69	3
1993.06	10	2675	22	33	16	66	3
1993.07	11	2890	15	32	14	54	3

	Argentina	Brazil	Chile	Colombia	México	Venezuela	United States
1993.08	10	3449	22	31	14	63	3
1993.09	9	4361	30	31	14	63	3
1993.1	8	4839	25	32	14	63	3
1993.11	8	4830	31	32	14	70	3
1993.12	9	5757	8	33	12	71	3
1994.01	8	7066	11	33	11	70	3
1994.02	6	6616	17	32	9	67	3
1994.03	7	9610	13	32	10	67	4
1994.04	8	9666	19	32	16	67	4
1994.05	8	10944	16	33	16	67	4
1994.06	8	13533	21	35	16	73	4
1994.07	8	122	13	36	17	45	4
1994.08	9	63	16	38	14	45	5
1994.09	8	57	18	38	14	45	5
1994.1	8	53	13	40	14	45	5
1994.11	9	61	13	43	14	45	5
1994.12	10	56	11	45	19	48	6
1995.01	11	49	10	39	37	44	6
1995.02	12	47	13	41	42	44	6
1995.03	19	65	12	42	70	44	6
1995.04	19	65	13	43	75	44	6
1995.05	16	65	13	42	59	47	6
1995.06	11	61	13	41	47	49	6
1995.07	10	60	14	37	41	49	5
1995.08	9	57	18	36	35	49	5
1995.09	9	48	22	37	33	49	5
1995.1	9	44	14	36	40	49	5
1995.11	9	41	14	37	53	49	5
1995.12	9	39	8	40	49	49	5
1996.01	9	36	10	40	41	49	5
1996.02	8	32	11	40	39	51	5
1996.03	7	30	13	41	41	51	5
1996.04	7	28	17	41	35	85	5
1996.05	7	27	19	39	28	85	5
1996.06	7	27	16	39	28	85	5
1996.07		26	12	40	31	85	5
1996.08		26			27	85	5

Exchange Rate (n.c. per US$)

Country	Argentina	Brasil	Chile	Colombia	México	Venezuela
1980.01	60,114,217.00	62,656,642,000.00	39.000	44.41	0.02	4.29
1980.02	58,599,473.00	60,693,004,000.00	39.000	44.94	0.02	4.29
1980.03	57,224,607.00	58,760,684,000.00	39.000	45.62	0.02	4.29
1980.04	56,006,721.00	56,053,812,000.00	39.000	46.05	0.02	4.29
1980.05	54,899,808.00	54,123,204,000.00	39.000	46.78	0.02	4.29
1980.06	53,922,890.00	52,566,185,000.00	39.000	47.32	0.02	4.29
1980.07	53,064,473.00	51,039,347,000.00	39.000	47.79	0.02	4.29
1980.08	52,342,319.00	49,243,442,000.00	39.000	48.24	0.02	4.29
1980.09	51,719,679.00	47,751,346,000.00	39.000	48.92	0.02	4.29
1980.1	51,216,389.00	45,312,243,000.00	39.000	49.60	0.02	4.29
1980.11	50,697,085.00	43,989,443,000.00	39.000	50.27	0.02	4.29
1980.12	50,188,206.00	41,984,733,000.00	39.000	50.92	0.02	4.29
1981.01	49,236,829.00	40,181,181,000.00	39.000	51.45	0.02	4.29
1981.02	44,247,788.00	38,263,531,000.00	39.000	51.96	0.02	4.29
1981.03	42,229,730.00	35,933,621,000.00	39.000	52.49	0.02	4.29
1981.04	31,595,577.00	33,804,548,000.00	39.000	52.94	0.02	4.29
1981.05	30,497,103.00	31,891,453,000.00	39.000	53.57	0.02	4.29
1981.06	22,099,448.00	30,087,527,000.00	39.000	54.18	0.02	4.29
1981.07	20,462,451.00	28,385,632,000.00	39.000	54.93	0.02	4.29
1981.08	18,772,292.00	26,779,628,000.00	39.000	55.68	0.02	4.29
1981.09	17,220,596.00	25,312,960,000.00	39.000	56.39	0.03	4.29
1981.1	16,007,684.00	23,948,446,000.00	39.000	57.22	0.03	4.29
1981.11	14,762,327.00	22,701,007,000.00	39.000	58.09	0.03	4.29
1981.12	13,796,909.00	21,517,997,000.00	39.000	59.07	0.03	4.29
1982.01	9,975,062.30	20,455,222,000.00	39.000	59.84	0.03	4.29
1982.02	9,975,062.30	19,482,820,000.00	39.000	60.63	0.04	4.29
1982.03	8,639,308.90	18,554,753,000.00	39.000	61.40	0.05	4.29
1982.04	8,481,764.20	17,672,386,000.00	39.000	62.21	0.05	4.29
1982.05	6,861,063.50	16,750,929,000.00	39.000	63.02	0.05	4.29
1982.06	6,359,300.50	15,878,515,000.00	46.460	63.84	0.05	4.29
1982.07	2,565,747.30	15,051,174,000.00	46.840	64.69	0.05	4.29
1982.08	2,565,747.30	14,199,411,000.00	58.810	65.55	0.05	4.29
1982.09	2,565,747.30	13,270,279,000.00	67.410	66.42	0.05	4.29
1982.1	2,565,747.30	12,402,471,000.00	67.740	67.68	0.05	4.29
1982.11	2,305,475.50	11,591,149,000.00	70.660	68.97	0.05	4.29
1982.12	2,059,944.40	10,883,761,000.00	73.430	70.29	0.10	4.29

Country	Argentina	Brasil	Chile	Colombia	México	Venezuela
1983.01	1,850,309.90	9,989,828,500.00	75.270	71.45	0.10	4.29
1983.02	1,658,237.30	7,209,521,800.00	78.800	72.81	0.10	4.29
1983.03	1,484,891.20	6,586,195,300.00	73.330	74.19	0.11	4.29
1983.04	1,344,357.10	6,044,886,000.00	74.210	75.60	0.11	4.29
1983.05	1,232,969.60	5,571,199,900.00	76.170	77.04	0.12	4.30
1983.06	1,125,999.30	5,064,736,500.00	77.710	78.51	0.12	4.30
1983.07	1,003,915.30	4,494,051,500.00	78.710	80.00	0.12	4.30
1983.08	887,154.01	4,098,360,700.00	80.190	81.68	0.13	4.30
1983.09	764,759.87	3,726,287,300.00	82.310	83.40	0.13	4.30
1983.1	632,631.11	3,266,033,300.00	84.320	85.15	0.14	4.30
1983.11	518,618.40	3,008,752,700.00	86.330	86.94	0.14	4.30
1983.12	429,904.13	2,794,715,400.00	87.530	88.77	0.14	4.30
1984.01	380,170.32	2,546,296,300.00	88.010	90.63	0.15	4.30
1984.02	344,091.94	2,267,106,300.00	88.180	92.53	0.15	4.91
1984.03	305,586.11	2,059,925,100.00	88.200	94.47	0.16	7.50
1984.04	266,481.91	1,892,635,900.00	89.340	96.45	0.16	7.50
1984.05	227,381.25	1,738,305,900.00	90.740	98.47	0.16	7.50
1984.06	195,152.41	1,591,435,200.00	91.470	100.40	0.17	7.50
1984.07	161,953.81	1,443,569,600.00	92.310	102.65	0.17	7.50
1984.08	134,417.64	1,305,173,200.00	92.980	104.81	0.18	7.50
1984.09	108,939.58	1,180,764,300.00	115.230	107.01	0.18	7.50
1984.1	83,288.91	1,048,817,700.00	117.740	109.26	0.18	7.50
1984.11	68,231.44	954,529,680.00	121.760	111.55	0.19	7.50
1984.12	55,948.75	863,693,470.00	128.240	113.89	0.19	7.50
1985.01	44,766.77	767,085,080.00	129.430	116.60	0.20	7.50
1985.02	37,309.95	696,026,320.00	144.110	120.10	0.20	7.50
1985.03	29,176.64	617,977,530.00	146.990	126.27	0.21	7.50
1985.04	22,299.03	552,208,840.00	150.770	132.58	0.22	7.50
1985.05	16,839.27	501,824,820.00	153.760	138.70	0.22	7.50
1985.06	12,492.19	459,866,220.00	156.380	142.90	0.23	7.50
1985.07	12,492.19	427,018,630.00	175.410	147.79	0.28	7.50
1985.08	12,492.19	394,548,060.00	176.990	152.06	0.29	7.50
1985.09	12,492.19	351,437,700.00	178.720	157.90	0.31	7.50
1985.1	12,492.19	321,261,680.00	179.600	162.43	0.32	7.50
1985.11	12,492.19	294,117,650.00	181.830	166.64	0.34	7.50
1985.12	12,492.19	262,154,430.00	183.860	172.20	0.37	7.50
1986.01	12,492.19	226,244,340.00	185.700	175.00	0.41	7.50
1986.02	12,492.19	198,699,420.00	188.500	178.10	0.44	7.50
1986.03	12,492.19	198,699,420.00	189.430	181.53	0.47	7.50
1986.04	11,897.68	198,699,420.00	187.880	186.56	0.50	7.50
1986.05	11,621.15	198,699,420.00	187.790	190.46	0.54	7.50
1986.06	11,229.65	198,699,420.00	189.660	193.76	0.58	7.50
1986.07	10,863.66	198,699,420.00	191.840	197.59	0.63	7.50

Country	Argentina	Brasil	Chile	Colombia	México	Venezuela
1987.01	7,518.80	166,293,770.00	205.180	222.79	0.99	14.50
1987.02	6,501.95	138,923,970.00	205.390	226.73	1.06	14.50
1987.03	6,501.95	124,187,140.00	210.840	231.08	1.13	14.50
1987.04	6,501.95	108,122,980.00	212.440	235.13	1.20	14.50
1987.05	6,176.65	80,891,870.00	215.240	239.41	1.28	14.50
1987.06	5,560.19	63,399,115.00	222.480	243.32	1.35	14.50
1987.07	5,067.78	59,755,329.00	224.760	247.56	1.42	14.50
1987.08	4,412.58	56,867,530.00	225.150	250.95	1.50	14.50
1987.09	3,801.92	53,625,054.00	225.840	254.39	1.57	14.50
1987.1	2,857.14	49,197,631.00	232.450	257.17	1.65	14.50
1987.11	2,857.14	43,603,038.00	235.210	260.30	1.76	14.50
1987.12	2,666.67	38,061,757.00	238.140	263.70	2.21	14.50
1988.01	2,450.98	32,972,435.00	240.900	267.98	2.22	14.50
1988.02	2,176.28	27,919,065.00	242.790	273.64	2.28	14.50
1988.03	1,895.73	24,006,984.00	244.570	280.09	2.28	14.50
1988.04	1,610.31	20,008,731.00	242.870	286.46	2.28	14.50
1988.05	1,413.43	16,903,313.00	247.890	293.16	2.28	14.50
1988.06	1,150.09	14,129,374.00	249.240	299.28	2.28	14.50
1988.07	931.10	11,376,329.00	244.800	305.03	2.28	14.50
1988.08	836.12	9,402,030.80	245.810	311.44	2.28	14.50
1988.09	836.12	7,576,175.00	246.380	317.96	2.28	14.50
1988.1	811.69	5,935,166.40	247.600	323.88	2.28	14.50
1988.11	780.64	4,676,314.00	245.700	329.88	2.28	14.50
1988.12	747.94	3,593,362.10	247.200	335.86	2.28	14.50
1989.01	717.36	2,750,000.00	245.840	343.12	2.31	14.50
1989.02	676.59	2,750,000.00	246.040	350.22	2.34	14.50
1989.03	632.11	2,750,000.00	252.240	357.72	2.37	35.68
1989.04	129.87	2,664,728.70	252.380	365.61	2.40	37.38
1989.05	56.50	2,385,082.40	254.250	373.70	2.43	37.58
1989.06	38.31	1,810,401.60	269.630	381.79	2.46	37.83
1989.07	15.33	1,269,621.40	274.950	389.20	2.49	37.02
1989.08	15.33	981,441.83	278.680	397.33	2.52	37.76
1989.09	15.33	724,255.99	280.880	405.84	2.55	38.00
1989.1	15.33	526,315.79	285.530	414.87	2.58	39.27
1989.11	15.33	373,235.61	291.560	424.16	2.61	43.07
1989.12	5.57	242,120.09	297.370	433.92	2.64	43.58
1990.01	5.36	155,095.60	295.580	445.69	2.68	43.42
1990.02	1.68	89,763.68	295.180	457.17	2.70	42.84
1990.03	2.15	64,614.66	296.980	468.96	2.73	43.16
1990.04	2.00	53,665.87	296.920	479.75	2.76	44.78
1990.05	2.00	49,801.70	296.560	491.64	2.79	46.15
1990.06	1.90	45,065.71	297.070	502.39	2.82	46.03
1990.07	1.84	39,860.85	298.480	513.71	2.84	49.16
1990.08	1.61	38,368.17	304.460	525.60	2.86	49.01
1990.09	1.78	32,651.41	307.580	534.90	2.89	48.75

Country	Argentina	Brasil	Chile	Colombia	México	Venezuela
1994.04	1.00	2.11	426.130	837.31	3.27	116.06
1994.05	1.00	1.47	421.810	841.12	3.31	136.15
1994.06	1.00	1.00	418.340	819.64	3.39	173.08
1994.07	1.00	1.06	423.980	815.62	3.40	179.16
1994.08	1.00	1.12	418.330	816.30	3.38	169.57
1994.09	1.00	1.17	412.320	842.00	3.40	169.39
1994.1	1.00	1.18	411.150	838.55	3.43	169.50
1994.11	1.00	1.18	403.990	829.03	3.45	169.92
1994.12	1.00	1.18	402.920	831.27	5.33	170.00
1990.1	1.80	25,712.95	321.770	545.61	2.92	48.97
1990.11	1.95	19,003.52	332.260	556.53	2.93	50.12
1990.12	1.79	15,531.46	337.090	568.73	2.95	50.41
1991.01	1.06	12,492.05	337.340	578.96	2.96	51.33
1991.02	1.00	12,308.11	337.660	588.63	2.97	53.66
1991.03	1.04	11,509.65	344.100	598.46	2.98	54.11
1991.04	1.02	10,547.31	337.440	608.45	2.99	54.52
1991.05	1.01	9,659.29	342.520	618.61	3.01	55.11
1991.06	1.00	8,807.89	348.040	628.82	3.02	55.40
1991.07	1.00	7,934.90	348.310	639.37	3.03	57.97
1991.08	1.00	6,983.95	353.700	652.11	3.04	59.29
1991.09	1.01	5,914.87	357.290	667.18	3.06	59.28
1991.1	1.01	4,263.43	360.710	679.30	3.07	59.99
1991.11	1.01	3,272.25	368.890	694.70	3.07	60.16
1991.12	1.00	2,572.98	374.510	706.86	3.07	60.96
1992.01	1.01	2,084.20	350.460	716.70	3.07	61.86
1992.02	1.01	1,686.24	346.690	725.10	3.06	64.03
1992.03	1.01	1,383.30	348.020	733.34	3.08	65.39
1992.04	1.01	1,147.70	346.690	741.66	3.08	64.93
1992.05	1.01	965.22	351.990	750.08	3.11	65.27
1992.06	1.01	797.86	358.710	758.62	3.12	65.83
1992.07	1.01	654.05	364.670	767.22	3.11	66.48
1992.08	1.01	535.96	374.400	775.94	3.08	67.69
1992.09	1.01	429.69	375.310	784.75	3.12	68.89
1992.1	1.01	342.29	373.990	793.65	3.13	73.93
1992.11	1.01	276.38	381.700	802.12	3.12	77.35
1992.12	1.01	222.00	382.120	811.77	3.12	78.88
1993.01	1.00	174.94	384.370	820.08	3.09	80.18
1993.02	1.00	138.48	391.310	828.49	3.09	81.87
1993.03	1.00	109.47	401.880	836.94	3.10	83.89
1993.04	1.00	85.22	405.150	845.54	3.10	85.27
1993.05	1.00	65.95	405.280	853.70	3.12	86.96
1993.06	1.00	50.61	404.650	862.91	3.12	87.56
1993.07	1.00	38.65	405.650	871.76	3.12	90.86

Country	Argentina	Brasil	Chile	Colombia	México	Venezuela
1993.08	1.00	29.05	408.660	880.72	3.11	93.25
1993.09	1.00	21.47	410.830	889.76	3.12	95.92
1993.1	1.00	15.80	412.440	898.88	3.12	98.15
1993.11	1.00	11.65	419.330	908.06	3.11	101.78
1993.12	1.00	8.43	428.470	917.33	3.11	104.24
1994.01	1.00	6.00	431.040	926.00	3.11	106.86
1994.02	1.00	4.31	429.380	929.93	3.21	109.55
1994.03	1.00	3.01	426.890	820.78	3.36	112.78
1995.01	1.00	1.19	410.790	859.30	5.70	170.00
1995.02	1.00	1.17	410.490	856.99	5.84	170.00
1995.03	1.00	1.12	404.010	880.23	6.82	170.00
1995.04	1.00	1.10	387.820	876.21	5.79	170.00
1995.05	1.00	1.10	377.630	876.36	6.18	170.00
1995.06	1.00	1.08	373.950	881.23	6.31	170.00
1995.07	1.00	1.07	381.040	897.63	6.09	170.00
1995.08	1.00	1.05	393.530	960.19	6.31	170.00
1995.09	1.00	1.05	399.260	972.80	6.42	170.00
1995.1	1.00	1.04	415.070	994.50	7.17	170.00
1995.11	1.00	1.03	413.500	998.16	7.65	170.00
1995.12	1.00	1.03	406.910	987.65	7.64	252.11
1996.01	1.00	1.02	412.290	1,028.14	7.39	288.69
1996.02	1.00	1.02	412.580	1,039.81	7.54	289.58
1996.03	1.00	1.01	411.640	1,048.42	7.55	289.85
1996.04	1.00	1.01	407.280	1,058.90	7.40	360.47
1996.05	1.00	1.00	408.930	1,073.06	7.41	468.89
1996.06	1.00	1.00	410.730	1,069.73	7.61	471.25
1996.07	1.00	0.99	411.000	1,056.74	7.59	470.75
1996.08	1.00	0.98		1,045.02	7.58	474.20

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