

IMF WORKING PAPER

© 1996 International Monetary Fund

This is a *Working Paper* and the author(s) would welcome any comments on the present text. Citations should refer to a *Working Paper* of the International Monetary Fund, mentioning the author(s), and the date of issuance. The views expressed are those of the author(s) and do not necessarily represent those of the Fund.

WP/96/51

INTERNATIONAL MONETARY FUND

Middle Eastern Department

Credit and Exchange Rate-Based Stabilization

Prepared by May Khamis *

Authorized for distribution by Henry Jakubiak

May 1996

Abstract

This paper examines the behavior of private sector credit in chronic inflation countries that undergo exchange rate-based inflation stabilizations. It concludes that these programs are characterized by a strong increase in private sector credit, both in absolute terms and as a fraction of real economic activity. Empirical results using data for Mexico, Chile, Argentina, and Israel support a negative statistically significant relationship between credit and inflation for Mexico, Argentina, and Chile, but not for Israel. In addition, for both Chile and Mexico, dummy variables representing periods of inflation stabilization are positive and statistically different from zero indicating a stronger expansion in private sector credit during stabilization. These results could potentially explain the consumption boom that is usually present in the early stages of these programs.

JEL Classification Numbers:

E44, E51, E63, E65

* The author is grateful to Enrica Detragiache and Laurence Ball for comments and suggestions. The author also thanks Christian Thimann and Gunnar Jonsson for helpful suggestions. The usual disclaimer applies.

	<u>Contents</u>	<u>Page</u>
Summary		
I.	Introduction	1
II.	The Literature on Exchange Rate-Based Stabilizations	3
	1. The real interest rate theory	4
	2. The intertemporal consumption substitution theory	5
	3. The wealth effect theory	9
III.	Inflation, Financial Reform, and Private Sector Credit	10
	1. Mexico	11
	2. Chile	12
	3. Argentina	14
	4. Israel	16
IV.	Empirical Results	17
	1. Mexico	18
	2. Chile	19
	3. Argentina	20
	4. Israel	22
V.	Inflation and Private Sector Credit: Theoretical Interpretations of the Empirical Results	23
VI.	Conclusions	26
Bibliography		46

Summary

This paper is an empirical examination of the behavior of private sector credit in countries with chronic inflation that undergo inflation stabilization. The paper shows that these programs are characterized by a strong increase in private sector credit. In addition, empirical tests are used to determine whether the decline of inflation can explain the increase in credit. The data support a negative statistically significant relationship between credit and inflation for Mexico, Argentina, and Chile, but not for Israel.

For both Chile and Mexico, dummy variables indicating periods of inflation stabilization are positive and statistically different from zero. In Mexico, inflation stabilization has been accompanied by financial sector reforms. Thus, the documented increase in the intercept of the relationship in Mexico is attributed to both inflation stabilization and financial liberalization. In Chile, financial sector reform preceded inflation stabilization; stabilization was thus achieved within a liberalized financial sector. Accordingly, the increase in the intercept of the relationship in Chile is attributed to inflation stabilization, given a liberalized financial environment. Inflation stabilization programs in both Argentina and Israel were preceded by financial sector reforms. Dummy variables indicating financial sector reform and stabilization periods are not statistically significant in either country. In Argentina, the inflation rate remained high under the program, which could explain the weaker response of private sector credit. In Israel, the result is explained by multiple factors, including specific credit market conditions and the tight monetary policy implemented under the program.

The paper discusses a number of potential causes for the increase in credit during stabilization. First, disinflation can expand credit supply through the remonetization of the economy when the reduction of nominal interest rates and the return to monetary assets as a result of disinflation increase the liquidity positions of the banking sector. Second, inflation stabilization can increase the supply of credit by decreasing the variance of the perceived real lending rate, the risk of default, or both. Third, credit expansion might be explained by the presence of moral hazard in banks' lending. Expecting that they will be bailed out in case of insolvency, banks are inclined to finance projects that otherwise would be too risky. Finally, the dramatic reduction in nominal interest rates during stabilization increases the demand for credit. The sharp reduction in nominal interest rates, especially in the case of heterodox programs, results in a onetime "debt-rescheduling" effect that postpones principal repayment. In addition, nominal interest rate reduction is often associated with a lengthening of maturities. Both these effects tend to increase credit demand.

The increase in credit documented in this paper is important because it can be one of the factors contributing to the boom that characterizes the beginning of exchange-rate-based stabilizations. The evidence suggests that further work on the relationship between credit expansion and growth in exchange-rate-based stabilizations could be promising.

I. Introduction

Existing literature on inflation stabilization focuses on different aspects of exchange rate-based stabilizations (ERBS) including the cyclical behavior of consumption and output, the dynamics of the real interest rates, and inflation convergence. ^{1/} The behavior of credit during these programs, however, has received little attention in this literature. In this paper, we study the behavior of private sector credit in chronic inflation countries that undergo inflation stabilization. We conclude that these programs are characterized by a strong increase in private sector credit, both in absolute terms and as a fraction of real economic activity. Using data for Mexico, Chile, Argentina, and Israel we test empirically whether the decline of inflation can explain the documented increase in credit. The results support a negative statistically significant relationship between credit and inflation for Mexico, Argentina, and Chile, but not for Israel.

In addition, for both Chile and Mexico, dummy variables indicating periods of inflation stabilization are positive and statistically different from zero. This indicates that the intercept of the estimated relationship between credit and inflation is greater during stabilization than in any other period. In the Mexican case, inflation stabilization has been accompanied by a financial sector reform and therefore the documented increase in the intercept of the relationship is attributed to the combined effect of stabilization and financial liberalization. In the Chilean case, financial sector reform preceded inflation stabilization and stabilization was achieved in the presence of a liberalized financial sector. Accordingly, the increase in the intercept of the relationship is attributed to inflation stabilization, given a liberalized financial environment. Inflation stabilization programs in both Argentina and Israel were preceded by financial sector reforms. Dummy variables indicating financial sector reform and stabilization periods for both countries are not statistically significant. In the Argentine case, inflation remained high even under the program which could explain the weaker reaction of private sector credit. In the Israeli case where the credit market was highly directed during the seventies and early eighties, enterprises were overburdened with debt at the time of stabilization which hindered their ability to undertake new debt at the time of stabilization.

A number of possible explanations for the increase in credit during stabilization are proposed. On the supply side, disinflation can expand credit supply through remonetization of the economy, lower lending risk, and possible moral hazard practices in banks' lending. We find that the stabilization of high inflation in these programs is generally accompanied by remonetization where as inflation decreases and becomes less persistent

^{1/} See Kiguel and Liviatan (1992), and Vegh (1992, 1995).

domestic liquid assets become more attractive. Accordingly, the return to monetary assets as a result of disinflation increases the liquidity positions of the banking sector allowing for credit expansion.

The second effect of inflation stabilization on credit supply is related to the decrease in risk that may be associated with a lower level of inflation. Assuming perfect credibility of the stabilization program, inflation stabilization could increase the supply of credit by decreasing the variance of the perceived real lending rate and/or the risk of default where, given the expected real lending rate, a lower variance of that rate or a reduced credit risk increases bank supply of credit.

Credit expansion might also be explained by the presence of moral hazard in banks' lending. Expecting that they will be bailed out in case of insolvency, banks are inclined to finance projects that would be otherwise too risky. Banks have been repeatedly bailed out by many of the Latin American governments after threats of bankruptcy where that the largest banking institutions are usually state owned and therefore the government is obliged to bail them out if they become insolvent. For example, in Brazil, 56 percent of total lending is carried out by two state-owned banks. In addition, the crisis in the financial sector usually coincides with an overall economic crisis. As a measure of crisis control, the government bails out the financial sector. Mexico's recent experience is a case in point.

On the demand side, an expansion of credit demand is mainly related to the dramatic reduction in nominal interest rates. Although real interest rates increased in many episodes following inflation stabilization, the sharp reduction in nominal interest rates, especially in the case of heterodox programs, results in a one-time "debt-rescheduling" effect that postpones principal repayment. ^{1/} In addition, nominal interest rate reduction is often associated with a lengthening of maturities. Both effects tend to increase credit demand.

The documented increase in credit is important because it can potentially be one of the factors contributing to the boom that characterizes the beginning of ERBS. Theoretical and empirical work on the relationship between credit and real economic activity has been growing recently due to concerns about the effect of financial fragility, banking failures, and loan rationing and their interaction with monetary policy. This literature suggests that monetary aggregates are determined jointly by monetary policy and the conditions in the credit market. In addition, this view focuses on exogenous credit market shocks and their effect on both monetary aggregates and real output; that is, credit market shocks that arise independently from monetary policy such as banking crises. ^{2/} In a

^{1/} Bruno and Meridor, (1991).

^{2/} For references see Brunner and Meltzer (1988), Friedman (1988), Bernanke and Blinder (1988), and Friedman and Kuttner (1993).

recent paper, Calvo (1993) introduces evidence on the effect of real bank credit contraction in Eastern European countries on output contraction. He concludes that the hypothesis that output contraction may partly owe to a credit contraction cannot be ruled out. Given the evidence on credit behavior documented in this paper, further work on ERBS along the lines of Calvo's paper could be very promising.

This paper is organized as follows. Section (II) reviews and critiques the existing literature on exchange rate-based stabilization programs. The literature review indicates that existing work on ERBS does not address credit behavior under these programs. Section (III) presents an overview of the behavior of inflation and private sector credit in Mexico, Chile, Argentina, and Israel for the period 1970 to 1994 in addition to a profile of the financial sector reforms undertaken in this period. Data supporting the presence of a negative relationship between private sector credit and inflation is presented. Section (IV) presents empirical evidence on the relationship between inflation and private sector credit. Section (V) discusses the theoretical relationship between inflation stabilization and private sector credit. Section (VI) concludes.

II. The Literature on Exchange Rate-Based Stabilizations

There is an impressive volume of literature on ERBS. Among other things, the literature documents a series of empirical regularities that characterize these stabilizations. These regularities include the well-documented business cycle where the experience of inflation stabilization in countries with chronic inflation under ERBS has been accompanied, in most cases, by a nontraditional pattern of initial output expansion. 1/ The traditional view is that programs aimed at stopping inflation involve an initial cost of loss of output because of rigidities in past nominal contracts (See Fischer 1988, and Taylor 1979) or because of credibility problems. This classical pattern has been observed in programs aimed at stopping low or moderate inflation; orthodox stabilization programs that targeted chronic inflation in which money was used as the nominal anchor; and, to a lesser degree, exchange rate-based stabilizations aimed at stopping hyperinflation. This cycle, however, has been reversed in programs aimed at stopping chronic inflation where these programs have been accompanied by an initial boom that sometimes lasted for several years before ending in a recession. 2/ The literature offers a number of theories to explain the observed business cycle. As shall be seen below, whereas these theories offer a variety of potential explanations, credit is left out of the overall framework.

1/ See Kiguel and Liviatan (1992), and Vegh (1992, 1995).

2/ Kiguel and Liviatan (1992).

The literature on ERBS can be categorized under three main theories: the real interest rate theory initially suggested by Rodriguez (1982); the intertemporal consumption substitution theory suggested first by Calvo (1986); and the wealth effects theory suggested by Helpman and Razin (1987). The following discussion highlights the elements of each theory and discusses the degree to which it is successful in explaining the observed cycle. In all three theories, credit is left unexamined.

1. The real interest rate theory

In a 1982 paper, Rodriguez attempted at modelling the essential characteristics of the Argentine Tablita that was launched in December of 1978. ^{1/} The model incorporates two goods, traded and nontraded. Rodriguez assumes that purchasing power parity holds for traded goods, whereas the price inflation of the nontraded goods is determined, in the spirit of the expectations augmented Phillips curve, by expectations of future inflation and the excess demand prevailing in the market. Rodriguez assumes rigidities in inflation expectations by assuming adaptive expectations. The author also assumes the presence of perfect capital mobility thus the condition of uncovered interest parity. Under these assumptions, the excess demand for nontraded goods, ED_N , can be described by the following equation:

$$ED_N = F(r, e) \quad F_r < 0, F_e > 0$$

$$r = i - \pi^e = i^* + \beta (\epsilon^e - \pi_N^e) + k$$

where r is the real interest rate, e is the relative domestic price of traded to nontraded goods or the real exchange rate, i is the domestic nominal interest rate, π_N^e is the expected inflation rate, i^* is the international interest rate, β is the share of consumption of nontraded goods, ϵ^e is the expected devaluation rate, π_N^e is the expected inflation in the price of nontraded goods, and k is a constant risk factor.

The first equation essentially says that excess demand for nontraded goods varies positively with the real exchange rate and negatively with the real interest rate. Given perfect credibility and rigidity in inflation expectations, Rodriguez shows that a disinflation program based on the reduction in the rate of devaluation results in a reduction in the real interest rate and an appreciation in the real exchange rate. Rodriguez shows that initially the real interest rate effect dominates resulting in an increase in excess demand for nontraded goods, thus the observed boom. In later stages, however, the opposite effect of the real exchange rate appreciation dominates resulting in an eventual elimination of excess demand.

^{1/} Related work can found in Fischer (1986 and 1988).

The above model is interesting in that it is consistent with the observation that, in some cases, recession was underway before the collapse of the program. That is, recession is not contingent on the failure or the credibility of the program. In addition, it incorporates the negative effect of real exchange rate appreciation on aggregate demand. There are, however, two main drawbacks to this theory. The first is that this theory does not explain why the boom following stabilization is associated mainly with consumption expansion as opposed to investment expansion. The second is a more serious inconsistency with the observed data. Although the data on (ex-post) real interest rates associated with orthodox stabilization programs undertaken in the seventies are consistent with the above results, real interest rates following the heterodox stabilization programs in the eighties contradict the above. The data indicate substantial increases in real interest rates upon stabilization.

Table 1a shows the behavior of (ex-post) real lending rates for Argentina, Chile and Uruguay following the orthodox stabilization plans (Tablitas) undertaken in these countries in the late seventies. In both Chile and Uruguay, real lending rates declined considerably in the early stages of the program. In the case of Argentina, the lending rates remained negative for the first two quarters of the program and increased afterwards. Table 1b shows data on the real exchange rate under heterodox stabilization programs in Argentina, Brazil, Israel, and Mexico. In all four cases, real interest rates increased substantially upon the initiation of the program. ^{1/} Although real interest rates declined gradually after stabilization, they remained above their pre-stabilization levels. This could be explained by the quicker convergence of inflation rate (to the preannounced devaluation rate) in the case of the heterodox programs due to the introduction of incomes policies upon stabilization. At any rate, the building block of the Rodríguez argument, i.e. the real interest rate effect, is undermined in the case of heterodox programs.

2. The intertemporal consumption substitution theory

The intertemporal substitution theory, first advanced by Calvo (1986), attributes the business cycle to the lack of credibility of the stabilization programs. ^{2/} The central theory is based on a one-good, cash-in-advance model, with perfect capital mobility and Ramsey-type consumers. Lack of credibility is modelled as temporary policy with perfect foresight. Calvo shows that a temporary reduction in the rate of devaluation leads to a consumption boom where agents will shift part of their consumption from the future to the present. The representative agent maximizes his/her lifetime utility at time 0 given by:

^{1/} An estimate of the expected inflation rate for Israel using capital market data indicate that the ex-ante real interest rates on bank loans rose significantly in the early stages of the 1985 stabilization (Bank of Israel, 1985).

^{2/} Extensions of the basic model are found in Calvo (1987 and 1991).

$$\int_0^{\infty} u(c_t) e^{-rt} dt$$

where c is consumption and r is a positive and constant subjective rate of discount and is assumed to be equal to the international real interest rate. The consumer faces a lifetime budget constraint and a cash-in-advance restriction:

$$a_0 + \int_0^{\infty} (y_t + g_t) e^{-rt} dt = \int_0^{\infty} (c_t + i_t m_t) e^{-rt} dt$$

$$m_t \geq \alpha a_t$$

where y_t and g_t denote real income and real government lump-sum transfers respectively. a_t denotes real assets that can be held either in international bonds or in domestic money, i_t is the nominal interest rate, and m_t denotes real monetary balances. Interest rate arbitrage implies the uncovered interest parity condition:

$$i_t = r + \epsilon_t$$

where ϵ_t is the expected (and actual) rate of devaluation. The first order condition for the above maximization problem will therefore be:

$$u'(c_t) = \lambda (1 + \alpha i_t)$$

where λ is the Lagrange multiplier associated with the budget constraint and is assumed constant. This condition is the familiar equality between the marginal utility of consumption and its price multiplied by the marginal utility of wealth. Here, the effective cost of a unit of consumption is the output cost (=1) plus the opportunity cost of holding money i_t .

Under full credibility, an announcement of a permanent reduction of the devaluation rate will result in a permanently lower domestic nominal interest rate. If the new level of i_t is perceived to remain constant over time then the consumer has no incentive to substitute consumption intertemporally. Accordingly, the utility maximizing stream of consumption will be constant.

Calvo models the lack of credibility of the program by modelling the decrease in the rate of devaluation as temporary. Given the interest arbitrage condition and the expected increase in the rate of devaluation, say at time T , the consumer expects the nominal interest rate to increase one-to-one with the increase in the rate of devaluation. Therefore, the effective cost of consumption, given the higher cost of holding money, will be greater for $t \geq T$. Accordingly, the utility maximization level of consumption for $t < T$ will be greater than that for $t \geq T$, thus the observed consumption boom.

Calvo and Vegh ^{1/} extend this model to a two sector model with traded and nontraded goods. Under the assumption of lack of credibility, the theoretical implications of the model are generally consistent with the stylized facts. For $t < T$, the model predicts an increase in private consumption of both traded and nontraded goods. The consumption of traded goods increases at $t=0$ and remains constant until $t=T$ where it declines below its pre-stabilization level. The level of consumption of nontraded goods jumps initially then starts declining gradually and could possibly reach below its pre-stabilization level even before the expected failure of the program. This is consistent with the observed cycle following stabilization with recessions setting in even before the abandoning of the program as in the case of the Chilean and Uruguayan Tablitas in the late seventies. The current account deteriorates directly after stabilization due to the resulting trade deficit. Although the trade deficit is constant for $t < T$, the current account will be deteriorating due to the accumulation of foreign debt. The model predicts a U-shaped path for inflation with inflation rate declining initially at a rate lower than the per-announced devaluation rate. Thus, due to the lack of credibility the inflation rate exhibits inertia. If at time T the authorities abandon the program, inflation will continue to increase towards its initial level. If the authorities stick to their plan, then the inflation rate jumps downwards at time T and converges from below to the lower devaluation rate. The observed time path of inflation for the Chilean, Uruguayan, and Argentine Tablitas, as well as the Cruzado plan of Brazil and the Austral plan of Argentina follow the U-shaped path where authorities decided to eventually abandon the program. The path of inflation after the 1985 Israeli stabilization plan and the 1988 Mexican Stabilization plan follow that in which the authorities adhered to the stabilization plan.

The model predicts a U-shaped time path for the real exchange rate where it appreciates upon the initiation of the program but starts depreciating again at time T , whether the program is abandoned or not. The initial appreciation of the real exchange rate is observed in most programs (the exceptions are the Brazilian Cruzado plan and the Argentine Austral plan where the real exchange rate depreciates briefly and starts appreciating afterwards). The U-shape, however, is mostly obvious in the Tablitas in the late seventies.

The model's predictions of the time path of the real interest rate are consistent with those observed in the Tablita programs but do not agree with the observations of the real interest rate following the heterodox programs in the eighties. The model implies that the real exchange rate jumps downward upon the initiation of the program and remains under its initial level up to time T . At time T , the real interest rate jumps to above its initial level and starts converging to its initial level afterwards. The (ex-post) real interest rates in the Tablita programs indicate an initial increase in the levels of the real interest rate. The real interest rates

^{1/} Calvo and Vegh (1990 and 1991), and Vegh (1992).

associated with the heterodox programs indicate an initial increase. As mentioned above, this pattern is probably due to the adoption of income policies in the heterodox programs that resulted in a quicker convergence in the inflation rate.

Accordingly, the theoretical implications of the intertemporal model are generally consistent with the observed facts. In recent work, Reinhart and Vegh ^{1/} attempt at examining the empirical relevance of the intertemporal substitution approach in explaining the consumption cycle in exchange rate-based stabilizations. ^{2/} At the theoretical level, the intertemporal substitution of consumption occurs due to the temporary decrease in the nominal interest rate. At the empirical level, Vegh and Reinhart use Cochrane's methodology (Cochrane, 1988) to decompose the variance of the nominal interest rate into its permanent and transitory components. They examine seven programs in six chronic-inflation countries: Argentina, Brazil, Chile, Israel, Mexico, and Uruguay. The results indicate that temporary shocks are responsible for 40-90 percent of the total variance of nominal interest rates. In four of the countries they examine, temporary shocks account for 75 percent of the variance of nominal interest rates. As an evidence on the presence of consumption smoothing, the authors estimate the intertemporal elasticities of consumption and find that the elasticities are rather low but statistically different from zero. The estimates for the six countries lie in a 0.05-0.8 range and vary within countries depending on the choice of interest rate (whether deposit rates or stock market returns). Estimates are found to be clustered around the 0.2 level.

Having established the existence of the necessary (but not sufficient) ingredients for the temporariness hypothesis, Reinhart and Vegh estimate the quantitative importance of the hypothesis in explaining the observed consumption pattern. The authors conclude that the model performs poorly for the Argentine and Uruguayan Tablita where it misses the initial consumption boom entirely. For the remaining five programs, the model's predictions range between 59 percent and 136 percent of the actual increase in consumption.

The above discussion indicates that in general, the intertemporal substitution approach has limited success in empirically explaining the business cycle related to exchange rate-based stabilizations.

^{1/} Reinhart and Vegh (1994a and 1994b).

^{2/} Due to the restrictive assumption of fixed velocity implied by the cash-in-advance model, the authors introduce money by introducing transaction cost technology; the consumer must incur transaction costs that varies negatively with the amount of real money balances and positively with the amount of consumption, to purchase goods.

3. The wealth effect theory

The wealth effects of stabilization program have been introduced by Helpman and Razin (1987). The authors use a Blanchard-type consumption function (see Blanchard 1985) to show that an unexpected exchange rate freeze generates capital gain for the currently alive population. The model assumes finite-lived individuals and therefore Ricardian equivalence does not hold. The unexpectedly low exchange rate level increases the real value of nominal asset holdings, such as money balances. In the presence of finite-lived individuals, this wealth effect is not fully offset by future tax liabilities. Accordingly, an exchange rate freeze brings about an increase in private consumption and a worsening of the current account. The increase in future tax liabilities in this model is due to the loss of reserves attached to the freeze in the exchange rate increasing government debt and debt service. Future reductions in the budget deficits are therefore expected by means of an increase in taxes. The consumption effect stems from a tilt in the consumption profile as a result of finite lifetimes without the need to abandon the fixed exchange rate system. As time goes by, the share of the population that enjoys the capital gain declines while that who enjoys tax liabilities increases resulting in an eventual decline in consumption. The end result is a temporarily higher consumption level, worsening trade accounts, reserve losses and larger government debt. 1/

The importance of this theory in explaining the business cycle is an empirical matter. The temporary increase in consumption is explained by the increase in wealth that could be due to, as in the above presented model, a decrease in inflation tax. However, stabilization programs are often followed by a sharp increase in tax collection where the effective rates of collection become high due to the disinflationary effect (Bruno and Meridor, 1991).

The above discussion highlights the basic argument of each theory. The review clearly indicates that these theories do not examine the behavior or the role of credit during stabilizations. In the next section, credit expansion during stabilization is documented using data on inflation and credit for four countries: Mexico, Chile, Argentina, and Israel. In

1/ Related work can also be found in Helpman and Liederman (1988), and Drazen and Helpman (1987 and 1988). These papers view stabilization efforts as two stage programs. The first stage is exchange rate management with few other adjustments, and the second stage is either a fiscal adjustment or an abandonment of the exchange rate policy. These models implement infinite-lived individuals but Ricardian equivalence does not hold due to distortions resulting from expectations of the different forms of budgetary adjustment. Real effects in the first period will therefore vary depending on the kind of fiscal tool that is expected to be used in the second stage to adjust the budget.

addition, as most of ERBS have been accompanied or preceded by a financial sector reform, the section includes a summary of financial sector reforms undertaken in each of the four countries throughout the period studied.

III. Inflation, Financial Reform, and Private Sector Credit

The previous section shows that existing work fails to discuss the behavior and role of credit in exchange rate-based stabilization programs. In the discussion below, we will show that ERBS have been accompanied by an expansion in credit extended to the private sector. In addition, the empirical evidence presented in the next section indicates a statistically significant negative relationship between credit and inflation for Mexico, Chile, and Argentina. It could be argued therefore that the expansion in credit is related to inflation stabilization and could be responsible for some share of the boom in economic activity. 1/

To control for credit expansion that occurs as a result of autonomous consumption expansion, we use private sector credit as a share of GDP for annual data presented in this section. For all quarterly data presented in this paper, and due to the unavailability of complete GDP quarterly data, the credit variable used for Mexico, Chile and Argentina is real private sector credit as a ratio to the manufacturing production index (as a proxy for real economic activity). For Israel, quarterly GDP is available and therefore the credit variable used is private sector credit as a share of quarterly GDP. 2/

The discussion includes four programs: The Chilean Tablita (February 1978), the Argentine Tablita (December 1978), the Israeli heterodox program (July 1985), and the Mexican Pacto (December 1987). In this section, we present a profile of each country's inflation performance and credit behavior. In addition, as most of ERBS programs have been also accompanied (or preceded) by a financial sector reform we provide a summary of financial sector reforms undertaken in each of the above countries throughout the period studied. In the next section, we will present empirical evidence on the presence of a statistically significant negative relationship between credit and inflation. In the case where financial sector reform coincides with inflation stabilization, part of the credit expansion observed is attributed to the combined effect of stabilization and financial sector reform.

1/ In Section (V) we suggest channels through which inflation reduction could have a positive effect on the stock of private sector credit.

2/ We will refer to the above described quarterly credit variable by "credit." The regressions are carried out using first differences instead of levels due to considerations of stationarity of the time series.

1. Mexico

Inflation and private sector credit: Starting at single digits in 1970, annual inflation rate rose steadily throughout the seventies to reach 28 percent in 1981. As a result of the debt crisis in 1982, inflation rose even higher to remain above 60 percent, with triple digit inflation in 1983 and 1987. Inflation was brought down soon after the initiation of the heterodox program (Pacto) in December 1987. 1/ The stabilization program was viewed to be successful where inflation dropped drastically afterwards to remain around the 20 percent level. Table 2 shows average annual inflation rates for Mexico for the 1970-1981, 1982-1987, and 1988-1992 periods defining distinct macroeconomic regimes. The corresponding data for average private credit as percentage of GDP indicate that as average annual inflation increased from 18 percent in the period 1970-1981 to 84 percent in the period 1982-1987, credit extended to the private sector declined from 26 percent to 14 percent. After stabilization, credit recovered to reach an average of 24 percent which is close to the pre-debt crisis level.

Figure 1 shows the time series for inflation and credit (as a ratio to the index of manufactured production) using quarterly data for 1970:1-1994:3. The figure indicates three main periods: 1970:1-1982:3 which underscores a period of relatively low average inflation rates; 1982:3-1988:1 which indicates the beginning of the debt crisis and the ensuing chronic inflation; 1988:1-1994:3 which indicates the start of the heterodox inflation stabilization program and the successful lowering of the inflation rate. The figure illustrates the dramatic increase in credit after the initiation of the Pacto in December 1987.

The financial sector. 2/ Following the debt crisis in August 1982, the Government nationalized all domestic banks. Due to the virtual stop of foreign financing of the government budget deficit, the Government relied on the banking sector to finance the deficit primarily by increasing the required reserves ratio. To attract domestic savings, the Government also imposed ceilings on deposit rates offered by commercial banks securing relatively higher rates on government bonds. This period was also accompanied by demonetization of the economy where substitution for domestic money took place in the form of capital flight and recourse to nonmonetary financial substitutes that offered relatively higher interest rates, especially government bonds. These policies resulted in the erosion of savings in the banking sector and a decline in banks' share in financial intermediation.

In January 1988, soon after the initiation of the Pacto, the Government adopted a tight monetary policy where commercial banks were given lending ceilings of 90 percent of the outstanding average balance on December 1987.

1/ For a detailed discussion of the Mexican stabilization program see Ortiz (1991) and Dornbusch and Werner (1994).

2/ See Skiles (1991).

This ceiling was further reduced to 85 percent in February. Savings in the commercial banks' sector dropped in real terms by 10 percent between the end of 1987 and September 1988 where funds were further diverted to the unregulated interfirm market and brokerage houses. In October 1988, the Government attempted to increase the attractiveness of bank savings by allowing banks to accept unlimited amounts of deposits in the form of "bankers' acceptances" that were free of interest rate ceilings, credit restrictions, and forced lending requirements. ^{1/} The required reserves ratio for this instrument was 30 percent as opposed to 45 percent for the traditional bank savings deposits. In addition, banks were allowed to hold reserves in the form of government securities (CETES). Bankers' acceptances grew tremendously and by the end of 1988 accounted for 60 percent of all traditional bank deposits.

In April 1989, all limits on traditional banking instruments were formally abolished. Interest rate controls, credit ceilings, and forced lending requirements were abolished and the required reserves ratio on all deposits dropped to 30 percent and could be held in the form of CETES. The deregulation of the banking sector was completed. These reforms were accompanied by a lower budget deficit freeing the funds for private sector borrowing in addition to a substantial increase of savings in the banking sector.

During 1989, the regulatory and supervisory structure of the banking sector was strengthened and restrictions on foreign investment in the financial services industry were lifted. In addition, the Government approved the privatization of the banking sector that began in 1991.

2. Chile

Inflation and private sector credit: Chile's history with inflation started in the 1960s when government policies were accommodating the inertial inflation resulting from periodic increases in prices and wages. ^{2/} Average annual inflation reached 21 percent in the sixties and rose to triple digits in subsequent years to reach a peak of 505 percent in 1974. Chronic inflation persisted in Chile until the 1978 exchange rate based-stabilization program (Tablita) succeeded in bringing it down. The period-average annual inflation rate dropped from 234 percent in the period

^{1/} Bankers' acceptances are bank deposits offered by bank subsidiaries

^{2/} For a complete discussion of the Chilean experience, see Corbo and Solimano (1991), Corbo (1985), and the Institute of International Finance (1990).

1970-1977 to 23 percent in the period 1978-1993 (see Table 2). ^{1/} In 1993, average annual inflation reached a low of 13 percent. The behavior of credit extended to the private sector follows that observed in Mexico. Average private sector credit as a share of GDP increased from 9 percent in 1970-1977 to 47 percent in the period 1978-1993. Average private sector credit as a share of private consumption rose from 13 percent to 70 percent.

Figure 2 shows time series for quarterly inflation rate and credit (as a ratio to the manufacturing production index). The figure indicates the start of the Tablita program in February 1978 and its collapse in June 1982. The period before the Tablita program includes the military coup in September 1973 and the orthodox stabilization program in 1975 that involved privatization, financial sector, tax and fiscal reform in addition to tight *monetary policies*. Inflation in this period did not drop substantially where three-digit inflation continued well into early 1977. The Government eventually adopted the preannounced devaluation schedule (Tablita) in February 1978 that culminated in fixing the exchange rate in June 1979. In June 1982, faced with unsustainable real exchange appreciation, accumulating current account deficits, and decreasing capital inflows, the Government abandoned the fixed exchange rate policy. After about two years of unsuccessful management (including the financial crisis in 1983), Chile achieved substantial real devaluation (starting with a large nominal devaluation of 23 percent in September 1984) and embarked on its sustained recovery. It is noticeable that the collapse of the Tablita did not restore the inflation rates of the 1970s. Starting at very low levels, credit shows a slight increase in 1975 and 1976. The increase became stronger in early 1977 and continued until the collapse of the Tablita in mid-1982. The trend was then reversed, however, not dramatically.

The financial sector. ^{2/} The Chilean financial sector reform preceded the Tablita program. Initial steps toward financial reform were taken in 1974 where some aspects of the domestic financial markets were liberalized. Nonbank financial intermediaries (or private money-lending houses called *financieras*) were allowed to operate. Although most restrictions on capital inflows were still in place, foreign banks were allowed to reestablish branches and offices. In May 1974, interest rates were freed for the *financieras* but remained controlled for commercial banks until all interest rates were freed in October 1975. Reserves requirements for banks were also reduced from levels as high as 100 percent and the complicated system of directed credit allocation was phased out. In July

^{1/} The Tablita collapsed in June 1982 and was followed by a financial sector crisis. Growth however resumed after 1984 where successful real devaluation occurred. The periods reported in Table 3.2 do not reflect these episodes. A more detailed analysis of the effect of the financial crisis and the recovery that followed on credit is included in the section (IV).

^{2/} See Institute of International Finance (1990), and Corbo (1985).

1976, the system of directed credit was replaced by complicated reserve requirements which were reduced only gradually. For commercial banks reserve requirements started at 85 percent of demand deposits and 55 percent for deposits of 30-360 days' maturity. These were lowered in stages to 10 percent and 4 percent respectively. Until September 1979, interest was paid on required reserves. However, in the period following that and until June 1982, these requirements acted as a tax on intermediation. 1/

Restrictions on international capital movements were tighter than they had been under the Popular Unity Government. Restrictions on capital inflows were finally eased in September 1977 with progressive relaxation of restrictions during the following five years (important steps were taken in June 1979 and April 1980 which included the elimination of all quantitative restrictions). The collapse of the Tablita in 1982 resulted eventually in a financial crisis in 1983. In January 1983, the Government decided to take over five private banks including the two largest private banks in Chile and during the period 1982-85 a number of capital controls were adopted. 2/ These measures were temporary and were relaxed by 1987.

3. Argentina

Inflation and private sector credit. Since the mid-1970s and until recently, Argentina has not been very successful in bringing down inflation 3/. All through the period between 1975 and 1991, with the exception of 1986, inflation remained at triple digits. In 1976, with average annual inflation of 444 percent, the new military government introduced an austere stabilization program with sharp reduction in fiscal deficits and the reversal of the inward oriented policies that were in place since the 1930s. This was accompanied with liberalization in various sectors including financial sector reform. This program, however, was not successful in reducing inflation significantly where average annual inflation reached 176 percent in 1978. In December 1978, the Government introduced the Tablita program with a preannounced schedule of devaluation. Inflation was not lowered substantially and remained around 100 percent in 1980 and 1981. In April 1981, faced with an overvalued peso, a continuing large fiscal deficit, a reversal of foreign capital inflows, and a deteriorating current account, the Government abandoned the Tablita. As a result, and exacerbated by the debt crisis in 1982, inflation accelerated to reach an average annual of 672 percent in 1985. The Austral plan in mid 1985 succeeded in curbing inflation temporarily. Upon the failure of the plan inflation jumped to reach four digits in 1989 and 1990 until it was successfully stabilized in 1992.

1/ These requirements explains a large part of the high spread between lending and deposit rates which prevailed during this period (see Institute for International Finance, 1990).

2/ See Valdes-Prieto (1994).

3/ See World Bank (1985).

Table 2 shows average annual inflation rates and average private sector credit (as a share of GDP or private consumption) for the periods 1971-78, The Tablita period of 1979-81, and 1982-85. ^{1/} The table indicates that average annual inflation decreased from 145 percent in the period 1971-78 to 122 percent in 1979-81. In contrast, private sector credit as a share of GDP increased from 23 percent to 30.52 percent. Upon the collapse of the Tablita, average annual inflation increased for the subsequent period to reach 452 percent and credit declined again to reach 26 percent. Figure 3 shows a time series of quarterly inflation rate and private sector credit (as a ratio to manufactured production index) for the period 1970:1-1985:2. The figure indicates the beginning and end of the Tablita program. The figure indicates a reduction in credit in 1975 and early 1976 against a substantial increase in inflation rate. Credit shows an upward trend that starts in the third quarter of 1976 (which coincides with both a reduction in inflation rate and financial sector reform) and continues until the debt crisis in August 1982. Inflation accelerates afterwards and credit starts a downward trend.

The financial sector: ^{2/} In the early 1970s, the financial sector in Argentina was highly centralized. Until June 1977, all financial institutions (banks and nonbanks) were required to hold their deposits in the central bank and were paid a fixed commission over the deposits rate. Banks' loanable funds were provided by advances and discounts from the central bank. The financial sector was highly regulated with interest rate ceilings on loans and deposits, and various restrictions on the composition of credit. The signs of financial reform came with the new government where in March 1976 the Government announced its policy objectives regarding the deregulation of the financial sector. The initial step was taken in May 1976 where financial institutions were allowed to expand their operations with 30-day certificates of deposits with free interest rates. In addition, they were allowed to use these funds to make loans at freely negotiated interest rates. Decentralization of all deposits took place in June 1977 with a reduction of the reserve requirement ratio on all deposits to 45 percent. This was accompanied by the freeing of interest rates. As the case for most Latin American countries, the financial sector was negatively affected by the debt crisis in 1982. After 1982, a number of financial sector development took place including the dollarization of the economy during the second half of the 1980s and the recent implementation of the Convertibility Plan in 1991. ^{3/}

^{1/} The discussion of the Argentine case will be limited to the period 1971-1985 because complete monetary data is not available for the subsequent period.

^{2/} See Mathieson (1982). The discussion below will only cover financial reform adopted in the period 1970:2-1985:2; i.e., the period used in the empirical section presented below for Argentina.

^{3/} These developments are not discussed in this paper as they fall outside the time period used for the empirical analysis in the next section.

4. Israel

Inflation and real private credit: The Israeli experience with high inflation started in the early 1970s where average annual inflation climbed from 12 percent in 1971 to 79 percent in 1979. The early 1980s were characterized by attempts of different kinds at curbing inflation. This included allowing the overvaluation of the Israeli shekel between 1981 and 1983. This policy resulted in high expectations of devaluation and the substitution of money with interest bearing assets. This, coupled with unchanged rates of money expansion and a corrective devaluation at the end of 1983, resulted in a major inflation shock where average annual inflation reached 374 percent in 1984. The heterodox stabilization program of July 1985 was finally successful in lowering inflation where average annual inflation dropped to 48 percent in 1986. The program was successful and inflation continued to drop gradually to reach 12 percent in 1994.

Due to the complicated nature of the Israeli credit market and financial sector reform, period averages on private credit (as a share of GDP) do not reveal much. Table 2 shows average annual inflation rate and average private sector credit for the periods 1978-1985 and 1986-1993. The first period underscores the period following the foreign exchange reform of December 1977 (discussed below), and the second period represents the post-stabilization period. Whereas average annual inflation for the pre-stabilization period is higher than the post-stabilization period, average credit (as a share of GDP) remains higher for the earlier period. This is primarily due to the high level of credit that characterized the late seventies due to the foreign currency reform and the high share of directed private sector credit (about 40 percent of total private sector credit) before 1985.

Figure 3 shows time series using quarterly data for inflation and private sector credit (as a share of quarterly GDP). The figure shows the jump in credit after the 1977 reform and the subsequent decline. The figure also indicates the start of the heterodox program in the third quarter of 1985 and the subsequent increase in credit. Following stabilization in 1985, there is a detectable upward trend in the credit series.

The financial sector: ^{1/} The financial and credit market in Israel has undergone various changes since late 1977. In December 1977, the Government approved a foreign currency reform which included the liberalization of foreign currency regulations that resulted in a significant change in the composition of financial assets held by the private sector. The private sector was allowed to purchase foreign currency deposits which, coupled with mounting expectation of inflation resulted in soaring of foreign currency deposits and a substantial increase in foreign currency credit and consequently total private sector credit (see Figure 3).

^{1/} See Bruno and Piterman (1988), Piterman (1989), Bruno and Meridor (1991), Bank of Israel (1981a, 1981b), and Ben-Bassat (1993).

In 1979, the Government restrained this growth in credit by imposing higher required reserves ratios on foreign currency deposits (which eventually reached 100 percent) and relatively higher interest rates (see Bank of Israel 1981a, 1981b).

Throughout the 1970s and until 1985, most sectors of the economy (including services) were granted substantial amounts of directed credit at low (and negative real) interest rates for both exports and domestic consumption. Total outstanding debt rose considerably throughout this period; for example, total outstanding debt to net capital stock in agriculture rose from around 20 percent to 50 percent in the early seventies to reach 90 percent in 1987. In the early 1980s, the Government stopped handing out unindexed long-term loans, and after 1985, subsidized credit was limited to export production with far less attractive terms. The share of directed credit in total credit fell from 40 percent in 1984 to reach 18 percent in 1989 (see Bruno and Meridor, 1991).

One of the objectives of the Bank of Israel in the 1985 stabilization was to control the expansion of bank credit. The central bank's role was to permit the accommodation of bank credit to the price shock of July 1985 less ten percentage points and to prevent any further nominal expansion in the following period. The Bank of Israel therefore raised reserve requirement on shekel deposits and maintained high interest rates on its discount-window loans. The nominal interest rate was gradually lowered (until March 1986) even though credit expanded in excess of the target. Controlling private sector credit proved to be difficult. This was due to, among other factor, the increase in the liquidity of the banking sector that resulted from the increase of unindexed shekel-denominated assets at the expense of indexed (and dollar-denominated) assets where the former had a lower reserve requirements than the latter.

In April 1987, the Government approved the capital market reform which included reductions on the mandatory reserve requirement on long-term (dollar) linked assets. In addition, capital markets were opened up to the free floating of private bond issue.

The above discussion establishes an informal negative link between inflation and credit. *We present this relationship formally next.*

IV. Empirical Results

In this section, we present estimates of the relationship between the change in inflation and the change in private sector credit. Regressions are carried out using quarterly data from the International Monetary Fund. The dependent variable in the regressions for Mexico, Chile, and Argentina is the first difference of real private sector credit as a ratio to the index of manufactured production. Due to the unavailability of complete quarterly GDP data, the index of manufactured production is used as a proxy for real GDP (or domestic aggregate demand) to account for the effect of

real production growth (or domestic aggregate demand growth) on credit expansion. For Israel, the dependent variable is the first difference of private sector credit as a share of quarterly GDP. 1/ For the rest of this paper, we will refer to both variables as credit. For all regressions, we use first differences where we could not reject the hypothesis of a unit root in the credit series for all four countries using the Augmented Dickey-Fuller test. This implies that the credit series are not stationary in which case regressions using levels result in biased OLS standard error estimates. 2/

1. Mexico

Table 3 shows regression results using quarterly data for Mexico for the period 1970:3-1994:3. The change in credit (extended by deposit money banks and other financial institutions) is regressed on the change in quarterly inflation rate $\Delta\pi_t$, in addition to dummy variables. The dummy variable D_{1982} has a value of 1 for the period 1982:3-1988:1 and zero otherwise. 3/ This dummy variable captures the debt crisis period where external financing was unavailable. The dummy variable D_{1988} has a value of 1 for the period 1988:2-1994:3 and zero otherwise. This dummy variable captures the heterodox inflation stabilization program period. At the same time, it covers the period of financial sector reform where it coincided with the initiation of the Pacto. For all regressions, Durbin-Watson statistics indicate that we can accept the null hypothesis of no serial correlation in the residuals.

Regression (1) uses the change in inflation as a dependent variables. As hypothesized, the coefficient on inflation is negative and is statistically significant at the 10 percent level. Regression (2) uses the change in inflation in addition to a dummy variable for the stabilization period and an interaction terms between inflation change and the dummy variable. 4/ The coefficient on inflation is again negative and statistically significant at the 10 percent level. The coefficient on D_{1988}

1/ Both quarterly GDP and the quarterly index of manufactured production are from the International Monetary Fund, General Economic Statistics data base. All other variables used in these regressions are from the International Monetary Fund, International Financial Statistics.

2/ The use of changes in regressions emphasizes the short-term relationship between variables whereas the use of level time series emphasizes the long-term relationship.

3/ Although Mexico announced the initiation of the stabilization program in December 1987, inflation did not decrease until the second quarter of 1988 thus the inclusion of the first quarter of 1988 in D_{1982} (see Figure 3.1).

4/ The dummy variables D_{1982} and D_{1988} will be referred to henceforth as the intercept dummy variables and the interaction terms $\Delta\pi_t D_{1982}$ and $\Delta\pi_t D_{1988}$ as the slope dummy variables.

is positive and statistically significant at the 1 percent level. The coefficient on $\Delta\pi_t D_{1988}$ is not statistically significant. Regression (3) is similar to regression (2) with intercept and slope dummies added for the debt crisis period. The coefficients on D_{1982} and $\Delta\pi_t D_{1982}$ are not statistically significant. This result indicates that the relationship between inflation and credit in the period between 1982:3-1988:1 is similar to that in 1970:3-1982:2. The coefficient on D_{1988} is still positive and statistically significant at the 1 percent whereas the coefficient on $\Delta\pi_t D_{1988}$ is not statistically significant. Due to the addition of these dummies, the coefficient on inflation is no longer significant.

The regression results are very interesting and need to be interpreted carefully. From regressions (1) and (2) we conclude that, as proposed in the earlier section, there is a statistically significant negative relationship between credit and inflation; an increase in inflation results in a decrease in credit and a decrease in inflation results in an increase in credit. Regression (2) indicates that the intercept of the relationship is different throughout the stabilization period compared to the earlier periods; the positive coefficient on D_{1988} indicates that the intercept of the relationship in this period is greater than in any other period. Given that financial sector reform accompanied inflation stabilization in Mexico, we conclude that the increase in the intercept of the relationship is due to the combined effect of inflation stabilization and financial sector reform. From regression (3), we conclude that the debt crisis did not change the fundamental relationship between credit and inflation.

2. Chile

Table 4 shows regression results using quarterly data for Chile for the period 1979:1-1994:1. ^{1/} The change in credit (extended by deposit money banks) is regressed on the change in quarterly inflation rate in addition to intercept and slope dummy variables. The dummy variable D_{1982} has a value of 1 for the period 1982:3-1984:4 and zero otherwise. This dummy variable captures the period following the collapse of the Tablita and includes the financial crisis in 1983. The dummy variable D_{1985} has a value of 1 for the period 1985:1-1994:1 and zero otherwise. This dummy variable includes the period of growth after the crisis years. For all regressions, Durbin-watson statistics are indeterminate. Whereas the OLS coefficient estimates are still unbiased (but not efficient), the presence of serial correlation in the residuals results in a biased estimate of the OLS standard errors. Accordingly, instead of the usually reported OLS standard error estimates, we calculate and report the Newey-West standard error.

Regression (1) uses quarterly data for the period 1979:1-1994:1. The period included starts one year after the initiation of the Tablita program.

^{1/} Quarterly data on credit are not available for the last three quarters of 1977 and 1978. Therefore, all series used in the regression start at 1979:1.

The series included thus excludes the period in which financial reform was implemented (1974-1976). Therefore, it represents a period with a liberalized domestic financial market. In this regression, we include the change in inflation as a dependent variable in addition to intercept dummy variable for both the crisis period following the collapse of the Tablita and the post crisis period. The coefficient on the intercept of the relationship is positive and significant at the 1 percent level. The coefficient on inflation is negative and statistically significant at the 10 percent level. The coefficient on D_{1982} is negative and significant at the 10 percent level and the coefficient on D_{1985} is negative and significant at the 5 percent level. It is interesting to note that the values of the coefficients on the dummy variables are similar. This indicates that, as in the case for Mexico, the slope of the estimated relationship is different during stabilization than in any other period. Regression (2) is similar to regression (1) with interaction terms for both crisis and post crisis period included. The coefficients on both intercept dummy variables are still negative and significant. The coefficients on both interaction terms are not statistically significant. The coefficient on inflation is no longer significant. Regression (3) is similar to regression (1) but excludes the crisis period from the time series. The data used therefore includes the Tablita program period 1979:1-1982:2 and the period 1985:1-1994:1. The coefficient on the intercept is positive and significant at the 1 percent level. The coefficient on inflation is negative and significant at the 1 percent level and that on the intercept dummy for the post crisis period is negative and significant at the 1 percent level. The exclusion of the crisis period in regression (3) produces even stronger results relative to regression (1) where the significance level of all coefficients increase and the value of the adjusted R^2 almost doubles.

Regression (1) indicates that the proposed negative relationship between credit and inflation holds. In addition, the intercept of the relationship during stabilization is higher than in both the crisis and post-crisis periods. From regression (2), we conclude that the slope of the relationship does not change throughout the regression period. The results in regression (3) emphasize those in regression (1). It is important to emphasize that the documented response of credit to inflation stabilization holds in the Chilean case given a liberalized financial sector.

3. Argentina

Table 5 shows regression results using quarterly data for Argentina. The period used is 1970:2-1985:2 which includes the financial sector reform, the Tablita program and the debt crisis and ends just before the Austral Plan in mid 1985. 1/ The change in credit (extended by deposit money

1/ Quarterly monetary data is not complete after 1987. Therefore, we choose to exclude the period 1985:3-1987:4 from the time series to avoid including additional dummy variables representing the Austral plan and the period following its collapse.

banks) is regressed on the change in quarterly inflation rate $\Delta\pi_t$ in addition to intercept and slope dummy variables. The dummy variable D_{1976} has a value of 1 for the period 1976:3-1979:1 and zero otherwise. This dummy variable captures the period of financial sector reform that started in May 1976 and ends at the start of the Tablita program. The dummy variable D_{1979} has a value of 1 for the period 1979:2-1981:1 and zero otherwise. This dummy variable represents the period of the Tablita program. The dummy variable D_{1981} has a value of 1 for the period 1981:2-1985:2 and zero otherwise. This dummy variable includes the period after the collapse of the Tablita in April 1981 and extends to the debt crisis period ending just before the initiation of the Austral plan in mid 1985. For all regressions, Durbin-watson statistics indicate that we can accept the null hypothesis of no serial correlation in the residuals.

Regression (1) uses the change in inflation as the independent variable. The coefficient on inflation is negative and significant at the 10 percent level. ^{1/} Regression (2) includes the change in inflation in addition to the intercept and slope dummy variables representing financial sector reform, D_{1976} and $\Delta\pi_t D_{1976}$ respectively. The coefficient on inflation is still significant at the 10 percent level whereas the coefficients on both dummy variables are not significant. Regression (3) includes the change in inflation in addition to the slope and intercept variables representing the Tablita program, D_{1979} and $\Delta\pi_t D_{1979}$ respectively. The coefficients on both dummy variables are not statistically significant. The coefficient on inflation is negative and significant at the 11 percent level. Regression (3) includes the change in inflation in addition to the intercept and slope dummy variables representing the post Tablita period, D_{1981} and $\Delta\pi_t D_{1981}$ respectively. Again, the coefficients on both dummy variables are not statistically significant. The coefficient on inflation is negative and significant at the 12 percent level.

The results in regression (1) establish the hypothesized negative relationship between inflation and credit. The results in regression (2) are very interesting. The regression indicates that the intercept dummy variable for the financial sector reform is not statistically significant. We, therefore, conclude that the observed upward trend in credit after 1976 is due to the observed decrease in inflation (see Figure 3). Regression (3) indicates that the relationship between credit and inflation does not change during the Tablita program. This result is different from that for Mexico and Chile where intercept dummy variables representing stabilization program periods are significant. This weaker response of credit in the Argentine case could be attributed to the unsuccessful attempt in Argentina to achieve a substantial decrease in inflation. As explained in the previous section,

^{1/} R^2 values for the Argentine regressions are very low. This is expected when using changes instead of levels in the regressions. Low R^2 values also reflect noise due to the use of quarterly data. We therefore emphasize in these regressions the significance of the coefficients rather than the explanatory power of the regressors.

inflation was not successfully stabilized in Argentina during the 1980s where average annual inflation remained high and was only lowered to around 100 percent during the Tablita program.

The results in regression (4) are similar to those in regressions (2) and (3) where there is no statistically significant effect of the collapse of the Tablita and the debt crisis on the relationship between credit and inflation.

4. Israel

Table 6 shows regression results using quarterly data for Israel for the period 1978:2-1994:2. The period starts after the implementation of the foreign exchange reform in December 1977. The change in credit (extended by deposit money banks and expressed as a ratio to quarterly GDP) is regressed on the change in quarterly inflation rate $\Delta\pi_t$ in addition to intercept and slope dummy variables. The dummy variable D_{1985} has a value of 1 for the period 1985:4-1994:2 and zero otherwise. This dummy variable captures the post stabilization period following the initiation of the heterodox stabilization program in July 1985. The dummy variable D_{1987} has a value of 1 for the period 1987:2-1994:2 and zero otherwise. This dummy represents the period following capital market reform in April 1987. For all regressions, Durbin-watson statistics indicate that we can accept the null hypothesis of no serial correlation in the residuals.

Regression (1) uses the change in inflation as the only dependent variable. The coefficient on inflation is negative but is not statistically significant. Regression (2) uses the change in inflation in addition to intercept and slope dummy variables representing the post stabilization period. None of the dependent variables have a statistically significant coefficient. The regression indicates that there is no significant effect on the intercept or slope of the relationship during and after the stabilization program where the coefficients on D_{1985} and $\pi_t D_{1985}$ are not statistically significant. Regression (3) uses the change in inflation in addition to intercept and sloped dummy variables representing the post capital reform period. Again, there is no significant effect on the intercept or the slope of the relationship where the coefficients on D_{1987} and $\pi_t D_{1987}$ are not statistically significant.

The above regressions therefore do not support our hypothesis of a negative relationship between credit and inflation. In addition, the relationship remains insignificant even when we include dummy variables for the heterodox stabilization program in July 1985 or capital reform in April 1987. This result can be explained by multiple factors. Up until the mid-1980s, the Israeli credit market can be characterized as highly controlled with a large share of directed private sector credit handed at low (or negative) real interest rates (see Section III). Therefore, at the time of stabilization, Israeli enterprises were heavily indebted due to the extension of controlled credit in the period before stabilization which hindered their ability to accumulate new debt (see Section III).

Accordingly, the effect of stabilization on new accumulation of debt has been relatively low in the Israeli case. In addition, after the initiation of the stabilization program in 1985, the monetary authorities used bank credit as the target of monetary policy for the first few years following stabilization, thus limiting the expansion of private sector credit. 1/

The above presentation of the empirical results supports four main conclusions: (1) as hypothesized, private sector credit responds positively to inflation stabilization. This is indicated in the regression results for Mexico, Chile, and Argentina; (2) the response of private sector credit expansion to inflation stabilization can be stronger in a financially liberalized environment as supported by the Mexican and Chilean cases where dummy variables denoting liberalized financial sectors during stabilization are positive and significant; (3) the response of private sector credit to inflation stabilization is stronger the higher the degree of stabilization (this is indicated by the difference of results for the Argentine case as opposed to the Chilean and Mexican cases where the dummy variable representing the Tablita period in the former case is not statistically significant); and (4) as supported by the Israeli case, specific exogenous conditions of the financial and private sectors in addition to macroeconomic policies could prevent a positive response of private sector credit to inflation stabilization.

Having established a negative empirical relationship between inflation and private sector credit, we next discuss the underlying theoretical relationship.

V. Inflation and Private Sector Credit: Theoretical Interpretations of the Empirical Results

Inflation stabilization has been accompanied in many cases with an increase in real interest rates. However, inflation reduction is, as expected, accompanied by a decline in nominal interest rates. Tables 7a and 7b show nominal interest rates for three orthodox stabilization programs and four heterodox programs. The nominal interest rate declined in all program as a result of declining inflation. The decrease, however, is more dramatic in the heterodox programs resulting from the more rapid reduction in inflation rate compared to the orthodox programs of the seventies (see Vegh, 1992). 2/

1/ Bruno and Piterman (1988).

2/ The table shows an increase in nominal interest rates in the first quarter after the initiation of the program in all heterodox program. This is a result of the initial maxi devaluation that preceded the implementation of the fixed exchange rate. In contrast, among the orthodox programs discussed, only the Argentine Tablita was preceded by a maxi devaluation and all these programs implemented an initial preannounced devaluation schedule rather than a fixed exchange rate (see Kiguel and Liviatan, 1992).

The sharp reduction in nominal interest rates results in a one-time "debt-rescheduling" effect where the repayment of principal is postponed. ^{1/} This results in a relatively lower nominal debt repayment burden encouraging consumers to increase their nominal debt by increasing the demand for credit. In addition, it is usually observed that nominal interest rate reduction is accompanied by a rise in the average loan repayment period. In Israel, for example, before stabilization, chain stores used to offer credit to their customers (through credit cards) at a cost of 10 percent for two weeks. After stabilization, 10 percent was the cost of credit for two and a half months. This also results in a lower loan repayment to income ratio. Bruno and Piterman (1988) conclude that such an extension of the term of credit may in part explain the rapid increase of credit during 1986 even though the real interest rate was still high.

We can present this effect formally as follows. Assuming that real demand for credit depends negatively on the real cost of credit r , and negatively on real income y , we can write the real credit demand function as follows: $\frac{C^d}{P} = C^d(r, y, \theta^d)$ where θ^d is a shift parameter representing other variable such as the debt repayment to income ratio. Accordingly, a one-time decrease in this ratio will result in an outward shift in the demand schedule for credit (i.e., credit demand as a function of the real interest rate).

On the supply side of credit, there are multiple effects of disinflation on the supply of credit. As inflation rises to high levels and becomes more persistent, flight from domestic money occurs. The flight from domestic money may take the form of a shift into foreign assets such as offshore accounts; a shift into interest-bearing domestic assets within the commercial system or in the money market ^{2/}; or a shift into real assets (Dornbusch, Sturzenegger, and Wolf, 1990). As a result, the liquidity of the banking sector and the ability to extend credit will be substantially affected.

The negative effect of inflation on the volume of private savings in the financial system and the demonetization of the economy is illustrated in Figures 5 to 8. The figures show time series for inflation, private sector

^{1/} Bruno and Meridor (1991).

^{2/} Governments usually attract private savings to finance public debt by offering indexed and relatively higher interest rates on government bonds. In addition, when inflation is expected to remain high for long, new financial services are offered with options for substituting away from domestic money. In Brazil, the financial sector was able to attract domestic savings by offering alternative financial instruments with short term indexation. Widespread indexation helped avoid capital flight and the dollarization of the economy. In Argentina, the absence of explicit indexation drove asset holders out of the financial system and lead to extensive dollarization. The Mexican experience was characterized by massive capital flight.

credit and M3 (as a percentage of GDP) for Mexico, Chile, Argentina, and Israel. 1/ For Mexico, except for 1988 where the monetary authorities adopted tight monetary policies (see section III), M3 and inflation show clear negative relationship, whereas M3 and private credit (as a share of GDP) are positively related. For Chile, the positive relationship between credit and M3 is very clear for the period between 1974 and 1982 which starts with the gradual reduction of inflation and ends with the collapse of the Tablita program. While this relationship holds prior to 1974, it is not very strong due to presence of financial repression and the forced financing of the public debt. The negative relationship between inflation and M3 for Chile is also clear after 1972. These patterns are most clear for the case of Argentina. Israel, however, departs from this trend. The positive relationship between credit and M3 holds only after 1980. 2/ In addition, the relationship between inflation and M3 is also positive after 1981. This reflects both the high level of control in the Israeli credit market and the adaptation of the Israeli financial market to inflation by offering a variety of indexed deposit accounts and the recourse to foreign exchange savings accounts.

Episodes of chronic inflation are also associated with a higher variability of inflation rates. Table 8 shows the mean and standard deviation of average annual inflation for different periods for Mexico, Chile, Argentina, and Israel. The periods shown for each country are the same periods presented in Table 2 representing distinct macroeconomic environments. The numbers show a clear positive relationship between the mean and standard error of average annual inflation for the different periods. The numbers indicate that the higher the mean the higher is the standard error for the period. Inflation stabilization could therefore increase the supply of credit by decreasing the variance of the perceived real rate of return on credit and/or risk of default. 3/

Formally, one can express the share of credit in banks' portfolio, λ , as dependent positively on the expected real return on credit r , and negatively on the expected real rate of return on substitute assets ρ as follows: $\lambda = \lambda(r, \rho, \theta^s)$ where θ^s is a shift variable that includes the variance of the real rate of return on credit (or the variance of the inflation rate) and the risk of default on loans. An increase in the variance of inflation and/or the risk of default will therefore result in an outward shift in the supply schedule and a subsequent increase in the volume of credit through an increase in the share of credit in banks' portfolio.

1/ This includes M1 in addition to savings and time deposits, and foreign currency deposits.

2/ Before the mid 1980s, the Israel credit market was highly controlled with large share of subsidized credit. Accordingly, the relationship between credit and M3 does not strictly hold.

3/ High inflation rates are generally associated with negative effects on economic growth (see De Gregorio, 1991). Thus, one can associate high inflation rates with a higher rate of default.

The previously suggested effect of the remonetization of the economy on credit supply is presented, in this framework, by an increase in total banks' deposits. An increase in total deposits will result in an increase in the volume of credit given a constant share of credit in banks' portfolio. Accordingly, while a lower variance of inflation will increase real private credit volume by increasing the share of credit in banks' portfolio, an increase in total deposits increases real private credit by increasing banks' liquidity.

One could also argue that the shift parameter in the demand schedule, θ^d , includes the variance of the expected real cost of credit (or the variance of the expected inflation rate). In other words, given the expected real credit cost, risk averse individuals would choose to borrow less if the variance of expected real credit cost increases and would borrow more if the variance decreases. This is translated into an outward shift in the demand schedule upon the reduction of the inflation rate. The negative effect of higher risk on both credit demand and supply is suggested by Carniero, et al. (1994). ^{1/}

The above discussion explores the channels through which inflation stabilization can affect credit. The arguments presented support the proposal that inflation stabilization associated with exchange rate-based stabilization is responsible for the autonomous increase in private sector credit.

VI. Conclusions

In this paper we study the behavior of private sector credit in chronic inflation countries that undergo exchange rate-based inflation stabilization. We conclude that these programs are characterized by a strong increase in private sector credit. Using empirical testing, we conclude that the observed increase in credit could be explained by the decline in inflation for Mexico, Chile, and Argentina. In addition, the results indicate that credit expansion is higher the stronger is the stabilization. Country specific credit sector conditions, as in the case of Israel, could weaken the private sector credit response to inflation stabilization. A liberalized financial sector could also enhance the response of private sector credit to stabilization as supported by the Mexican and Chilean cases.

^{1/} Related empirical presentation to the above discussion can be found in Copelman (1994). Financial sector reform effect on credit supply can also be discussed using the above framework. For example, a reduction in the required reserves ratio is presented by an increase in the liquidity position of banks similar to that in the case of remonetization. Liberalizing the interest rates in turn can be presented by an increase in the portfolio share of credit.

The documented increase in credit is important because it can potentially be one of the factors contributing to the boom that characterizes ERBS. Given the evidence on credit behavior documented in this paper, further work on the relationship between credit expansion and growth in exchange rate-based stabilizations could be very promising.

This paper does not address the downturn that usually follows the boom in economic activity in ERBS. The bust could be due to the classically observed real exchange rate appreciation, real wages increase, capital flight, and bank failures. The reader is referred to Vegh (1992) for a presentation of the behavior of the real exchange rate, real wages, current account deficits, and capital flows. This subject could be a topic for future research.

Table 1 a

Orthodox Stabilization Plans

Argentina Tablita program (January 1979)			Chile Tablita program (February 1978)			Uruguay Tablita program (October 1978)		
Year/Quarter		Real Lending Rate	Year/Quarter		Real Lending Rate	Year/Quarter		Real Lending Rate
1978	1	26.5	1977	1	108.9	1978	1	15.9
	2	14.6		2	61.5		2	17.2
	3	-8.5		3	38.4		3	17.1
	4	-20.8		4	74.6		4	1.4
1979	1	-3.0	1978	1	49.4	1979	1	-2.2
	2	-15.1		2	34.7		2	-14.8
	3	26.1		3	36.8		3	-13.1
	4	17.3		4	51.2		4	0.9
1980	1	10.0	1979	1	24.5	1980	1	17.8
	2	11.5		2	5.8		2	6.9
	3	9.1		3	13.1		3	22.9
	4	12.2		4	24.2		4	32.2
1981	1	17.6	1980	1	21.4	1981	1	26.2
	2	20.5		2	12.1		2	12.0
	3	66.9		3	5.0		3	26.6
	4	0.9		4	20.0		4	48.2
1982	1	50.4	1981	1	36.4	1982	1	33.8
	2	-36.2		2	37.8		2	26.0
	3	-51.4		3	41.5		3	39.7
	4	-39.5		4	49.7		4	-26.5
			1982	1	56.4	1983	1	56.0
				2	17.1		2	48.4
				3	5.4		3	25.6
				4	58.6		4	18.4
			1983	1	19.9			
				2	13.6			
				3	10.0			
				4	28.8			

Notes: Real Exchange rates are calculated using the one quarter ahead inflation rate.

Shaded areas highlight stabilization programs periods.

Source: Vegh 1992.

Table 1 b

Heterodox Stabilization Plans

Argentina Austral Plan (June 1985)			Brazil Cruzado Plan (February 1986)			Israel Stabilization Plan (July 1985)			Mexico Stabilization Plan (December 1987)		
Year/Quarter		Real Lending Rate	Year/Quarter		Real Savings Rate	Year/Quarter		Real Lending Rate	Year/Quarter		Real Treasury Bill Rate
1984	1	-41.4	1985	1	51.0	1984	1	0.8	1987	1	-16.0
	2	-22.6		2	-2.7		2	54.0		2	-18.3
	3	-11.2		3	-20.0		3	43.3		3	-27.2
	4	72.7		4	-26.0		4	315.8		4	-42.7
1985	1	-23.5	1986	1	213.0	1985	1	28.8	1988	1	51.9
	2	804.0		2	11.7		2	71.5		2	27.4
	3	82.1		3	1.1		3	406.4		3	25.0
	4	37.6		4	-51.4		4	172.2		4	19.5
1986	1	12.0	1987	1	-26.0	1986	1	38.4	1989	1	27.4
	2	-20.7		2	134.3		2	34.8		2	34.5
	3	1.4		3	-27.8		3	18.9		3	16.0
	4	25.1		4	-44.0		4	28.1		4	-4.7
1987	1	24.7				1987	1	42.2	1990	1	16.8
	2	-16.8					2	51.7		2	11.0
	3	6.8					3	34.0		3	3.5
	4	45.2					4	31.5		4	-4.6
1988	1	-15.3				1988	1	20.2	1991	1	6.7
	2	-32.9					2	32.7		2	7.3
	3	93.6					3	14.8		3	-1.7
	4	4.4					4	5.6		4	-5.2

Notes: Real Exchange rates are calculated using the one quarter ahead inflation rate.

Shaded areas highlight stabilization programs periods.

Source: Vegh 1992.

Table 2: Inflation and Domestic Private Sector Credit (by source)*

MEXICO	1970-81	1982-87	1988-92
Domestic private credit as a share of GDP	26.48	14.48	24.23
deposit money banks	9.55	11.37	21.37
other financial institutions	16.94	3.11	2.86
Domestic private credit as a share of private consumption	38.44	22.61	34.01
deposit money banks	14.26	17.78	29.98
other financial institutions	24.18	4.83	4.03
Inflation rate	17.81	83.67	39.80
CHILE	1970-77	1978-93	
Domestic private credit as a share of GDP**	9.46	47.21	
deposit money banks	9.46	47.21	
other financial institutions	#N/A	#N/A	
Domestic private credit as a share of private consumption**	13.18	69.93	
deposit money banks	13.18	69.93	
other financial institutions	#N/A	#N/A	
Inflation rate	234.23	22.69	
ARGENTINA	1971-78	1979-81	1982-85
Domestic private credit as a share of GDP	23.42	30.52	26.15
deposit money banks	21.25	26.51	24.77
other financial institutions	2.17	4.01	1.38
Domestic private credit as a share of private consumption	36.83	42.05	34.29
deposit money banks	33.33	36.50	32.47
other financial institutions	3.50	5.55	1.82
Inflation rate	144.54	121.58	451.87
Israel	1978-85	1986-93	
Domestic private credit as a share of GDP**	69.10	57.71	
deposit money banks	69.10	57.71	
other financial institutions	#N/A	#N/A	
Domestic private credit as a share of private consumption**	74.59	82.70	
deposit money banks	74.59	82.70	
other financial institutions	#N/A	#N/A	
Inflation rate	165.14	20.45	

Notes: * Excluding credit extended by monetary authorities. ** Excluding credit extended by other financial institutions. All figures are in percentages.

Source: Author's calculations using data from the IMF, International Financial Statistics.

Table 3: Mexico

*Dependent Variable: $\Delta Credit$
Period: 1970:3-1994:3*

	(1)	(2)	(3)
<i>Intercept</i>	9.47E6 (1.33E7)	-1.79E7 (1.47E7)	-1.71E7 (1.79E7)
$\Delta \pi_t$	-5.80E6+ (3.17E6)	-7.16E6+ (4.34E6)	-7.22E6 (7.31E6)
D_{1982}			-2.67E6 (3.18E7)
$\Delta \pi_t D_{1982}$			1.50E5 (9.17E6)
D_{1988}		1.13E8+++ (2.87E7)	1.12E8+++ (3.07E7)
$\Delta \pi_t D_{19}$		7.44E6 (6.05E6)	7.39E6 (8.45E6)
<i>N</i>	97	97	97
<i>Adj. R²</i>	0.024	0.151	0.133
<i>DW</i>	1.691	1.991	1.991

Notes: +++ Statistical significance at the 1% level. ++ Statistical significance at the 5% level. + Statistical significance at the 10% level. The dummy variable D_{1982} has a value of 1 for the period 1982:3-1988:1 and zero otherwise. The dummy variable D_{1988} has a value of 1 for the period 1988:2-1994:3 and zero otherwise

Table 4: Chile

Dependent Variable: $\Delta Credit^a$
period: 1979:1-1994:1

	(1)	(2)	(3) ^b
<i>Intercept</i>	2.50E9 ⁺⁺⁺ (8.20E8)	2.50E9 ⁺⁺⁺ (8.02E8)	2.40E9 ⁺⁺⁺ (8.20E8)
$\Delta \pi_t$	-2.35E8 ⁺ (1.42E8)	-2.21E8 (2.96E8)	-4.50E8 ⁺⁺⁺ (1.52E8)
D_{1982}	-2.73E9 ⁺ (1.63E9)	-3.00E9 ⁺ (1.60E9)	
$\Delta \pi_t D_{1982}$		1.94E8 (3.43E8)	
D_{1985}	-2.61E9 ⁺⁺ (9.59E8)	-2.69E9 ⁺⁺ (9.47E8)	-2.57E9 ⁺⁺⁺ (9.55E8)
$\Delta \pi_t D_{1985}$		-2.85E8 (3.40E8)	
<i>N</i>	61	61	51
<i>Adj. R²</i>	0.082	0.076	0.149
<i>DW</i>	2.418	2.429	2.509

Notes: ⁺⁺⁺ Statistical significance at the 1% level. ⁺⁺ Statistical significance at the 5% level. ⁺ Statistical significance at the 10% level. ^a Numbers between parenthesis are the Newey-West standard errors. ^b Series excludes the period 1982:3-1984:4 which includes the financial sector crisis. The dummy variable D_{1982} has a value of 1 for the period 1982:3-1984:4 and zero otherwise. The dummy variable D_{1985} has a value of 1 for the period 1985:1-1994:1 and zero otherwise.

Table 5: Argentina

Dependent Variable: $\Delta Credit$
Period: 1970:2-1985:2

	(1)	(2)	(3)	(4)
<i>Intercept</i>	1.41E6 (2.12E6)	9.94E5 (2.42E6)	3.39E5 (2.29E6)	2.54E6 (2.51E6)
$\Delta \pi_t$	-2.37E5 ⁺ (1.37E5)	-2.98E5 ⁺ (1.78E5)	-2.22E5 ^a (1.39E5)	-2.36E5 ^b (1.52E5)
D_{1976}		3.91E6 (5.64E6)		
$\Delta \pi_t D_{1976}$		2.15E5 (2.95E5)		
D_{1979}			8.28E6 (6.84E6)	
$\Delta \pi_t D_{1979}$			2.07E5 (1.30E5)	
D_{1981}				-4.58E6 (5.10E6)
$\Delta \pi_t D_{1981}$				1.10E5 (3.95E5)
N	60	60	60	60
Adj.R ²	0.033	0.014	0.026	0.012
DW	1.898	1.931	1.950	1.909

Notes:*** Statistical significance at the 1% level. ** Statistical significance at the 5% level.
⁺ Statistical significance at the 10% level. ^a Statistical significance at the 11% level. ^b
 Statistical significance at the 12% level. The dummy variable D_{1976} has a value of 1 for the
 period 1976:3-1979:1 and zero otherwise. The dummy variable D_{1979} has a value of 1 for
 the period 1979:2-1981:1 and zero otherwise. The dummy variable D_{1981} has a value of 1
 for the period 1981:2-1985:2 and zero otherwise.

Table 6: Israel

*Dependent Variable: $\Delta Credit$
Period: 1978:2-1994:2*

	(1)	(2)	(3)
<i>Intercept</i>	-0.0003 (0.0105)	-0.0222 (0.0154)	-0.0152 (0.0140)
$\Delta \pi_t$	-0.0012 (0.0012)	-0.0014 (0.0014)	-0.0014 (0.0012)
D_{1985}		0.0423 (0.0211)	
$\Delta \pi_t D_{1985}$		0.0014 (0.0025)	
D_{1987}			0.0337 (0.0210)
$\Delta \pi_t D_{1987}$			0.0079 (0.0084)
<i>N</i>	65	65	65
<i>Adj. R²</i>	0.004	0.038	0.025
<i>DW</i>	1.905	2.031	1.964

*Notes:*** Statistical significance at the 1% level. ** Statistical significance at the 5% level.
* Statistical significance at the 10% level. The dummy variable D_{1985} has a value of 1 for
the period 1985:4-1994:2 and zero otherwise. The dummy variable D_{1987} has a value of 1
for the period 1987:2-1994:2 and zero otherwise*

Table 7a
Orthodox Stabilization Plans

Argentina Tablita program (January 1979)			Chile Tablita program (February 1978)			Uruguay Tablita program (October 1978)		
Year/Quarter		Nominal Lending Rate	Year/Quarter		Nominal Lending Rate	Year/Quarter		Nominal Lending Rate
1978	1	260.6	1977	1	265.0	1978	1	76.7
	2	159.3		2	148.0		2	73.1
	3	144.1		3	107.5		3	74.9
	4	141.0		4	132.1		4	71.3
1979	1	131.1	1978	1	101.3	1979	1	69.5
	2	128.9		2	79.8		2	61.9
	3	148.1		3	73.9		3	62.5
	4	131.1		4	89.6		4	68.3
1980	1	117.9	1979	1	67.6	1980	1	67.1
	2	93.2		2	60.5		2	68.3
	3	104.6		3	59.6		3	65.4
	4	92.6		4	60.8		4	65.4
1981	1	170.1	1980	1	61.9	1981	1	63.6
	2	234.1		2	43.6		2	57.4
	3	275.5		3	41.0		3	58.5
	4	164.3		4	42.0		4	59.6
1982	1	157.7	1981	1	52.3	1982	1	49.1
	2	171.0		2	50.7		2	54.6
	3	115.1		3	51.0		3	66.0
	4	165.1		4	54.1		4	76.1
			1982	1	55.2	1983	1	105.3
				2	47.7		2	101.9
				3	64.2		3	84.8
				4	88.4		4	84.8
			1983	1	50.3			
				2	44.1			
				3	39.2			
				4	37.7			

Source: Vegh (1992).

Table 7 b
Heterodox Stabilization Plans

Argentina Austral Plan (June 1985)			Brazil Cruzado Plan (February 1986)			Israel Stabilization Plan (July 1985)			Mexico Stabilization Plan (December 1987)		
Year/Quarter	Nominal Lending Rate		Year/Quarter	Nominal Savings Rate		Year/Quarter	Nominal Lending Rate		Year/Quarter	Nominal Treasury Bill Rate	
1984	1	339.6	1985	1	309.0	1984	1	452.4	1987	1	103.8
	2	618.1		2	248.4		2	710.7		2	98.8
	3	708.0		3	176.9		3	1062.0		3	96.3
	4	1808.0		4	284.4		4	1067.1		4	113.4
1985	1	1267.5	1986	1	327.1	1985	1	499.8	1988	1	134.5
	2	3141.0		2	21.7		2	715.3		2	52.1
	3	139.5		3	27.4		3	612.2		3	41.1
	4	93.2		4	78.8		4	186.3		4	48.9
1986	1	83.6	1987	1	612.0	1986	1	78.9	1989	1	49.2
	2	68.9		2	948.5		2	51.7		2	52.9
	3	110.1		3	161.4		3	53.4		3	38.7
	4	167.6		4	325.3		4	57.0		4	39.2
1987	1	135.7				1987	1	67.8	1990	1	44.4
	2	162.6					2	65.8		2	38.0
	3	365.9					3	57.5		3	30.2
	4	306.6					4	54.7		4	26.4
1988	1	391.6				1988	1	46.3	1991	1	22.9
	2	607.7					2	42.3		2	19.5
	3	520.1					3	40.0		3	17.6
	4	201.8					4	38.0		4	17.0

Source: Vegh (1992).

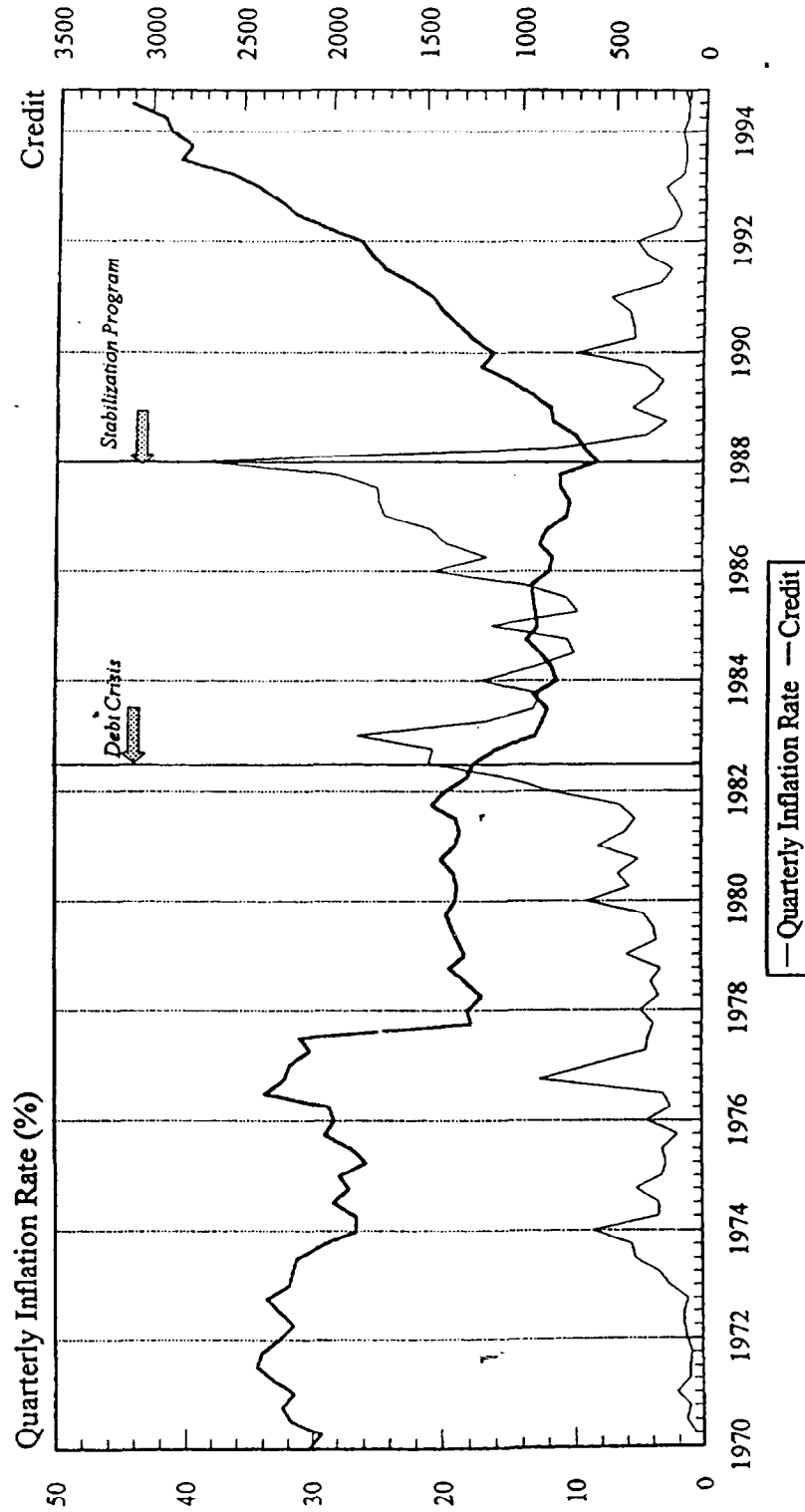
Table 8
Average Annual Inflation Rate: Mean and Standard Error

MEXICO	1970-81	1982-87	1989-92*
Mean	17.8	83.7	18.9
Standard error	8.4	29.2	6.5
CHILE	1970-77	1978-93	
Mean	234.2	22.7	
Standard error	183.1	8.6	
ARGENTINA	1971-78	1979-81	1982-85
Mean	144.5	121.6	451.9
Standard error	138.4	32.9	240.3
ISRAEL	1978-85	1986-93	
Mean	165.1	20.4	
Standard error	113.1	11.7	

* 1988 is not included where inflation in the first quarter remained very high resulting in a relatively high average annual inflation.

Source: Author's calculations using data from the IMF,

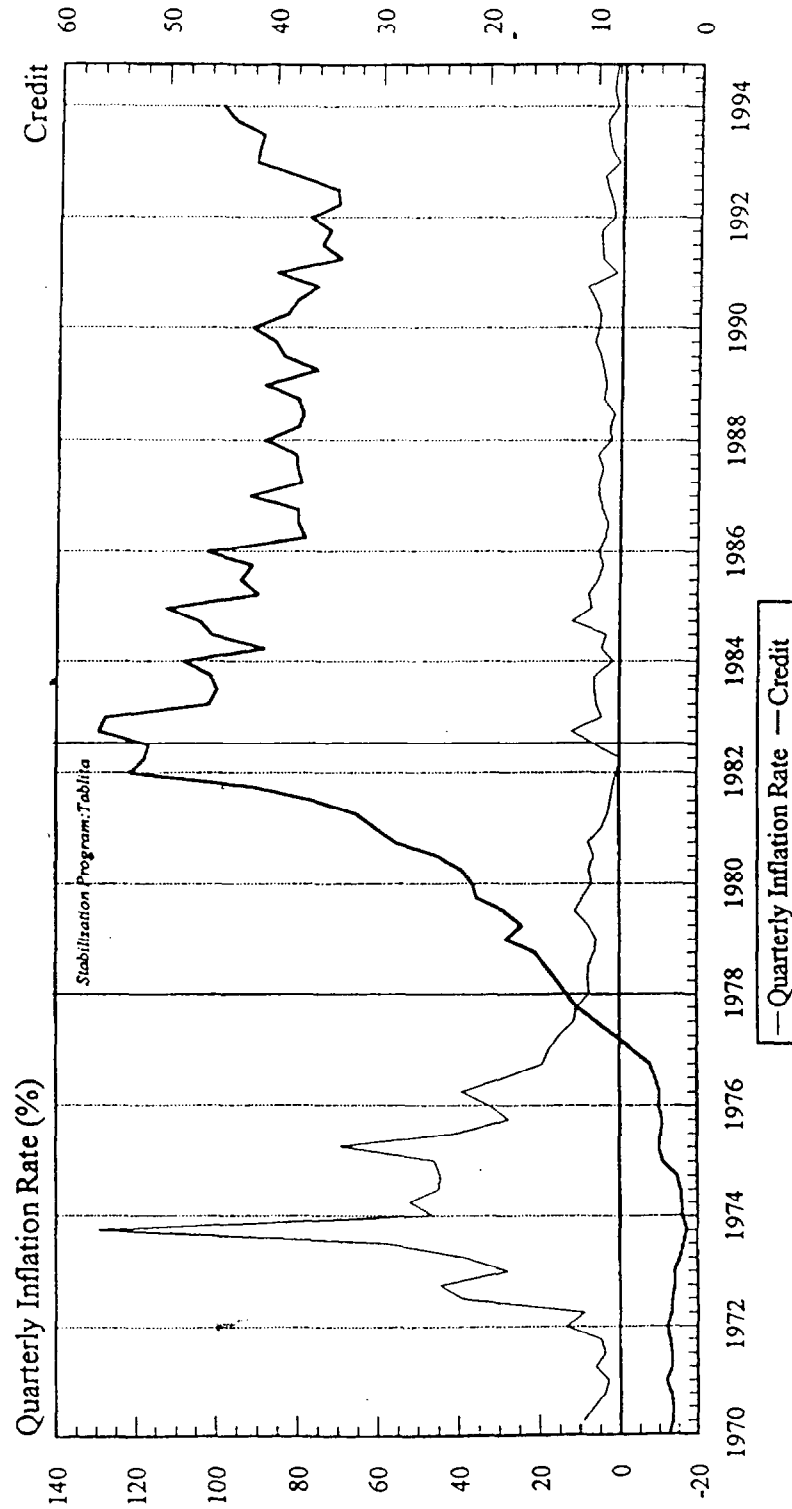
Figure 1
Mexico: Inflation and Credit



Notes: Credit refers to real private sector credit extended by money deposit banks and other financial institutions and is normalized by a manufacturing production index.

Source: Author's calculations using data from the International Monetary Fund, International Financial Statistics.

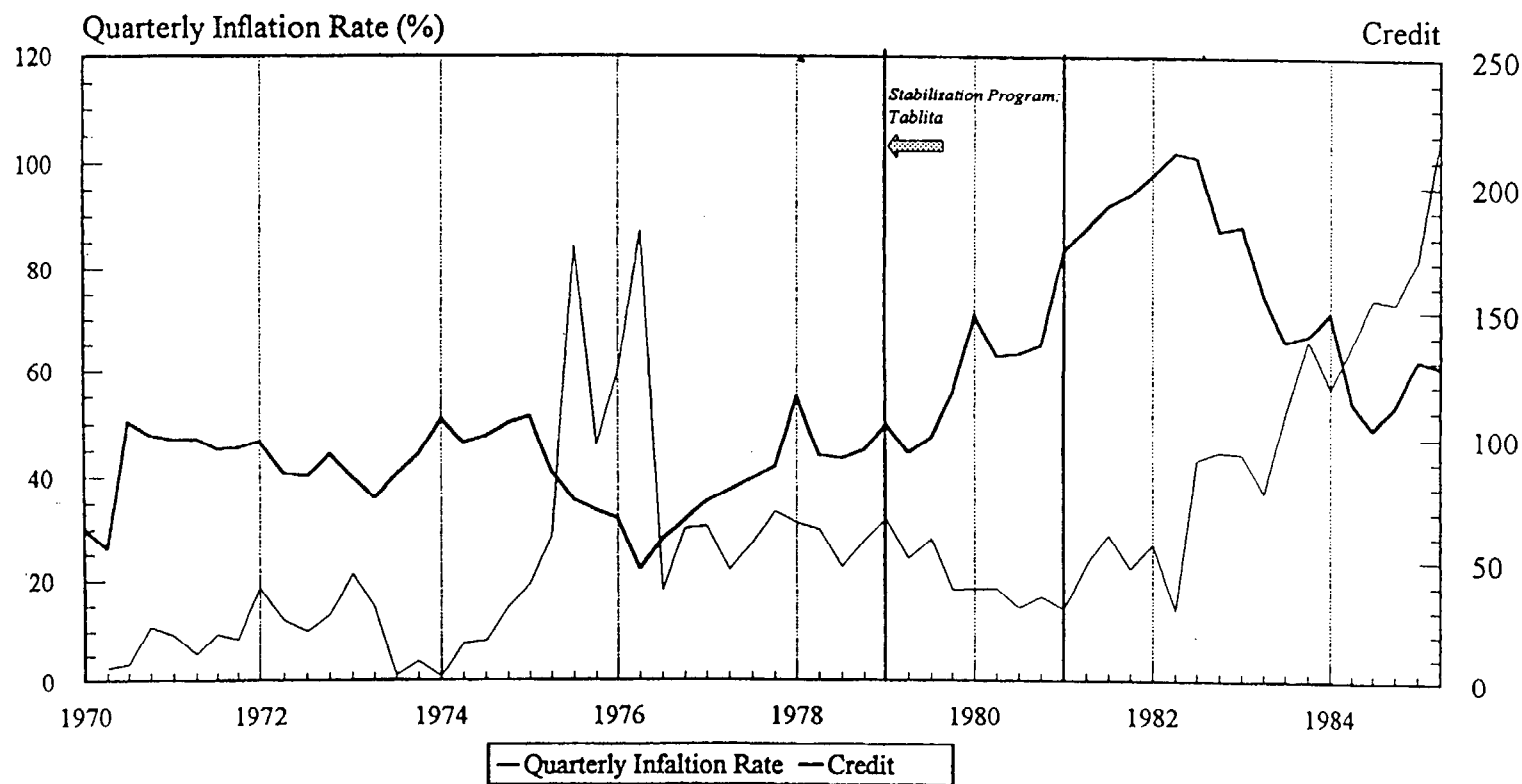
Figure 2
Chile: Inflation and Credit



Notes: Credit refers to real private sector credit extended by money deposit banks and is normalized by a manufacturing production index.

Source: Author's calculations using data from the International Monetary Fund, International Financial Statistics.

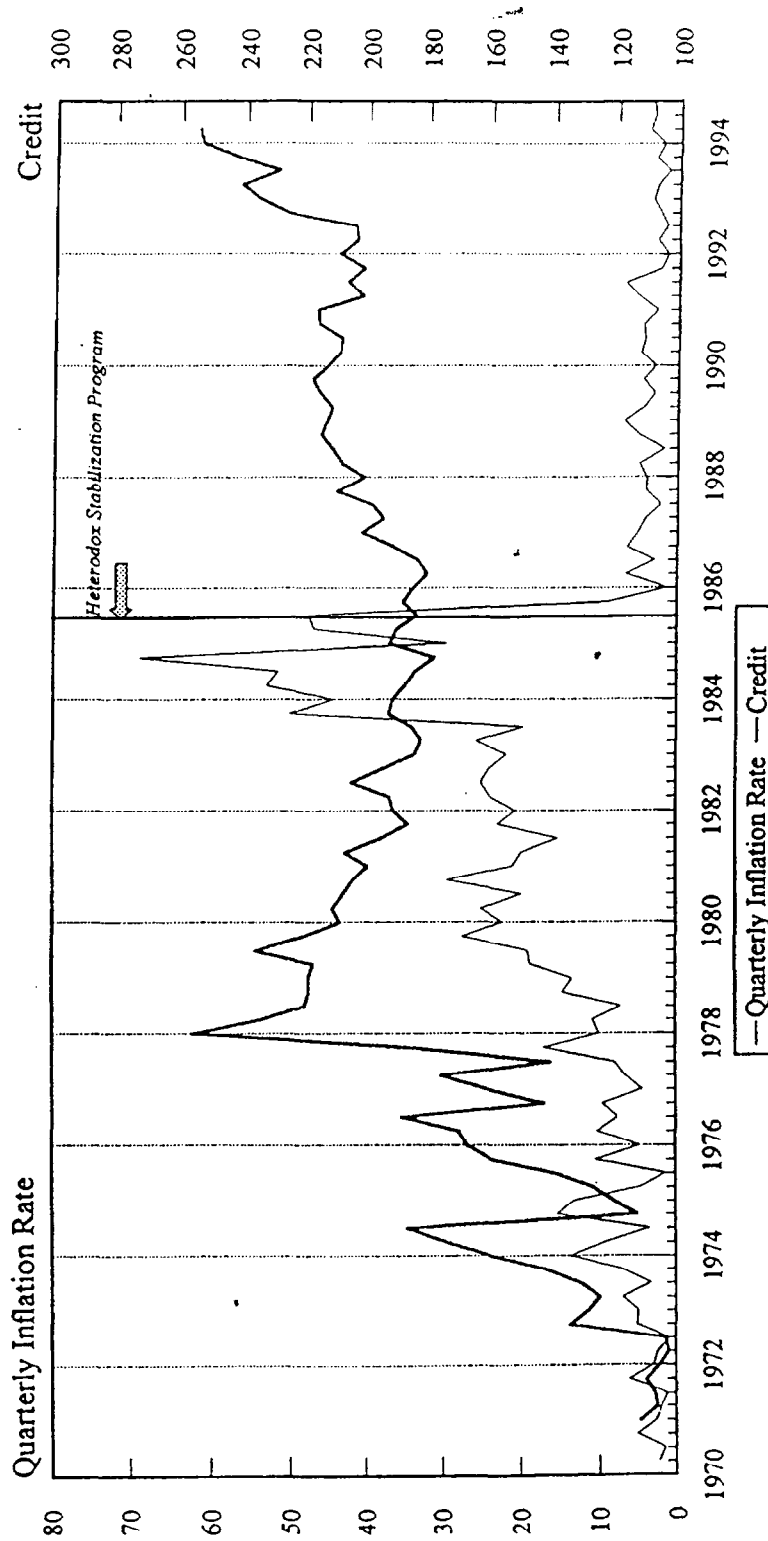
Figure 3
Argentina: Inflation and Credit



Notes: Credit refers to real private sector credit extended by money deposit banks and other financial institutions and is normalized by a manufacturing production index.

Source: Author's calculations using data from the International Monetary Fund, International Financial Statistics.

Figure 4
Israel: Inflation and Credit



Notes: Credit refers to private sector credit extended by money deposit banks and is expressed as a percentage of quarterly GDP.

Source: Author's calculations using data from the International Monetary Fund, International Financial Statistics.

Figure 5: Mexico

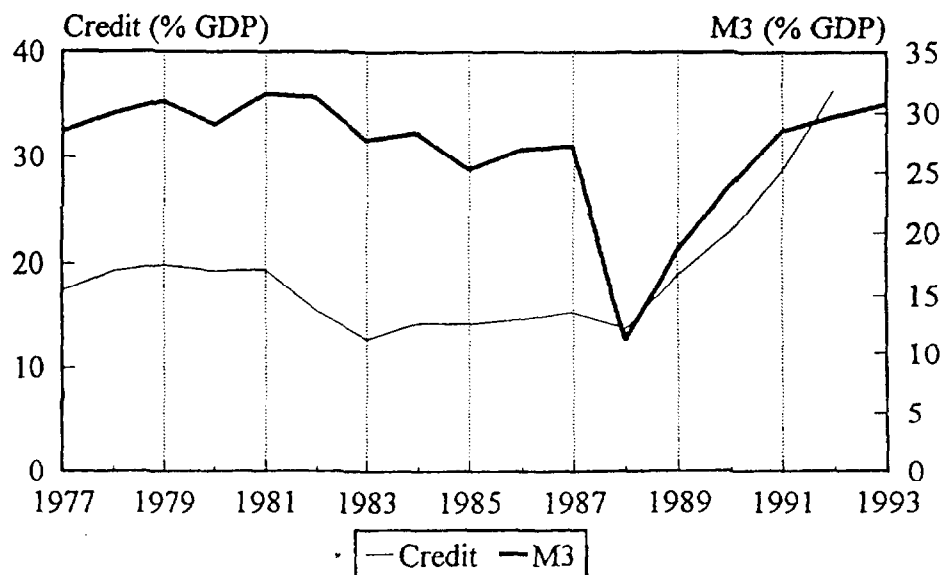
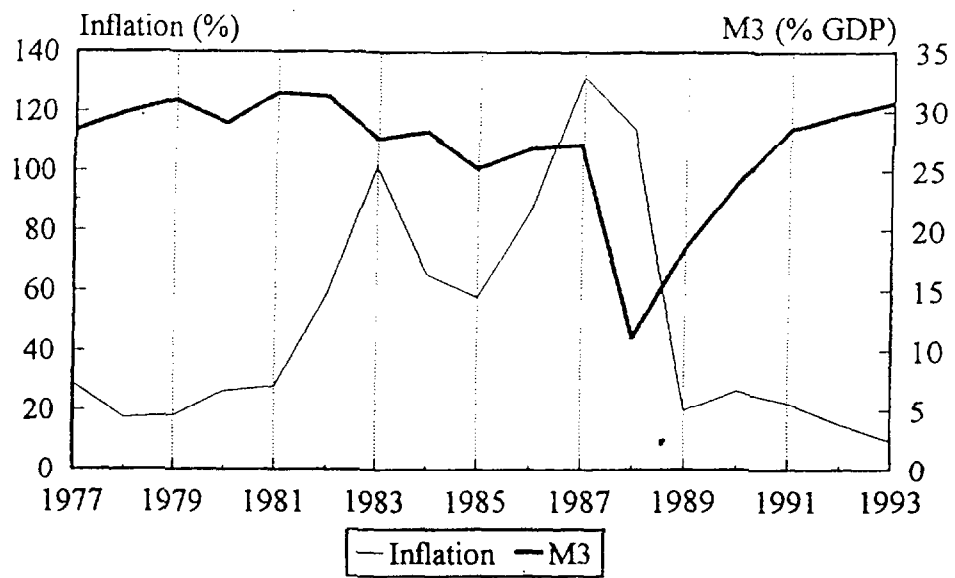


Figure 6: Chile

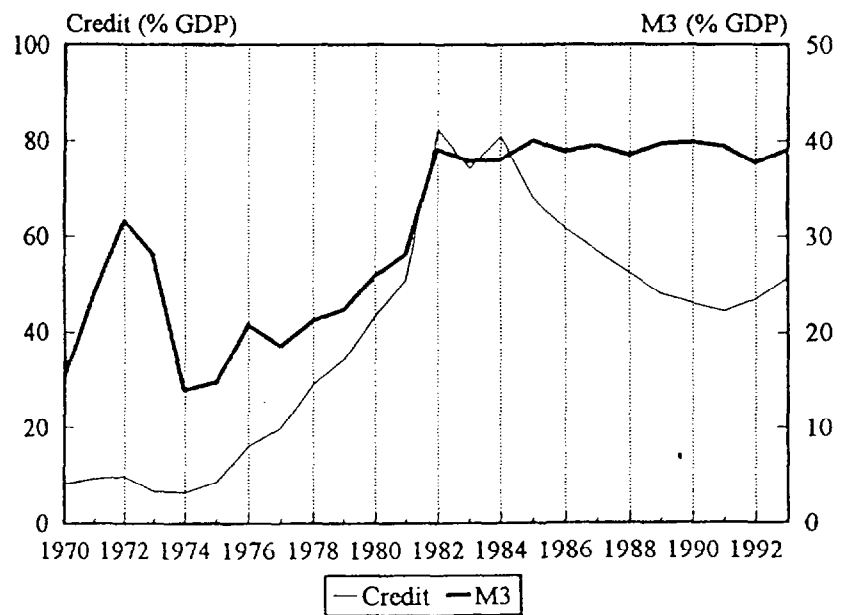
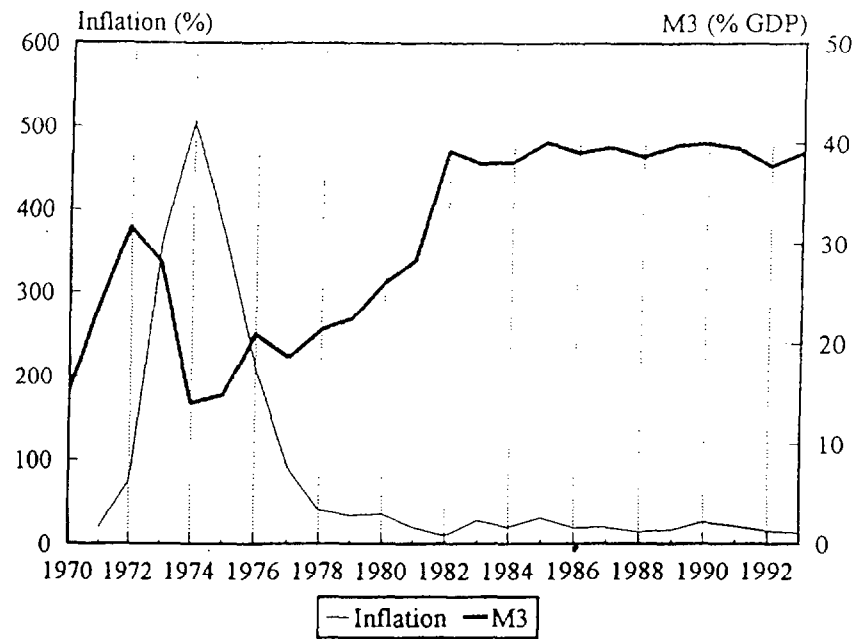


Figure 7: Argentina

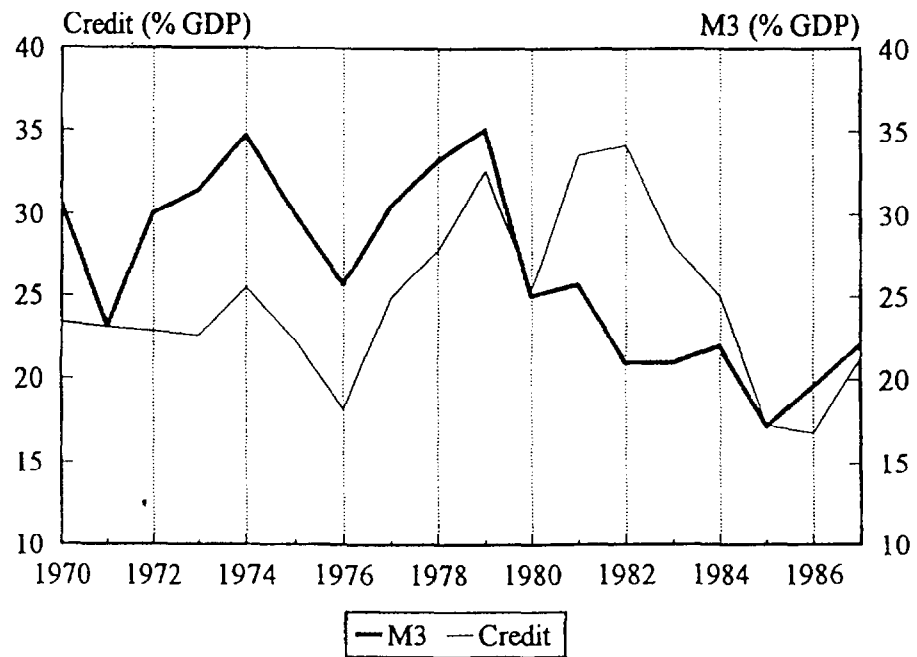
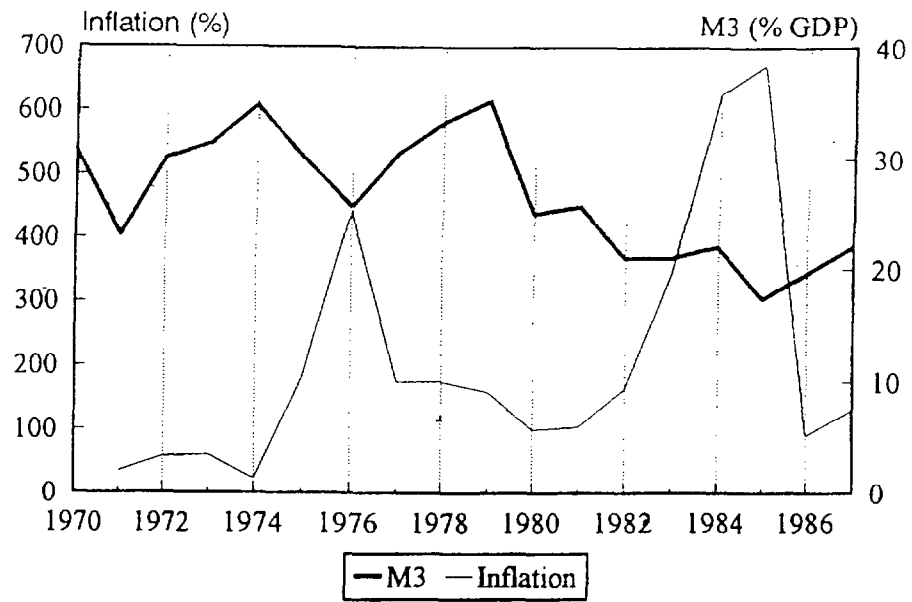
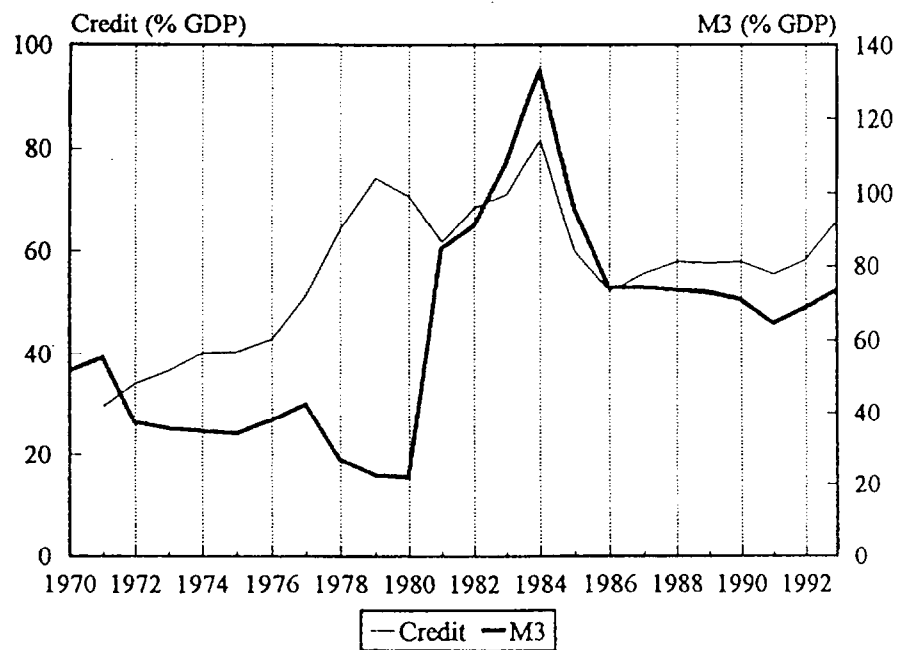
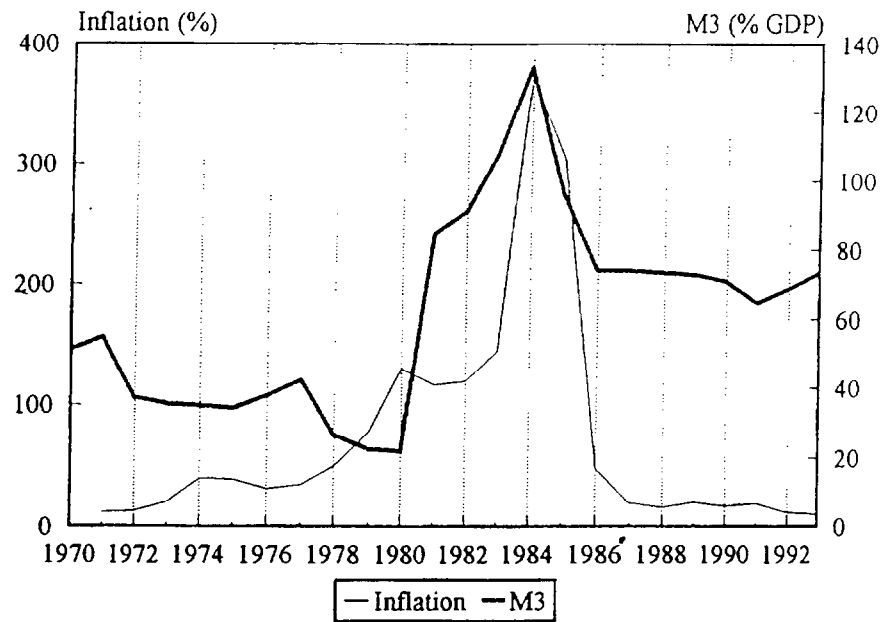


Figure 8: Israel



BIBLIOGRAPHY

- Bank of Israel, *Annual Report*, (Israel 1985).
- Bank of Israel, "Report on the Increase in the Money Supply Between February 28 and August 31, 1979," *Bank of Israel Economic Review*, No. 52 (1981a), pp. 72-73.
- Bank of Israel, "Report on the Increase in the Money Supply Between March 31, 1978 and September 29, 1978," *Bank of Israel Economic Review*, No. 51 (1981b), pp. 111-131.
- Ben-Bassat, Avraham, "Capital Market Reform in Israel," *Bank of Israel Economic Review*, No. 65 (1993), pp. 17-30.
- Bernanke, Ben, and Alan Blinder, "Is it Money or Credit?," *American Economic Review*, Vol. 78, No. 2 (May 1988), pp. 440-445.
- Blanchard, Olivier, "Debt, Deficits, and Finite Horizons," *Journal of Political Economy*, Vol. 93 (1985), pp. 223-47.
- Brunner, Karl, and Allan Meltzer, "Money and Credit in the Monetary Transmission Process," *American Economic Review*, Vol. 78, No. 2 (May 1988), pp. 446-451.
- Bruno, Michael, and Leora Meridor, "The Costly Transition from Stabilization to Sustainable Growth: Israel's Case," in Michael Bruno, Stanley Fischer, Elhanan Helpman, Nissan Liviatan, and Leora Meridor, eds., *Lessons of Economic Stabilization and its Aftermath*, (Cambridge, Massachusetts: MIT Press, 1991), pp. 241-275.
- Bruno, Michael, and Sylvia Piterman, "Israel's Stabilization: A Two-Year Review," in Michael Bruno, Guido Di Tella, Rudiger Dornbusch, and Stanley Fischer, eds., *Inflation Stabilization: The Experience of Israel, Argentina, Brazil, Bolivia, and Mexico*, (Cambridge, Massachusetts: MIT Press, 1988), pp. 3-47.
- Calvo, Guillermo, "Output Collapse in Eastern Europe: The Role of Credit," *Staff Papers*, International Monetary Fund, Vol. 40, No. 1 (March 1993), pp. 32-52.
- _____, "Temporary Stabilization Policy: The case of Flexible Prices and Exchange Rates," *Journal of Economic Dynamics and Control*, Vol. 15 (January 1991), pp. 197-213.
- _____, "Balance of Payment Crises in a Cash-in-advance Economy," *Journal of Money, Credit, and Banking*, Vol. 19, No. 1 (1987), pp. 19-32.

_____, "Temporary stabilization: Predetermined Exchange Rates," *Journal of Political Economy*, Vol. 94, No. 6 (1986), pp. 1319-29.

_____, and Carlos Vegh, "Exchange Rate-Based Stabilization Under Imperfect Credibility," IMF working Paper WP/91/77 (Washington: International Monetary Fund, March 1993).

_____, "Credibility and the Dynamics of Stabilization Policy: A Basic Framework," IMF working Paper WP/90/110 (Washington: International Monetary Fund, 1990).

Carneiro, Dionisio D., Werneck, Rogerio L. F., Garcia, Marcio G. P., and Marco A. Bonomo, "Brazil," in Roberto Frenkel, ed. *Strengthening the Financial Sector in the Adjustment Process*, (Washington: Inter-American Development Bank, 1994), pp. 85-146.

Inflation, Dionisio D., Werneck, Rogerio L. F., Garcia, Marcio G. P., and Marco A. Bonomo, "Brazil," in Roberto Frenkel, ed. *Strengthening the Financial Sector in the Adjustment Process*, (Washington: Inter-American Development Bank, 1994), pp. 85-146.

Cochrane, J. H., "How Big is the Random Walk in GNP?," *Journal of Political Economy*, Vol. 96 (1988), pp. 893-920.

Copelman, Martina, "The Role of Credit in Post-Stabilization Consumption Booms" (unpublished; Cambridge, Massachusetts: Massachusetts Institute of Technology, 1994).

Corbo, Vittorio, "Reform and Macroeconomic Adjustment in Chile During 1974-1984," *World Development*, Vol. 31, No. 8 (1985), pp. 893-916.

_____, and Andres Solimano, "Chile's Experience with Stabilization Revisited," in Michael Bruno, Stanley Fischer, Elhanan Helpman, Nissan Liviatan, and Leora Meridor, eds., *Lessons of Economic Stabilization and its Aftermath*, (1991), 57-98, (Cambridge, Massachusetts: MIT Press).

De Gregorio, Jose, "The Effects of Inflation on Economic Growth: Lessons from Latin America," IMF working Paper WP/91/95 (Washington: International Monetary Fund, 1991).

Dornbusch, Rudiger, and Alejandro Werner, "Mexico: Stabilization, Reform, and No Growth," *Brookings Papers on Economic Activity*, No. 1 (1994), pp. 253-315.

Dornbusch, Rudiger, Federico Sturzenegger, and Holger Wolf, "Extreme Inflation: Dynamics and Stabilization," *Brookings Papers on Economic Activity*, No. 2 (1990), pp.1-84.

- Drazen, A. and E. Helpman, "Stabilization with Exchange Rate Management Under Uncertainty," in E. Helpman, A. Razin, and E. Sadka, eds., *Economic Effects of the Government Budget*, (Cambridge, Massachusetts: MIT Press, 1988), pp. 310-327.
- Drazen, A. and E. Helpman, "Stabilization with Exchange Rate Management," *Quarterly Journal of Economics*, (November 1987), pp. 835-855.
- Stanley, "Real Balances, the Exchange Rate, and Indexation: Real Variables in Disinflation," *Quarterly Journal of Economics*, Vol. 103, No. 1 (1988), pp. 27-49.
- , "Indexing, Inflation, and Economic Policy," (Cambridge, Massachusetts: MIT Press, 1986).
- Friedman, Benjamin, "Monetary Policy Without Quantity Variables," *American Economic Review*, Vol. 78, No. 2 (May 1988), pp. 440-445.
- , and Kenneth Kuttner, "Economic Activity and the Short-Term Credit Markets: An Analysis of Prices and Quantities," *Brookings Papers on Economic Activity*, No. 2, (1993), pp. 193-283.
- Helpman, Elhanan, and Assaf Razin, "Exchange Rate Management: Intertemporal Tradeoffs," *American Economic Review*, Vol. 77 (March 1987), pp. 107-123.
- Helpman, Elhanan, and Leonardo Liederman, "Stabilization in High Inflation Countries: Analytical Foundations and Recent Experience," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 28 (1988), pp. 9-84.
- Institute of International Finance, "Financial Liberalization and the Experience of Chile," in *Financial Sector Reform: Its Role in Growth and Development*, (Washington: 1990), pp. 92-113.
- Kiguel, Miguel, and Nissan Liviatan, "The Business Cycle Associated with Exchange Rate-Based Stabilizations," *The World Bank Economic Review*, Vol. 6, No. 2 (1992), pp. 279-305.
- Patinkin, Don, "Money, Interest, and Prices," (New York: Harper and Row, 1956).
- Mankiw, N. Gregory, "Consumer Durables and the Real Interest Rate," *Review of Economics and Statistics*, (August 1985), pp. 353-362.
- Mathieson, Donald, "Inflation, Interest Rates, and the Balance of Payments during A Financial Reform: The Case of Argentina," *World Development*, Vol. 10, No. 90 (1982), pp. 813-827.
- Ortiz, Guillermo, "Mexico Beyond the Debt Crisis: Toward Sustainable Growth with Price Stability," in Michael Bruno, Stanley Fischer, Elhanan

Helpman, Nissan Liviatan, and Leora Meridor, eds., *Lessons of Economic Stabilization and its Aftermath*, (Cambridge, Massachusetts: MIT Press, 1991), pp. 293-313.

Piterman, Sylvia, "Economic Stabilization in Israel: Financial Difficulties in the Adjustment Process to Low Inflation," (mimeograph, 1989)

Reinhart, Carmen, and Carlos Vegh, "Intertemporal Consumption Substitution and Inflation Stabilization: An Empirical Investigation," (Washington: International Monetary Fund, June 1994a).

_____, "Nominal Interest Rates, Consumption Booms, and Lack of Credibility: A Quantitative Examination," forthcoming in the *Journal of Development Economics* (Washington: International Monetary Fund, 1994b).

Rodriguez, Carlos A., "The Argentine Stabilization Plan of December 20th," *World Development*, Vol. 10, No. 9 (1982), pp. 801-11.

Skiles, Marilyn, "Stabilization and Financial Sector Reform in Mexico," Federal Reserve Bank of New York, Research Paper No. 9125, (August 1991).

Taylor, John, "Staggered Wage Setting in a Macro Model," *American Economic Review Papers and Proceedings*, Vol. 69, No. 2 (1979), pp. 108-13.

Valdes-Prieto, Salvador, "Financial Liberalization and the Capital Account: Chile," in Gerardo Caprio, Jr., Izak Atiyas, and James Hanson, eds., *Financial Reform: Theory and Practice*, (Cambridge, Massachusetts: Cambridge University Press, 1994).

Vegh, Carlos, "Real Effects of Exchange Rate-Based Stabilizations: An Analysis of Competing Theories" International Monetary Fund (1995)

_____, "Stopping High Inflation: An Analytical Overview," *Staff Papers*, International Monetary Fund, Vol. 39, No. 3 (September 1992).

World Bank, *Argentina Economic Memorandum*, Volume 1, (Washington: The World Bank, 1995).

