INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

ProQuest Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600

EMERGING MARKET DISINFLATION IN THE 1990S: THE ROLE OF CAPITAL FLOW

BY

Apolinar Mesa

BA, Lehman College, 1988

MA, Fordham University, 1999

DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF FHILOSOPHY

IN THE DEPARTMENT OF ECONOMICS

AT FORDHAM UNIVERSITY

NEW YORK

March, 2003.

A.2 Abstract

FORDHAM UNIVERSTIY

Graduate School of Arts & Sciences

Date April 14, 2003

This dissertation prepared under my direction by:

Apolinar Mesa

entitled "Emerging Markets Disinflation in the 1990s: The Role of Capital Flows"

Has been accepted in partial fulfillment of the requirements for the Degree of

Doctor of Philosophy

in the Department of

Economics

MENTOR

READER

READER

Acknowledgements

I would like to express my profound gratitude to my mentor Dr. Darryl Mcleod who during the past two years gave generously of his time and thought in helping me to bring this dissertation to a happy ending. Also for discussing the concepts with me at length and for making available to me invaluable information, for his encouragement, advice and support in those difficult moment that I needed to keep my spirit up, for his criticism in trying to make a scholar out of me which helped me to stay in track and to growth personally, for his great patience in teaching me E-views, econometric program which played a vital role in the successful completion of this dissertation.

Also I would like to thank my committee members, Dr. Derrick Reagle and Dr. Henry Schwalbenberg, for their invaluable assistances and suggestions for improving this dissertation.

Many thanks are due to all my former professors in the economic department, but especially to Dr. Bartholomew Moore and Dr. Parantap Basu who made helpful comments about the economic models, and to Dr. Dominic Salvatore, head of the economic department, for his leadership and for his brilliant and succulent lectures which increased my knowledge and inspired me to pursue a specialization in international economics.

A special word of thanks is due to Marcelo Lafleur, graduate student at Fordham University, for making available to me valuable data. I am particularly

thankful to my friend Dr. Jovis Bellot, former graduate student at Fordham University, for reviewing and commenting upon the outline of first draft.

Lastly, but perhaps most importantly, I would like to thank my family, especially my wife Lorenza, and my children Michael, Jessica and Erika, for their patience, tolerance, love and understanding during this difficult and painful process.

Chapter 1

1.1 Introduction

Following the widespread high-inflation years of the second half of 1970s, the1980s, and the early 1990s, most emerging market countries entered a period of relative price stability. Inflation in Latin America, for example, fell from an average of over 400% in 1990 to under 10% in 1999. At the same countries returned to open access to international capital markets, and in effect became so-called "emerging market" economies. Is there a connection, causal or otherwise, between these two phenomena?

This dissertation explores the link between inflation and balance of payments shocks, both favorable and unfavorable. Unlike industrial countries, developing countries' inflation rates did not fall back to trend levels following the oil price shocks of the 1970s but instead drifted upward throughout the 1980s and early 1990s. Toward the end of the 1990s, both Brazil and Argentina experienced near hyperinflations. In the early 1990s the trend toward high and unstable inflation reversed and disinflation thus became the norm. Furthermore, the decline in inflation was evident both across regions and in countries at different stages of development. Sustained disinflation, economic growth, and declining unemployment in most emerging economies since the early 1990s is among the most remarkable and widely unanticipated economic trends in recent history.

Since 1995, a number of researchers have studied the importance of openness in reducing inflation. Many possible explanations for the lower and

more stable inflation have been offered, from increased central bank credibility to simply lower fiscal deficits. Cukierman et al (1992) focus on the growing degree of central bank independence in many countries. Romer (1993) finds economies more open to trade have lower inflation rates, while Grilli and Miles Ferritti (1995) find reducing capital controls appears to lower inflation rates. Studying a cross section of LDCs and OECD economies McLeod and Gruben (2000) find that capital account liberalization did contribute to the disinflation process.

The surge of capital inflows in developing countries in the 1990s, led countries to undertake substantial policy changes in the direction of improved macroeconomic management and economic liberalization. We hypothesize that the composition of capital inflows may be one of the major factors that account for the disinflation period in emerging markets in the 1990s. According to the World Bank (1996), the increased scale of private capital flows eased the financing constraints on recipient countries and increased the potential payoffs to them from sound policies. At the same time, given the volatility of short-term flows and to certain degree portfolio investment flows, it has also increased the need for caution and self-discipline in macroeconomic policy.

This suggests that countries that seek to attract and maintain strong ties to world financial markets must vigorously pursue policies that will enable them to benefit from global capital flows and avoid the associated dangers. Indeed, during financial crises, changes in investors' expectations about the exchange rate of any currency can become self-fulfilling as investors rush to sell financial

instruments denominated in that currency to minimize capital losses. Under these circumstances, expected exchange rate devaluations can spark massive capital outflow, and attempts by the central bank to mitigate the currency collapse can quickly deplete foreign exchange reserves and push up short-term interest rates.

1.2 External Factors in the Inflation Process

The objective of this study is to develop empirical evidence regarding the role of capital flows in the inflation process. Access to international capital markets and external shocks is a classic issue in understanding high inflation episodes. Dornbusch (1993, page 23) stresses the role of capital flows and external shocks in the inflation process:

> "The increase in inflation resulting from an external financing disruption is larger, the larger is the debt service shock and the real depreciation... it also depends on the response of velocity to inflation and on the degree to which inflation erodes real tax collection.... Not surprisingly the suspension of reparation payments in Germany and of debt service in Bolivia 1985 were essential steps in the stabilization of inflation. In Argentina, after 1982 external debt service became an important source of inflation..."

This dissertation examines essentially the reverse of this hypothesis. If debt shocks and reduced access to external financing raised inflation in the 1970s and 1980s, did restoration of access capital markets help reduce inflation in the 1990s? The basic inflation models developed which appears below explores three potential roles for capital in the inflation process:

1. Access to external finance allows governments to reduce seigniorage, financing the same deficit with bonds rather than money creation reduces inflation.

2. Capital inflows can increase economic growth, reducing the inflationary consequences of budget deficits. With a floating exchange rate the Balassa effect leads to a sustainable real appreciation of the currency, which also helps dampen inflation.

3. Capital inflows can serve as a commitment mechanism for the Central Bank, reducing the inflation caused by a lack of Central Bank credibility as in the model of Barro and Gordon (1982) and Barro and (1983).

1.3 Organization of the Study

This dissertation has five chapters. The first chapter is a general introduction. The second chapter summarizes the related theoretical background and empirical works. The third chapter specifies the model(s) to be utilized, explains the methods of data analysis and describes the data sets available for the study. Chapter four is an analysis and interpretation of the main empirical results. Chapter five is a final summary.

Chapter 2

Review of Theoretical Models and Empirical Works on Inflation and Disinflation

Inflation is one of the most important subjects of macroeconomic analysis and is among the principal concerns of policymakers and the public. As such, the study of inflation has a long history. Since the second half of the 1990s, there has been an increased interest in the study of disinflation in a large number of countries. This chapter is an attempt to survey the broad literature on inflation and disinflation theories and review the main empirical studies on these subjects. From the economic literature, we may differentiate between short-run versus long-run inflation theories; closed versus open economy models of inflation; low, high, and hyperinflation theories; perfect competition (market-clearing) versus imperfect (monopolistic) competition models; theories with assumptions of perfect or imperfect information; fiscal versus monetary theories of inflation, and so forth. For the purposes of the present study, it seems more appropriate to focus on the monetary and fiscal theories of inflation, the structural approach of inflation, and also some other relevant theories that explain the process of inflation and disinflation. Each of these approaches emphasizes different aspects regarding the root causes of prolonged inflation that characterized most emerging markets in the 1970s and 1980s, and therefore must be considered as the starting point to explain the disinflation process of the 1990s.

This chapter will be divided into two parts: the first part presents the theoretical works on inflation and disinflation; the second part is a review of some related empirical works.

2.1 Monetary Theory of Inflation And Disinflation

This theory proposes that inflation occurs when the rate of growth of the money supply exceeds the growth rate of the real aggregate output in the economy. Therefore, according to the monetary theory of inflation, "inflation is always and everywhere a monetary phenomenon". This view is mainly based on the quantity theory of money which implies that any change in the price level is proportional to a change in the money supply. Because the inflation rate is the percentage change in the price level, this theory of the price level is also a theory of the inflation rate. The quantity equation MV = PY written in the log form, is:

$$\text{Log } M + \text{Log } V = \text{Log } P + \text{Log } Y$$

From the preceding equation, we deduce that the percentage change in the quantity of money M is under the control of the central bank. Second, the percentage change in velocity V reflects shifts in money demand; we assume constant velocity so that the change in velocity is zero. Third, the percentage change in output Y depends on growth in the factors of production and on technological progress, which we can take as given. Fourth, the percentage

change in the price level is the rate of inflation. From the quantity equation the rate of inflation can be defined as:

$$\text{Log } P = \text{Log } M + \text{Log } V - \text{Log } Y.$$

Since Log V is constant, or is equal to zero, the rate of inflation is determined as:

$$\text{Log } P = \text{Log } M - \text{Log } Y.$$

If we denote the rate of inflation by Π, the rate of growth of the money supply by m, and the rate of growth of output by y, then:

$$\Pi = m - y$$

This equation states that the rate of inflation is equal to the excess of money growth over the trend of real output. Thus, with a steady state rate of growth of real output, the rate of inflation is determined by the rate of growth of the money supply, and variations in the inflation rate come only from variations in monetary growth.

Thus, the quantity theory of money states that the central bank, which controls the money supply, has ultimate control over the rate of inflation. If the central bank keeps the money supply stable, the price level will be stable. If the central bank increases the money supply, the price level will rise quickly.

Therefore, following this theory, inflation can be stabilized if the central bank is committed to a rule for monetary policy according to which the money supply is increased slowly and steadily. The commitment to a rule would eliminate all discretion in the conduct of monetary policy which is inflation biased.

2.2 Fiscal Theory of Inflation and Disinflation

According to the fiscal theory of inflation, high inflation is always and everywhere associated with large fiscal deficits. The fiscal or quasi-fiscal approach views the inflation problem as a result of large public sector deficits that need to be financed through money creation or seigniorage. Bruno (1995) shows that in all cases where there has been an inflation crisis, large deficits existed in the public sector before the crisis, even larger ones during the crisis, significant budget deficit reduction occurred during the post-crisis recovery. The fiscal and quasi-fiscal approach to inflation establishes the link between public deficits and money creation. According to monetarists and new classical economists, the growth in the money supply stems typically from the ongoing public sector deficits that are primarily financed by the central bank. In the "unpleasant monetarist framework" presented by Sargent and Wallace (1981), the government budget constraint is essential to understand the time line of inflation. Alternative financing methods for current government deficits only determine the timing of unavoidable inflation in the future, defining the assumption that fiscal policy dominates monetary policy. With economic agents being rational, inflation today is not only a function of public deficits, but is also

a function of future deficits. Hence, a temporary reduction of deficit which is not expected by the general public to last long will not have much effect on reducing the inflation rate. In this regard, it is argued that reduction in the rate of inflation can be achieved by a credible commitment of the central government to reduce the fiscal deficits and/or by making the central bank independent from any political influence.

2.3 Structuralist Model of Inflation And Disinflation.

The structuralist approach was first developed in the 1950s by a group of economists then in Chile and working for the United Nations Economic Commission for Latin America They sought to explain why certain Latin American economies seemed particularly likely to suffer high inflation. The intent of the structuralists was to develop a model to explain inflation in Latin America in general. While structuralists agree with monetarists that the money supply increases along with the price level, they believe, however, that the money stock is responding to inflation rather than initiating it. The root factors, they hypothesize, are not to be found in monetary and fiscal policy but rather in the more basic weaknesses of the Latin American economies. More especially, the structuralists feel that more fundamental "structural" causes are at the root of the inflationary process in Latin America. The basic source of rising prices is, in general terms, the pressure of economic growth on an underdeveloped social and economic structure. In particular, the agriculture, foreign trade, and government sectors are regarded as suffering from institutional rigidities that cause prices to

rise with economic development. Following this approach, inflation could have been reduced by implementing structural reforms such as price liberalization, large–scale privatization, enterprise structuring, financial sector reforms, and other institutional changes.

2.4 Rational Expectations Theory of Inflation and Disinflation

Macroeconomics in the 1970s was dominated by a revolutionary idea of the so-called Rational Expectations (RE) economists, such as Robert Lucas, Thomas Sargent, Neil Wallace, Robert Barro and so on. Starting with the monetarist assumptions of continuous market clearing and imperfect information, the RE school argued that people do not consistently make the same forecasting errors as suggested in the adaptive expectations idea: that economic agents form their macroeconomic expectations "rationally" based on all past and current information available, and not only on past information as in the case of the backward-looking, or adaptive, price expectations. According to the traditional monetarist approach from the 1960s, the errors in price expectations were related to each other. Here, however, they are totally random, or independent of each other. In such a case, monetary policy announcements are fully anticipated by economic agents, and the central bank can affect the real output and employment only if it can find a way to create a "price surprise". Otherwise, the forward-looking expectation adjustments of economic agents will ensure that their pre-announced policy fails. Similarly, if a policymaker announces a disinflation policy in advance, this policy cannot reduce prices if

people do not believe that the government will really carry it out. That is, in the new classical framework, price expectations are closely related to the necessity of policy credibility and reputation for successfully disinflating the economy.

2.5 Real Business Cycle Theory of Inflation and Disinflation

In the 1980s, the second generation of the new classical macroeconomists such as Edward C. Prescott, Finn E. Kydland, and Charles I. Plosser argued that upswings and downswings in economic activity originate from real (or aggregate supply) shocks rather monetary (or aggregate demand) shocks. Assuming that the aggregate demand curve is fixed, and by keeping the assumptions of continuous market-clearing, imperfect information, and rationality of expectations, the so-called real business cycle (RBC) theorists investigate the effects of supply shocks (process and production innovations, discovery of new sources of raw materials, changes in relative prices of foods and energy, bad weather, and nominal effective exchange rates) on business cycles. To a large extent, RBC theorists do not attempt to clearly explain price level changes or inflation; rather, they focus particularly on real output effects of adverse, or negative supply shocks such as deviation of factor productivity from trend or relative price changes caused by oil price shocks. The main contribution of the RBC economists is that they call our attention to the possibility of the important role of supply shocks in explaining inflation: persistent and negative supply shocks may cause inflation, but persistent

technological improvements may contribute significantly to the disinflation process in an inflationary environment.

2.6 New Political Macroeconomics of Inflation and Disinflation

Most of the theories on inflation mainly focus on the macroeconomic determinants of inflation and disinflation and simply ignore the role of non-economic factors such as institutions, political process and culture in the creation and acceleration process of inflation. They also overlook the possibility that sustained government deficits, as a potential cause for inflation, may be partially endogenized by considering the effects of the political process and possible lobbying activities on government budgets, and thus, on inflation. The so-called new political economy is the study of how the political nature of decision-making affects policy choices and, ultimately, economic outcomes. This literature provides fresh perspectives on the relations between timing of elections, policymaker performance, political instability, policy credibility and reputation, central bank independence and the inflation and disinflation process itself.

2.7 Review of Empirical Studies

Empirical studies on inflation have a long history, almost covering the globe. Though the study of disinflation is a recent phenomenon, current interest in this area of research is very encouraging. We present here a brief review of some empirical works on inflation and disinflation.

Cukierman et al (1992) develop four broad measures of central bank independence and explore their relationship with inflation outcomes. Economists and practitioners in the area of monetary policy generally believe that the degree of independence of the central bank from other parts of the government affects the rate of expansion of money and credit, and through them, important macroeconomic variables, such as inflation and the size of the budget deficit. Price stability, because of its beneficial long-run effects on overall economic activity, is considered the prime objective of central banks; central bank independence is one of the means by which the government can choose the strength of its commitments to price stability. However, pursuing price stability usually competes with other politically desirable tasks that the central bank can and often perform. Assuring price stability requires ensuring that the central bank is not forced to perform these functions. That is why in some countries, governments pass laws granting the central bank complete autonomy. This leads the authors to raise the question: do countries with more independent central banks have lower rates of inflation? Using different measures of central bank independence with data from 72 developing and industrial countries, the authors find that there is a significant negative relationship between central bank independence and the rate of inflation. But, for countries in which the monetary policy is dominated by a policy rule fixing their exchange rate to a relatively stable currency, high central bank independence is not necessary for price stability.

Romer (1993) provides some theoretical and empirical evidence on the openness-inflation relationship. His purpose was to demonstrate and test a prediction of models in which the absence of pre-commitment in monetary policy leads to inefficiently high inflation in large and less open economies. This prediction is based on the classic paper of Kydland and Prescott (1977) on time inconsistency of monetary policy and also on a study by Rogoff (1985b) noting that that surprise monetary expansion causes the real exchange rate to depreciate and that this reduces the incentive to undertake expansion. However, this is only valid in small open economies; in large and less open economies, the harm of the real depreciation induced by surprise monetary expansion is reduced, thus raising the equilibrium level of inflation. Therefore, the larger and hence less open an economy is, the greater the incentive to expand, and also the higher the equilibrium rate of inflation. Using a standard closed economy model of the dynamic inconsistency of optimal monetary policy and national account data for 114 countries, Romer finds that there is a quantitatively large and statistically significant negative relationship between openness and inflation, confirming the prediction of the theory. He also finds that political instability is positively related with inflation, and central bank dependence is strongly and positively associated with average inflation.

Grilli et al (1995) theoretically and empirically analyze the economic effects and structural determinants of capital controls from a long-term perspective. After looking at various explanations as to why countries impose or remove capital controls, the authors explore the different forms of capital

controls and their significant macroeconomic and distributional consequences. With regards to foreign exchange restrictions, they investigate whether limitations on the degree of capital mobility, together with other economic, political, and institutional features can help explain the behavior of key macroeconomic variables, such as inflation, real interest rates and growth. Using ordinary least squares and weighted least squares techniques, and data for 61 developing and developed countries, they find that restrictions on capital account transactions tend to be associated with higher inflation, a higher share of seigniorage revenue in total revenue, and lower interest rates. In addition, they find that capital controls are more likely to be in place when income is low, the share of government in economic activity is large, the exchange rate is managed, and the central bank in not independent. The results found are consistent with the view that capital controls are a complement to financial repression measures that allow the government to extract seigniorage revenue more effectively and to reduce domestic debt service through lower real interest rates. The implication of these results is that financial liberalization can foster disinflation.

Chang and Velasco (1998) argued that the 1997 Asian crisis was not new but rather a classic financial crisis made possible by the international illiquidity of the financial sector, similar to crises in Chile in 1982 and Mexico in 1994. They point to five elements present in these three cases: First, international illiquidity evidenced by sharply rising ratios of short term liabilities in foreign currency to short term liquid assets was a necessary and sufficient condition for financial crashes and/or BOP crises. The authors noted that if both domestic depositors and

foreign creditors lost confidence that banks will honor all its commitments and "panic", all depositors would attempt to withdraw all deposits in the short run and foreign creditors demanded repayment of credit which would force banks to liquidate some of its long term assets. As they showed, this liquidation would not prevent the banks' failure if their potential short run obligations exceed the resources they could have access to in the short run (i.e. international illiquidity). The key to liquidity, therefore, was the maturity characteristics of assets and liabilities: financial crises might become more likely if the average maturity of foreign debt became shorter. Based on data obtained from the Bank of International Settlements, at the end of 1996, Korea, Indonesia and Thailand had short-term debt to reserve ratios of more than one (Malaysia and the Philippines had doubled this ratio between 1994 and 1997). These indicated that short-term liabilities of the financial system were growing faster than its liquid assets, which according to the authors pointed to a deterioration of the international liquidity of these countries.

Second, Chang and Velasco believed that this deterioration of the international liquidity position of the international system was due to financial liberalization without much-improved regulatory oversight during times of large capital inflows. Reforms like deregulation of interest rates and lower reserve requirements were enacted as these Asean-5 countries tried to move away from financial "repression". These measures though desirable on efficiency grounds exacerbated international illiquidity of these countries as these promoted an

explosive growth in short-term international debt (i.e. debt denominated in foreign currency).

Third, fiscal problem was ex post, in the sense that bailouts deteriorate the fiscal position. Governments tried to help, but the crisis was one of excess demand for foreign currency, and hence they might see their own international reserves plunge in the struggle.

Fourth, in these crises, fixed exchange rate regimes collapsed, stemming from the mutual incompatibility between stabilizing banks and pegging the exchange rate. Illiquid banks prevented Central Banks from raising interest rates to defend currency pegs up to the point when international reserves were exhausted. At that point, the peg was abandoned and exchange rates plummeted.

Fifth, the effect of moderately weak fundamentals on asset prices and economic activity were magnified by the financial system through bankruptcies and early liquidation of investments (i.e. the size of the punishment was larger than the sin). Illiquidity left Asean-5 vulnerable to sharp reversals in capital flows from US$93 billion (1996) to –US$12 billion (1997).

McLeod and Gruben (2000) examine the relationship between capital account liberalization and rapid disinflation in the 1990s. The authors attempt to understand whether capital account liberalization accelerates disinflation or, in other words, whether countries that lowered barriers to convertibility are able to reduce inflation faster. The model used in the study is based on an extension of Romer's (1983) argument regarding inflation and trade openness to the capital account, particularly among small open economies. The model assumes that

capital account liberalization reduces the inflation rate that maximizes seigniorage and increases the reserve loss penalties for excess money creation. Capital account liberalization raises the inflation elasticity of demand for local currency, allowing access to substitute currencies. Inflation falls because the private sector anticipates the tighter monetary policy necessary to prevent currency substitution and reserve loss. Using a sample of 112 countries divided into two groups (open and closed), the authors find that capital account liberalization has contributed to the reduction of inflation in the 1990s. The results suggest that sustained removal of even capital or current account restrictions can reduce average annual inflation by as much as 3%. One major implication of this result is that disinflation may be an important indirect benefit of increased integration and globalization.

O'Donnell (2001) examines the impact of volume-based indicator of financial openness, plus its interaction with different measure of financial depth, on the level and volatility of inflation in a cross-section of 60 countries over the period 1971-1994. Financial openness is measured as the gross stocks of foreign assets and liabilities over the period considered. The main purpose of the study was to analyze empirically the effect of increasing capital mobility on the level and volatility of inflation. The study was motivated by the idea that inflation is a tax, and that the removal of capital control will reduce the inflation tax base by reducing the ability of the government to impose financial repression measures. As a result, the optimal rate of inflation may rise or fall. The result of the study shows that there is some evidence suggesting that the combination of

increasing financial openness and greater financial depth impacts positively on inflation levels and volatility, primarily in countries with inflation rates under 60 percent. But, in general, financial openness does not appear to impact inflation. The author explores the reasons that explain these results such as the degree of capital account liberalization in different countries, countries circumstances and policies, global economic climate, extent of capital control, size of the government, central bank independence, and so on.

Beck et al (2001) assess empirically the impact of banks on productivity growth, capital accumulation, private savings rate and overall growth. Based on the Schumpeterian view of finance and development that highlights the impacts of banks on productivity growth and technical change, the study assumes one cause for the cross-country differences in total factor productivity: difference in the level of banking sector development measured as credits to private sector relative to gross domestic product. Better banks influence growth primarily by raising domestic saving rate and attracting foreign capital. Two econometric procedures are used in this study—a pure cross-sectional instrumental variable estimator and a GMM dynamic panel technique--to evaluate the impact of differences in banking sector development on economic growth, capital accumulation, productivity growth and private saving. A panel data set from 49 to 63 countries were used, with data averaged over each of the seven-year periods between 1960 and 1995. The results from both econometric techniques reveal that high level of banking sector development produce faster rates of economic growth and total factor productivity. Thus, the data are consistent

with the Schumpeterian view that the level of banking sector development importantly determines the rate of economic growth by affecting the pace of economic growth and technological change. As such, the level of banking sector development may also affect the inflation and disinflation process through the growth and productivity channel.

Chapter 3

Inflation and Capital Flows in Small Open Economies

This chapter develops several scenarios regarding capital inflows and inflation. Rather than focus on a single approach we review the implications of capital flows and capital mobility for number of open economy inflation models. We distinguish two sorts of effects.

The first model is the well known traded-nontraded goods model often referred to as the Australian Model, the Salter-Swan model, or the dependent economy model. Our presentation of that model follows closely that of Sachs and Larrane (1991) so we adopt their TNT or traded-nontraded goods model acronym. The key implication of this model is that net capital inflows tend to lead to a real exchange rate appreciation, at least in the short term. With a fixed exchange rate this appreciation is likely to be associated with a potentially inflationary rise in real wages and nontraded goods prices. In a flexible exchange rate regime, net capital inflows may be inflationary or deflationary.

The second class is broadly referred to as currency crisis models (CC). These models come in two varieties: classic speculative attack or 1st generation current crisis models (CC) that focus on public sector deficits and the so-called 3rd generation models which focus on bank to bank short term lending. The first is Krugman's classic balance of payments model in which a fixed exchange rate regime runs a public sector deficit which, because interest rates and the price level are determined by the standard interest rate and purchasing power parity assumptions, deficits can only be financed by running down official reserves.

Once reserves reach some critical level, the fixed exchange rate is attacked and the regime collapses switching from fixed to floating exchange rates. Capital inflows into a fixed regime presumably augment reserves and delay the day of reckoning. On the other hand, floating rate regimes under this credit constrained scenario could be inflationary or deflationary. Generally however, capital flows prolong the life of fixed rate regimes lowering the expected inflation rate.

In the so-called third generation currency models, excessive expansion of domestic credit takes place through short-term bank to bank lending. These flows lead an excessive expansion of domestic credit as well as an appreciation of the real exchange rate. However, the term mismatch of private banks long term loans and short-term liabilities can lead to liquidity crisis as witnessed in 1997 in Thailand and a few months later in South Korea. Mexico experienced a similar crisis in the 1995. Hence, net short-term flows in particular may be associated with inflationary currency crises, particularly in fixed rate regimes.

3.1 Model Specification

In attempting the study of any relationship between variables, the first and most important step is to express them in mathematical form. This is called the specification of the model. Optimal specification of a model depends first of all on the hypotheses to be tested, then on theoretical consideration, and also on the type of data been employed.

This is a panel studied which has some significant benefit for allowing us to control for country specific effects when assessing the log of average of

inflation and capital inflows relationships. According to Bosworth and Collins (1999) many other previous studies have used panel data studied without fixed effects, assuming that country-specific effects are either absent or uncorrelated with the regressors. This correlation will bias the coefficient estimates. Therefore fixed-effects allow us to concentrate on the relationships within countries over time. However, we use a series of control and dummy variables that enable us to controls for country-specific effects, and the results were not significantly different from those with fixed effects. Thus, we use the following specifications:

$$\pi_{it} = \alpha_i + \beta X_{it}/Y_{it} + v_{it} \qquad (1)$$

where i = 1, ..., 114 and t = 1, ..., 6; π is the log of average rate of inflation and X denotes several explanatory variables as a share of GDP PPP, that vary across countries and over times.

3.2 Econometric Methods and Data Sources

Our data set is constructed as a panel of country observations which comes primarily from the World Bank's world Development Indicators and the International Financial Statistics of the International Monetary Funds, and includes as many as 114 countries (comprising both industrial and developing countries) over the period 1971-2000. Data for a number of developing countries, however, have a shorter span. Because of the uneven coverage, the

analysis is conducted using unbalanced panels. Since our interest is the longer-term effects of different types of capital flows on the log of average inflation, we use five-year average data as the frequency of observation. Data are thus available for six time series observations for each country. Missing data for individual countries in particular five-year periods reduces the total number of observations that are available for any given estimation procedure.

To obtain the empirical results we use three econometric methods: Pool Least Squares (PLS), General Least Squares (GLS) and Weighted Two-Stage Least Squared (W2SLS). Also we recognize that capital inflows are likely to be influenced by domestic economic conditions, which creates an endogeneity problem, thus, we use instrumental variable estimator to allow for this endogeneity.

3.3 Countries of this Study

The total countries of this study are one hundred and fourteen (114). They are from different categories and different regions. We have 23 industrial countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States. We also have eighty four countries classify by the World Bank as developing countries from the following regions: Latin America and Caribbean, East Asia and Pacific, Middle East and North Africa and Sub-Saharan Africa. They are distributed as following, twenty four (24) from Latin America and

Caribbean: Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay and Bolivariana Republic of Venezuela. Ten countries (10) from East Asia and Pacific: China, Fiji, Indonesia, Democratic Republic of Korea, Malaysia, India, Myanmar, Papua New Guinea, Philippines and Thailand. Thirty five (35) from Sub-Saharan Africa: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Democratic Republic of Congo, Republic of Congo, Cote d'Ivoire, Ethiopia, Gabon, The Gambia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe. Fifteen (15) countries from Middle East and North Africa: Algeria, Arab Republic of Egypt, Islamic Republic of Iran, Jordan, Libya, Malta, Morocco, Oman, Saudi Arabia, Syrian Arab Republic, Tunisia, Republic of Yemen, Bangladesh, Nepal and Sri Lanka. And seven (7) high-income economies: Bahrain, Cyprus, Hong Kong, Israel, Kuwait, Singapore and United Arab Emirates.

3.4 Inflation and Capital Flows in a TNT Framework

We are going to elaborate a theoretical model of tradable and non-tradable goods, that we will call TNT model. The economy only produces these two types of goods: tradables and non-tradables. Tradable prices are assumed to be

linked to international prices, while non-tradables prices are determined by the condition that this market clears at all times. Our main objective under this scenario will be to focus on the impact on the rate of the inflation brought about by changes in the real exchange rate fundamentals, which will be affected by capital flows. We will examine these effects on the rate of inflation under the presence of pure fixed exchange rates regimes and pure flexible exchange rates regimes.

$$P = \gamma p_n + (1-\gamma)p_t. \qquad (2)$$

Equation (2) says that the domestic overall index of inflation is a weighted average of tradables and non-tradables inflation, γ is the weight in the price index attached to the non-tradable good, P_n is the price of non-tradables, $1-\gamma$ is the weight in the price index attached to the tradable good, P_t is the price of tradables, and where $0 < \gamma < 1$. Under a floating exchange rate regime the nominal exchange rate $e = e(\Delta F, y, y^*)$ where e is the home currency price of dollars and ΔF are net capital inflows so that

$$P/P^* = \gamma P_n /P^* + (1-\gamma)\, e(cf, y, y^*). \qquad (3)$$

Equation 3 says that the relative prices (P/P*) are a function of the relative prices (P_n/P^*) and the floating exchange rate (e), which is a function itself of the capital flows (cf), gross domestic product (y) and foreign gross product (Y*), where P* is the imports traded price.

From equation (3) we have that $e = e_f$ for fixed or pegged exchange rate regime:

$$P/P^* = \gamma P_n/P^* + (1-\gamma)\, e_f, \qquad (4)$$

As shown in figure1, capital inflows always lead to an appreciation of the real exchange rate $q = P_t/P_n$ where $P_t = eP^*$. Note that in (3), capital inflows tend to make e fall or appreciate even as the excess demand for nontraded goods put upward pressure on P_n so the price level may rise or fall. However, with fixed exchange rates, only P_n can increase to reduce q from q_A to q_B hence capital inflows to fixed rate regime tend to be inflationary.

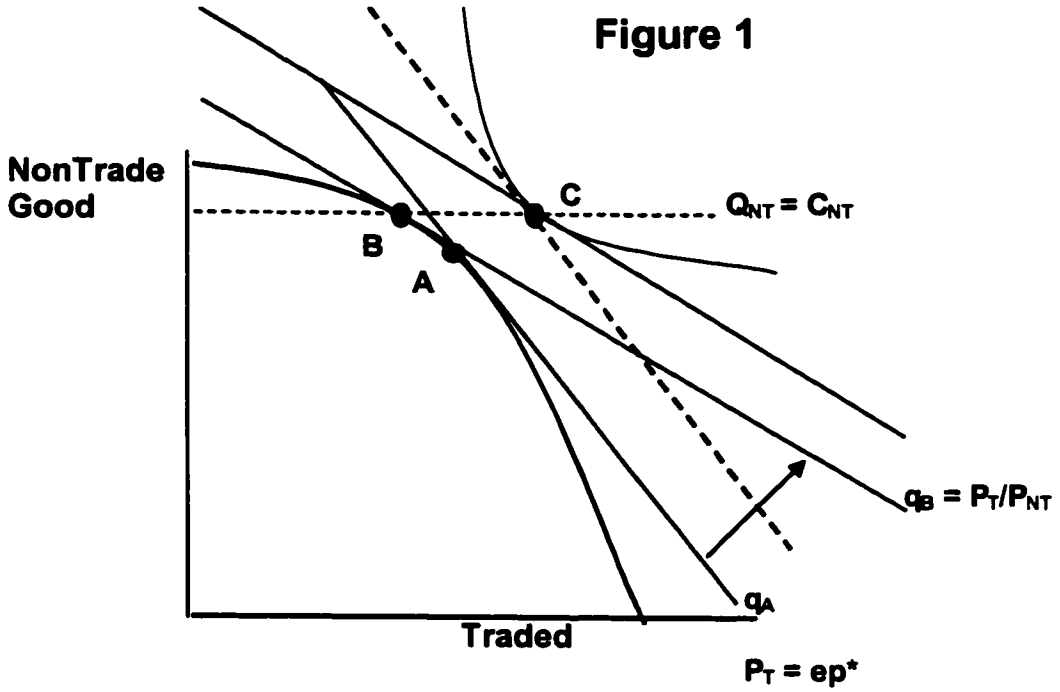


Figure 1: Capital Inflows always cause an appreciation of the real exchange rate, RER or $q = P_T/P_{NT}$ where $P_T = ep^*$.

Figure 1 demonstrates how an increase in capital flows affects the real exchange rate. Under fixed (e_f) or flexible rates (e), the capital inflow creates an excess demand for nontraded goods as the economy moves from exchange rate, will cause an increment in the availability of foreign resources which will result in the accumulation of international reserves at the central bank, monetary expansion, and increased inflation. Under fixed exchange rates the real appreciation takes place because the nominal exchange rate (e_f) and the international price (P*) are fixed, the first as a policy and the second is given by international market. Therefore the only component of the real exchange rate (q) that increased is the price of the nontradable goods (P_n), reducing the real

exchange rates (q), which is an appreciation. The real appreciation will make domestic price more expensive relative to the rest of the world, discouraging export and will make import prices less expensive relative to the rest of the world. That is, encouraging an increased in imports, which in turn will worsen the trade balance.

Under flexible exchange rates (e) the increased in capital flows will not necessarily translate into inflationary pressure. The reason is that as capital flows in the nominal exchange rate (e) will appreciates, reducing the nominal exchange rates ratio, but at the same time the capital inflows will pressure the price of nontradable goods, increasing domestic price (P_n). Therefore, if the nominal floating exchange rates (e) declines and domestic prices increase (P_n) the final result is unambiguous. In other words, how capital flows will affect the rate of inflation under a system of flexible exchange rate is an empirical question. The reason according to Edwards (1997) is that the extent of the appreciation will largely depend on two sets of key variables: the intertemporal elasticity of aggregate, on the one hand, and the income elasticity of demand and supply elasticity for non-tradable goods on the other. The intertemporal elasticity will determine the extent of consumption smoothing and the distribution of the expenditure increase through time. The elasticity for non-tradables, on the other hand, will determine the extent to which the surge in capital inflows will exercise pressure on non-tradable prices.

3.5 Model 2: Inflation, Deficit and Financing in a Krugman Framework.

Model two presents the following scenario:

The government decides to run an expansionary fiscal policy and asks the central bank to finance it by "printing money." The reasons why the government has to print money under these circumstances is either because it cannot borrow domestically or internationally or it cannot raise taxes because raising taxes will require the consent of a majority in the legislature, which may be difficult to get especially during election years. When the government is unable to borrow from domestic residents, and when his international creditworthiness is severely impaired abroad the only way to finance a deficit is to borrow from the central bank. The government budget constraint,

$$e\Delta CF - e\Delta R + \Delta M = (\theta - Z(\pi)), \qquad (5)$$

denotes three alternative means of financing a government budget deficit where ΔCF is government borrowing from abroad (capital inflows), ΔR is the reduction in foreign reserves – both converted into domestic currency at the fixed nominal exchange rate (e). $\Delta M = \mu$ is the change in money supply, which drives inflation. What must be financed is the primary government deficit (θ) less the inflation tax or seigniorage (Z).

If the government cannot borrow from abroad $\Delta CF = 0$ (with a continue fiscal deficit, even if the government can borrow from abroad the speculative attack may be inevitable). Then, if prices are set by the law of one price, while

capital and interest rates are fixed by interest rate parity, money demand is constant. That is if $M^d = L(y,p.i)$ and $p = ep^*$ and $i = i^* + \Delta e$ and $M^s = M^d$ then government deficits only deplete foreign exchange reserves,

$$-\Delta R = (\theta - Z). \qquad (6)$$

This last equation explains the reason why any attempt by the government to borrow from the central bank will lead to an increase of the money supply, which in turn will cause the public to exchange the domestic for foreign currency. A loss of international reserves will occur together with a subsequent reversal of the money supply increase. How does this situation result in higher inflation? The answer is simple: as long as foreign reserves continue to be available, the country can avoid inflation. The exchange rate remains fixed at its pegged level and the external price level is given; with purchasing power parity, domestic price also remains stable. If the fiscal deficit persists, however, the government will eventually run out of reserves. At that point, when domestic residents attempt exchange their home currency for foreign currencies and the government cannot continue to intervene in the market, the central bank has no other option than to allow the exchange rate to depreciate. This could be done either by the devaluation of the domestic currency or by allowing the domestic currency to start floating. Both cases lead to a higher rate of inflation. Assuming now that the government decides to switch from the fixed exchange rate to a floating exchange rate. Under a floating exchange rate regime and with no

international reserves available, the central bank cannot intervene to stop the depreciation of the domestic currency. This situation can be explained by the following equation:

$$\Delta M = \theta - Z(\pi) - \Delta CF, \quad (7)$$

showing that an increase in the money supply to finance a fiscal deficit will cause a nominal depreciation of the domestic currency, that is an increase in the real exchange rate. In addition, the continuous rate of depreciation of the real exchange rate caused by the increase in the money supply to finance the fiscal deficit is equal to the rate of inflation,

$$\Delta M = Z(\pi) = \theta, \quad (8)$$

where ΔM is the change of the money supply, and π is the rate of inflation. Therefore,

$$\pi = \Delta M = \Delta e, \quad (9)$$

where, π and ΔM are already defined above, and Δe is the change in the real exchange rate.

As shown above, under a floating exchange rate regime, the fiscal deficit will result in inflation. There is a definite link between the size of the deficit, the rate of inflation, and the rate of depreciation of the domestic currency. This link works in this way: the deficit leads to an increase of the nominal money supply

as the central bank buys the treasury bonds issued by the central government. At given prices and interest rates, there will be an excess of money chasing foreign assets causing the exchange rate to depreciate. With no reserves at its command, the central bank cannot intervene to stop the depreciation of the domestic currency. With purchasing power parity, the depreciation of the exchange rate leads to inflation.

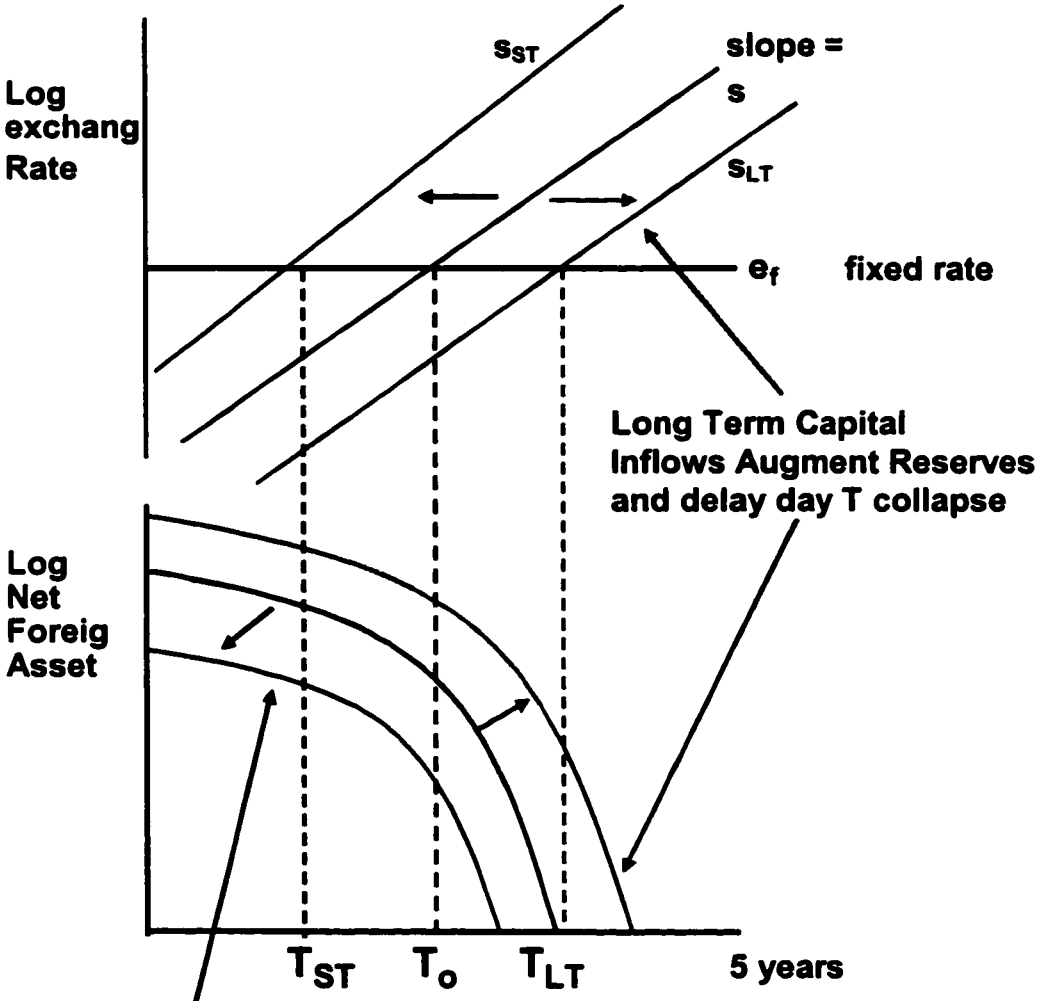
Figure 2 shows the transition between the two regimes where there is a shadow exchange rate. According to Flood and Garber (1984) the shadow exchange rate is defined as the floating exchange rate that would prevail if the attack had already occurred (that is, if all the central bank's foreign assets had already passed into private hands). Under floating rates $\Delta s = \Delta e = \pi$ and reserves stop falling but under a fixed rate regime $e = e_f$ in a perfect foresight world, investors know the date T when $s = e_f$ so at T the convert all there local currency into dollars. By augmenting or creating claims on foreign reserves, capital inflows can accelerate or delay date T since as Obstfeld and Rogoff (1999) show under perfect foresight the date of collapse is,

$$T = \frac{e_f - R_0 - \alpha\mu}{\mu} \tag{10}$$

Where as before μ is the rate of money growth and α is the semi-elasticity of demand for money in the Cagan model,

$$m^d(\pi^e) = \exp(-\alpha \pi^e). \quad (11)$$

Figure 2: Short vs.Long Term Capital Flows and Inflation



Generation 1: Krugman (1979) Speculative Attack Model
Generation 3: Chang and Velasco (1999) Liquidity Crisis Model driven by ST Bank to Bank lending

As shown in figure 2, long-term capital inflows augment reserves and delay date T to T_{LT} as reserves increase due to capital inflows. However. As emphasized in 3rd generation models, short-term liabilities (bank to bank credit lines for example) are viewed as claims on reserves--so investors anticipate a potential liquidity crisis as in Korea 1998. The date of collapse T moves closer to T_{ST} raising the average rate of inflation observed over any 5 years period.

The preceding classical speculative attack model emphasizes the collapse of fixed exchange rates. With the continue increasing fiscal deficit finances by the central bank, even if the government can borrow from the international market to increase foreign exchange reserves, as long as markets regard it as solvent, the speculative attack may be inevitable. Why the speculative attack has to be inevitable? Well, the model's important prediction is that the exchange rate will have to be abandoned before the central bank has completely exhausted its reserves through debt monetization.

In fact, from empirical perspective, according to Obstdeld and Rogoff (1995c) virtually all of the countries forced off fixed exchange rates by speculative attacks during the 1990s had the means to defend their exchange rates and had enough reserves and gold to buy back at least 80 to 90 percent of their monetary bases, if they had been so inclined. For some countries, the ratio of total reserves to base was well en excess of 100 percent. Then, the question is why OECD countries whose fixed exchange rates were broken by speculators in the early 1990s did not defend their currency until the point to avoid the collapse? This question is answered by Obstfeld and Rogoff(1996). According

to them is that most of this intervention was sterilized. The Bank of England, for example, reportedly engaged in over $70 billion in intervention within a few hours during the September 1992 attack on the pound, largely using forward markets. It suffered a substantial capital loss in these contracts after it ultimately decided to let the pound float.

3.6 Model 3: Inflation and Capital Flows in a Barro-Gordon Framework

The modern approach to the option to central banks with the option to float derives from Barro (1983) rules versus discretion framework. If government maximizes seigniorage subject to private sector expectations and the costs of inflation, which now include reduced access to private capital. Higher inflation leads to an appreciation of the exchange rates thereby raising expectations of devaluation and the risk premium—slower capital inflows reduce economic growth. In this model inflation falls because the central bank/treasury reduce budget deficits and monetary emissions (seigniorage) as access to capital flows increases the dead weight losses from inflation.

Following Agenor and Montiel (1996) version of Barro (1983) suppose that the Central Bank/Treasury objective function takes the form

$$L = \lambda \mu m^{d} (\pi e) - \exp (k_1 \pi + k_2 \pi^{e}), \qquad (12)$$

where μ denotes the rate of growth of the nominal money stock, π the actual rate of inflation , π^{e} the expected rate of inflation , m^{d} (.) money demand, and

μm^d (.) revenue from money creation – that is, seigniorage, and($k_1 \pi + k_2 \pi^e$) represent the costs of the actual rate of inflation. Given the Cagan money demand function equation (11) above, the seigniorage revenue is maximized at $\pi = \frac{1}{\alpha}$.

In equilibrium, $\mu = \pi = \pi_e$, so that the solution is

$$\mu^D = \pi^D = (\alpha + k_1 + k_2)^{-1} \ln(\lambda/k_1) > 0. \qquad (13)$$

The rates of inflation and monetary growth can therefore be higher than the seigniorage – maximizing rate $(1/\alpha)$ if (λ/k_1) is large enough. The government's decision problem becomes

$$\text{Max}_{\mu} L = \lambda\mu\, m^d(\mu) - \exp[(k_1 + k_2)\mu], \qquad (14)$$

subject to equation (11). The solution yields, using the approximation ln $(1-\alpha\mu) \cong -\mu\alpha$ for $\mu\alpha$ small enough,

$$\mu^R = \pi^R (2\alpha + k_1 + k_2)^{-1} \ln[\lambda/(k_1 + k_2)], \qquad (15)$$

which can be less than the inflation rate and the rate of monetary expansion are higher under discretion than under rules.

As shown in figure3, the costs of inflation hold the loss minimizing rate of inflation below the maximum rate. Opening the capital market raises α lowering the optimal rate of inflation. The disciplined (optimizing) central bank moves from A to B. However, the undisciplined government raises the inflation tax to obtain the same 3% of GDP seigniorage revenue, moving from C to B.

Figure 3: Inflation and Capital Mobility

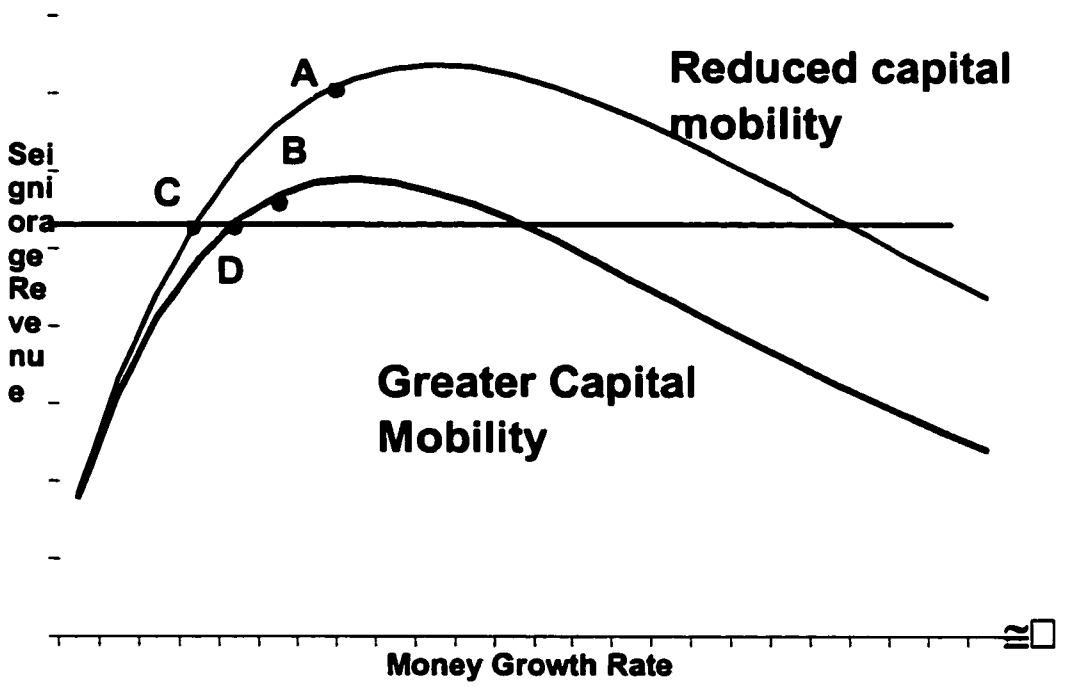


Figure 3: Inflation and gross capital flows: monetary-fiscal discipline model. Monetary discipline: move from A to B as greater capital mobility (inflows and outflows) increases elasticity of money demand resulting is lower optimal inflation and seigniorage.

Lack if discipline: move from C to D. The need for a fixed amount of fixed amount of fiscal revenue results in higher inflation-fiscal deficit results in too high an inflation tax.

3.7 Model 4: Inflation and Short-term Capital Flows in a Chang-Velasco Framework.

The following scenario described by Chang and Velasco shows the new theoretical set up of this model: Imagine a small open economy populated by ex ente identical agents, with three periods of interest: a planning period (t = 0), a short run (t = 1), and a long run (t = 2). There is a composite consumption of goods whose price in the world market is fixed over time and normalized to one "dollar". Each domestic agent has an endowment ($n \succ 0$) of consumption in the planning period. However, she only consumes in the other two periods, and for simplicity we assume that she is indifferent about whether she consumes in the short run or the long run. To provide for future consumption, domestic residents have access to two kinds of assets. First, they can invest in the world market, where the net interest rate is fixed at zero. Domestic residents can also borrow in the world market, but subject to a debt limit denoted by ($d \succ 0$). Second, domestic agents have access to a technology whose yields ($g \succ 1$) units of consumption in the long run, but only ($\delta \prec 1$) if liquidated in the short run.

We will assume that, because of indivisibilities or other reasons not explicitly modeled here, domestic agents cannot exploit the long-term technology if acting individually, but they can if they act collectively. As a

consequence, domestic agents will come from coalitions or banks, which will be assumed to offer demand deposits. A demand deposit is a contract by which a depositor surrenders to the bank her endowment e and her capacity to borrow (d). In exchange, she gets the right to withdraw either her initial deposit (n dollars) in the short run, or a larger amount, say (j)dollars, in the long run. In turn, each uses the deposits and the borrowing capacity thus obtained to invest in either the world asset or the long run asset, in order to service withdrawals and maximize profits. We shall assume that any bank must hold at least ($b \succ 0$) dollars per depositor in liquid form (that is, in the world asset). This may be due to the existence of reserve requirements; alternatively, (b) may represent the foreign reserves of the central bank, if we are considering the consolidated banking system.

If banks are competitive, profits will be driven to zero and demand deposits will be designed so as to maximize the utility of the representative depositor. It is not hard to see that this implies at least three conditions:

First, the bank's initial investment in the world asset will be as low as possible: since depositors are indifferent about short run and long run consumption in, are better served by investing in the long run, higher yield asset. So the (per depositor) initial investment in the world asset will be exactly (b).

Second, the typical bank will borrow all it can in the world market. This is because the world cost of credit is zero, while the bank can obtain a positive yield (equal to Ψ-1) on the long run investment. Hence the bank will borrow (d) (per depositor) in the world market in the planning period. Since each domestic

agent will deposit her endowment (n) in the banking system and the bank invests (b) dollars per depositor in the world asset, the investment in the long run asset will be h = n + d-b per depositor.

Third, since profits are zero, the bank will distribute all of its value to depositors in the long run. Hence (j) will equal the bank's resources after repaying its foreign debt, which are given by $\Psi h + b - d$.

Given the above expressions for (j) and (h), it follows that $j = \Psi n + (\Psi - 1)(d-b)$. Since $\Psi \succ 1$, $j \succ n$ if (b) is not too large. An implication is that domestic residents will find it more advantageous to join a bank than to act in isolation. More importantly, a banking system may emerge in this economy as a socially desirable mechanism. The typical bank will offer demand deposits, borrow in the world market, and allocate investment in order to maximize profits; in so doing, the banking system will improve social welfare.

This analysis is subject to one caveat, however. The caveat is that we have implicitly assumed that the holders of the bank's liabilities, domestic depositors and foreign creditors all remain confident in the bank. This assumption ensures that depositors do not attempt to withdraw their deposit in the short run, and that (assuming that the initial external debt is only for one period) foreign creditors roll over their initial credit d in the short run. By construction, the bank will be able to honor all its commitments if confidence is maintained. But what happens if confidence is lost? In that case, a crisis may happen and the bank may fail.

To see this, suppose that the initial credit (d) contracted in the planning period is a short term credit that needs to be renewed at t = 1. Suppose, further, both domestic depositors and foreign creditors "panic" and believe that the bank will fail. In that case, all depositors will attempt to withdraw (n) and foreign creditors demand repayment of the credit (d). What resources can the bank use to meet these demands? In the planning period, the bank had allocated (b) to liquid assets, and h = n + d-b to the illiquid asset. But if $b \prec n + d$, the value of the world investment will not be sufficient to meet the demands of depositors and foreign creditors. This means that the bank will have to liquidate some of the long-term asset, which is costly. In fact, even this will not prevent the bank's failure if $n + d \succ + \delta h$, that is, if the bank's potential short run obligations (given by the RHS) exceed the resources it can have access to in the short run (given by the LHS). The inequality just stated is crucial and corresponds to what we have called international illiquidity.

Several points are worth noting:

Banks may perform a useful social function even if liquid. In this simple model, feasible consumption by the representative depositor rises if $j \succ n$. It is easy to check that this requires that $b \prec d + n$, which is intuitive: if banks reserve too heavily, then they forego the opportunity to invest in the productive long-term asset. On the other hand, illiquidity requires $n + d \succ b + \delta h$. Hence, we can have

$b \prec n + d \prec b + \delta h$, and enjoy banks that are both welfare-enhancing and invulnerable to confidence crises. Note that this best of all possible worlds is

even more readily achievable if agents are risk averse (as in the original Diamond-Dybvig model), so that banks also raise welfare by permitting risk-pooling.

If the final system is illiquid, a crisis may occur when it could have been prevented: as we have seen, the demand deposit system would have been successful if depositors had not tried to withdraw their deposits and foreign creditors had rolled over their loans. Second, the cost of a crisis may be very large: in the event of a crisis, the economy's wealth shrinks to $b + \delta h = b + \delta (n + d) = (1-\delta)b + \delta(n+d)$, which can be much smaller than the initial investment $n + d$ if b and (δ) are small.

In general, a crisis may be due to a loss of confidence by domestic depositors, foreign creditors, or both. If $b + \delta h \prec n$, a domestic depositors' panic is enough to cause a crisis. But it is possible that $n \prec b + \delta h \prec n + d$. In such a case, a crisis can only occur if both depositors and foreign lenders panic. If a crisis then occurs, foreign creditors pull out of the country because they fear a domestic bank run, which itself occurs, because domestic depositors know that foreign loans will not be renewed.

The key definition of international illiquid depends on the maturity characteristics of assets and liabilities. So far we have implicitly assumed that loans (d) are short term, in the sense that they have to be rolled over in period 1. Suppose, by contract, that the banking system has the option to borrow (d) in the

planning period as a long-term loan. In that case, in the short run only domestic depositors can demand repayment of their claims on banks. The international illiquidity condition is now that $n \succ b + \delta h$; while this means that a crisis may still be possible, this condition is less likely to be satisfied than in the previous case of only short term foreign debt (for more details see figure #2 above). An immediate implication is that crises may become more likely if the average maturity of foreign debt become shorter.

3.8 Model 5: Productivity Shock

This model, follow Blanchard (1997), was modified to serve our purpose. In this model capital flows lead to accelerate growth, rising creditworthiness and falling inflation for the same government budget deficit. Under this scenario falling inflation is likely to be associated with rapid output and export growth and a steady appreciation of the real exchange rate—i.e., the Samuelson Balassa effect. Starting again with the government budget constraint

$$CF_t + M_t = (\theta_t - Z_t(\pi_t)) + (1+r_t)\, CF_{t-1}, \qquad (16)$$

where CF_t is the level of capital inflows, M_t is the level of money supply , θ_t is the primary deficit, Z_t is the level of seigniorage, r_t is the real interest rate and CF_{t-1} is the previous debt.

We denote the growth rate of output by g, so that $(\frac{Y_{t-1}}{Y_t})$ can be written as $(\frac{1}{1+g})$. And use an approximation $(\frac{1+r}{1+g}) = (1+r-g)$, and divide equation (15) by real output (y) , then, we have

$$(\frac{CF_t}{Y_t} - \frac{CF_{t-1}}{Y_{t-1}}) = (\frac{\theta_t - z_t}{Y_t}) + (r-g)\frac{CF_{t-1}}{Y_{t-1}}, \qquad (17)$$

dropping Y_t and Y_{T-1} solving for Z_t, assuming that $Z_t = \phi(\pi)$, then, take differentiation of:

$$\Delta F = (\theta_t - Z_t) + (r-g)F_{t-1}, \qquad (18)$$

$$\Delta F = [\theta t - Z_t(\pi)] + (r-g)F_{t-1}, \qquad (19)$$

$$Z_t(\pi) = \theta_t + (r-g)F_{t-1} - \Delta F, \qquad (20)$$

$$\pi = Z[\theta_t + (r-g)F_{t-1} - \Delta F] \qquad (21)$$

$$\frac{dZ}{d\pi} = [\theta_t + (r-g)F_{t-1} - \Delta F], \qquad (22)$$

$$\text{for } \pi \prec \pi^*, \text{ then } Z'[\theta_t + (r-g)F_{t-1} - \Delta F] \succ 0, \qquad (23)$$

$$\text{for } \pi \succ \pi^*, \text{ then } Z'[\theta_t + (r-g)F_{t-1} - \Delta F] \prec 0, \tag{24}$$

Figure # 4 Seigniorage and Money Growth

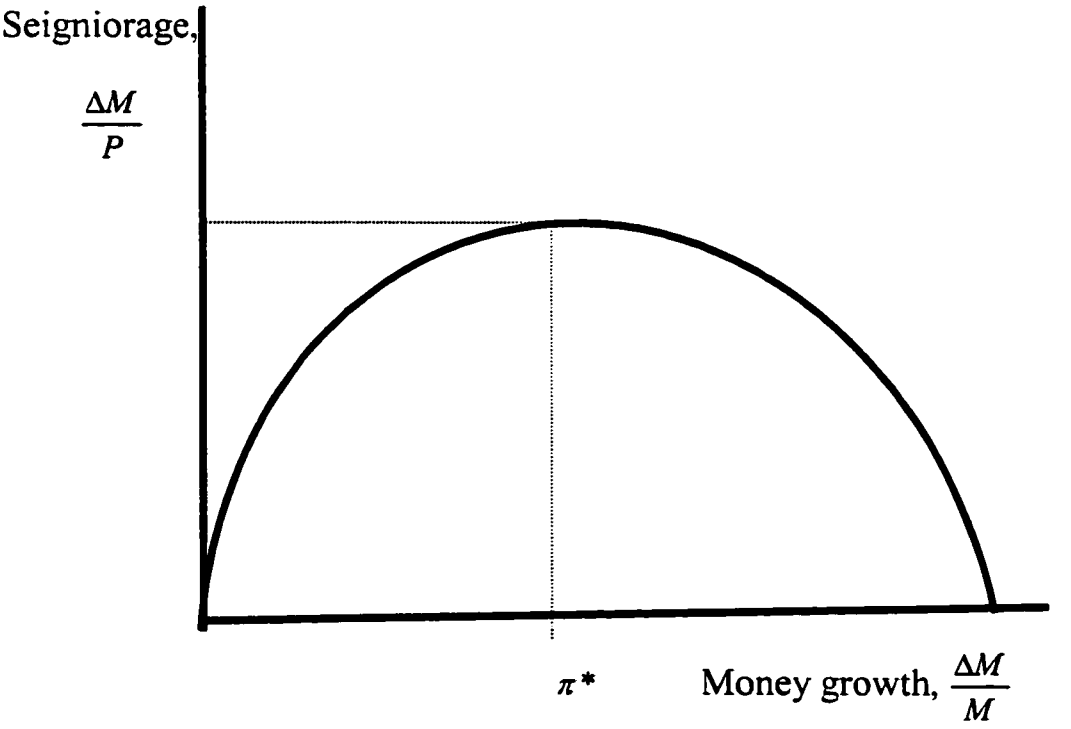


Figure # 4 shows the relationship between seigniorage and money growth that is hump-shaped. It means that a low rate of money growth leads to a small reduction in real money balances. Thus, it leads to an increase in seigniorage. When money growth (and therefore inflation) becomes very high, however, the reduction in real money balances induced by higher money growth becomes

larger and larger. Eventually, there is a rate of money growth-shown by point π^* in figure # 4- beyond which further increases in money growth actually decrease seigniorage.

As can be noted on figure 4, the relationship between seigniorage (Z) and the rate of inflation (π) is not a monotonic function. Therefore, we must consider the downward and upward sloping segments of the curve as representing two separate functions, each with a restricted domain.

There are two cases: first, when the actual rate of inflation (π) is less than the optimal level of inflation (π^*), $\pi < \pi^*$. And second when the actual rate of inflation greater than the optimal rate of inflation, that is $\pi > \pi^*$.

From equation (21) we determine mathematically the effects of capital flows on the rate of inflation, and then we show the effects graphically in figure # 5.

$$\pi_t = Z_t^{-1}[\theta t + (r-g)F_{t-1} - \Delta F], \tag{25}$$

$$\frac{d\pi}{d\Delta F} = Z_t^{-1}[\theta_t + (r-g)F_{t-1} - \Delta F]^{-1}, \tag{26}$$

$$\frac{d\pi}{d\Delta F} = \frac{-1}{Z'[\theta_t + (r-g)F_{t-1} - \Delta F]}, \tag{27}$$

$$\frac{d\pi}{d\Delta F} \prec 0 \text{ for } \pi \prec \pi^* \text{ and } \frac{d\pi}{d\Delta F} \succ 0 \text{ for } \pi \succ \pi^* \tag{28}$$

Figure # 5 Inflation and Capital Flows

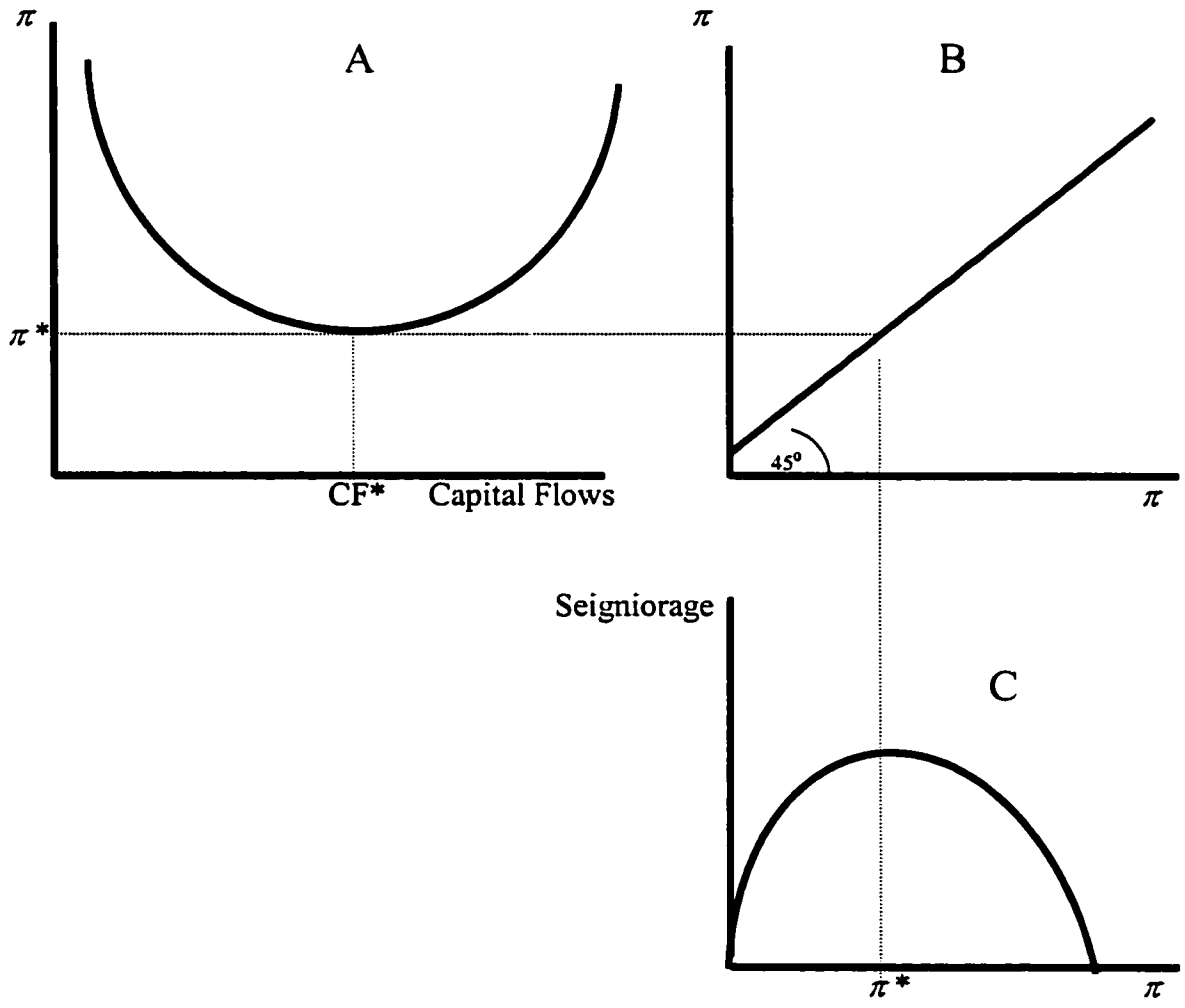


Diagram A in figure # 5 shows that as capital inflow increases the rate of inflation decreases in such a way that when inflation reaches its minimum level coincides with the optimal level of capital inflows (CF*). Eventually, any

Capital inflows beyond that level (CF*) will be inflationary. At the same time diagram C, connected through diagram B, shows that the optimal level of inflation (π*) coincides with the optimal level of capital inflows (CF*).

We know that

$$g = \varphi\left[FDI, PE, \frac{Ep^*}{P}, \frac{Q_t}{L}\right] \tag{29}$$

where FDI is foreign direct investment, PE is portfolio equity, Ep*/P is the nominal exchange rate and Q t/L is the labor productivity.

3.9 Deficits, Seignorage and Inflation

Here, we describe how the relationship between budget deficit and the desire of the government to get seignorage could lead to high inflation and sometimes to hyperinflation. Given the following equation:

$$S = \frac{\Delta M}{P} = \frac{\Delta M}{M} \cdot \left(\frac{M}{P}\right), \tag{30}$$

where S is the government seignorage revenue, $\frac{\Delta M}{P}$ is the change in the money supply divided by the price level, $\frac{\Delta M}{M}$ is the rate of change of the money supply, and $\left(\frac{M}{P}\right)$ represent real money balances.

Seignorage can be expressed as a ratio of real income as in the following equation:

$$S = \frac{\Delta M / P}{Y} = \frac{\Delta M / M}{Y} \cdot (\frac{\Delta M / P}{Y}), \quad (31)$$

where $\frac{\Delta M / P}{Y}$ is the ratio of seignorage to real income, $\frac{\Delta M / M}{Y}$ is the ratio of the rate of change of money supply to real income, and $\frac{M / P}{Y}$ is the real money balances as a ratio of real income.

By defining the demand for real money balances as a function of income and the nominal interest rate, we obtain the following equation:

$$\frac{M}{P} = YL(i), \quad (32)$$

where $\frac{M}{P}$ is the real money balances, Y is income, and (i) is nominal interest rate. Substituting the nominal interest rate by its equivalent, which is the real interest rate plus the expected rate of inflation into the equation for the real money balances, we obtain:

$$\frac{M}{P} = YL\ (r + \pi^e), \quad (33)$$

where, again, $\frac{M}{P}$ is real money balances, Y is income, r is the real interest rate, and π^e is the expected rate of inflation.

Assuming constant money growth, seignorage can be calculated as:

$$S = \frac{\Delta M}{P} = \frac{\Delta M}{M} \cdot (\frac{M}{P}), \quad (34)$$

By replacing $\frac{M}{P}$ by its value in the above equation, we find that the real money balances depends negatively on expected rate of inflation,

$$S = \frac{\Delta M}{P} = \frac{\Delta M}{M}[YL(r + \pi^e)]. \quad (35)$$

If money growth is constant forever, and assuming that output growth equal zero, then inflation and expected inflation will eventually be constant as well, and we have:

$$\pi^e = \pi = \frac{\Delta M}{M}. \quad (36)$$

By replacing expected inflation (π^e) by ($\frac{\Delta M}{M}$), we find that as money growth increases, real money balances decrease.

$$S = \frac{\Delta M}{P} = \frac{\Delta M}{M}[YL(r + \frac{\Delta M}{M})]. \quad (37)$$

But, we know that the empirical relation between seignorage and money growth looks like the following equation:

$$S = \frac{\Delta M}{P} = \frac{\Delta M}{M} \cdot (\frac{M}{P}). \quad (38)$$

The relation between seigniorage and money growth is hump-shaped. At low rate of money growth, such as those observed in industrial countries, an increase in money growth leads to a small reduction in real money balances. Thus, it leads to an increase in seigniorage. When money growth (and therefore inflation) becomes very high, however, the reduction in real money balances induced by higher money growth becomes larger and larger. Eventually, there is a rate of money growth beyond which further increases in money growth actually decrease seigniorage.

In the short-run, an increase in the rate of money growth (ΔM/M) leads to little change in real money balances (M/P). But, over time, as prices adjust, real money balances decrease, and the government will find that the same rate of money growth yields less and less seignorage. Therefore, the government cannot finance a large deficit in the long run with a constant rate of money growth. Some time in the future, the government will have to continually increase the rate of money growth, (ΔM/M). This is why actual money growth exceeds the rate of growth of money eventually leads to hyperinflation (Cagan, 1956).

There is also another effect at work, as inflation becomes very high, the budget deficit typically becomes worse. Part of the reason has to do with the lags in tax collection. This is called the Tanzi-Olivera effect. As taxes are collected on past nominal income, their real value goes down with inflation.

3.10 Models of Capital Flows and Inflation Key Hypotheses

The major hypotheses of this study are to test a relations exist between the log of average inflation and the composition of capital flows, other variables as well as several economic policies.

These are the five main hypotheses that will be tested in this dissertation:

H1. TNT Model with fixed exchange rates: net capital flows are likely to be inflationary as they push up nontraded goods prices. Because international prices are fixed by the fixed exchange rate, net capital inflows are inflationary and are associated with an appreciation of the real exchange rate.

H1A. TNT Model with Flexible exchange rates: net capital flows may or may not be inflationary as they push up nontraded goods prices but the nominal fixed exchange rate can appreciate.

H2. Barro-Gordon, Romer style credibility models: gross capital flows, particularly in economies open to capital flows increase the elasticity of money demand: this reduces the seigniorage-maximizing rate of inflation. This effect should be strongest with short-term flows and gross flows in economies with open capital markets (no capital controls).

H3. Chang & Velasco Generation 3 currency crisis model—short-term capital flows are more likely to lead to crises and fixed exchange rate make countries more vulnerable.

H4. Long term productivity or Supply-side models: gross FDI and other long term capital flows raise productivity in traded and non traded goods sectors reducing inflation. If FDI favors the traded goods sector (favorable productivity shocks), leading to real exchange rate appreciation (Balassa-effect), which reduces inflationary pressures (rising wages in non-tradable sector can offset this effect to some extent).

H5. Pure Seigniorage Models: Closed capital markets reduce the elasticity of demand for money raising inflation rates—capital inflows are more likely to be inflationary in a fixed exchange regime countries with capital controls—inflation is likely to be associated with a real exchange rate appreciation.

3.11 Endogeneity of Capital Flows

The two-way interaction between capital flows and the rate of inflation creates an endogeneity problem that may lead to bias coefficient estimates when capital inflow is used as an explanatory variable. However, the direction of this bias is unclear. Suppose that the monetary authorities are running an expansionary policy under pure flexible exchange rates system. Because of the excess of money supply the exchange rates start to depreciate, central bank does not intervene under pure flexible rates system, and prices increase in the same proportion, according to purchasing power parity. Thus, depreciation raises the domestic currency price of the foreign goods which raises the domestic prices of domestically produced goods as well. The increase in inflation makes capital flows out immediately, at least short-term flows, which will bias the coefficient of capital flows in an inflation regression downward. (A restricted monetary policy will have the opposite result).

To correct for this problem, we use the Instrumental Variable technique to separate the flows that are related to exogenous factors. The idea is to find a set of variables that are both correlated with the explanatory variables, different types of capital flows, and uncorrelated with the disturbances. The set of variables that we use as instrumental variables are: world gross capital flows as a share of gross domestic product converted to international dollars using purchasing power parity rates; growth of income per capita as a share of a share of gross domestic product converted to international dollars using purchasing

power parity rates; and gross domestic product converted to international dollars using purchasing power parity rates.

3.12 Causality Test

One interesting question concerning model specification is whether one variable is causality related to another. To provide a basis for addressing this question, (Granger, 1969) introduced a concept of causality that has come to be known as "Granger" causality. The Granger approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. Y is said to be Granger-caused by x if x helps in the prediction of y, or equivalent if the coefficients on the lagged x's are statistically significant[1]. In that sense the log of average inflation is regressed on past and present values of different types of capital flows, as well as the different types of capital flows are also regressed on the past and current values of the log of average inflation. On one hand, if Granger-causality runs in both ways, then we have the econometric problem called endogeneity. On the other hand, if Granger-causality runs in only one way, from capital inflows to the log of average inflation, the set of coefficients of the future values of capital inflows should test insignificantly different from the zero vector (via a F test)[2], and the set of coefficients of the

[1] It is important to note two things: first, that two-way causation is frequently the case; x Granger causes y and y Granger causes x and second, that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term. See Introduction to the Theory and Practice of Econometrics, second edition by George G. Judge, R. Carter Hill, Willian E. Griffths, Helmut Luthepohl and Tsoung-Chao Lee.

[2] One application of F test is in testing for causality.

past value of capital inflows should test significantly different from zero[3]. To generate these empirical results we use the Wald test. However, because the nature of most of the economic data can be categorized as non-experimental, it is very difficult and often impossible to determine cause and effects relationships from the available data.

We run bivariate regressions of the following form for each type of capital flows:

1. $LP_{it} = \beta_0 + \beta_1 LP_{it-1} + \beta_2 FDI_{it-1} + \varepsilon_{it}$
2. $FDI_{it} = \beta_0 + \beta_1 FDI_{it-1} + \beta_2 LP_{it-1} + \mu_{it}$

3.13 Instrumental Variables Regression

A fundamental assumption of regression analysis is that the independent variables are uncorrelated with the disturbance term. If this assumption is violated the Ordinary Least Squares (OLS) and the Weighted Least Squares (WLS) are biased and inconsistent. There are two cases:

1. When they are endogenously determined variables as independent variables.
2. When independent variables are measured with errors.

In this section we are concerned with the first problem, thus we must use Instrumental Variables Regression. The idea is to find a set of variables, termed instruments that are both: (i) correlated with the explanatory variables in the equation and (ii) uncorrelated with the disturbances. These instruments are used

[3] Before running this regression both data sets are transformed, so as to eliminate any autocorrelation in the error attached to this regression. This is required to permit use of the F test. Source: A guide to Econometrics, fourth edition by Peter Kennedy.

to eliminate the correlation between the explanatory variables and the disturbances.

Two-Stage Least Squares (2SLS) is a special case of instrumental variables regression. There are two stages in this regression. In the first stage it finds the portions of the endogenous and exogenous variables that can be attributed to the instruments. This stage involves estimating an OLS regression of the original equation in the model on the sets of instruments. The second step is a regression of the original equation with all of the variables replaced by the fitted values from the first-stage regressions.

Chapter 4

Empirical Results and Regression Analysis

This chapter presents empirical evidence on how the magnitude and types of capital flows affect the rate of inflation, given certain related policies and institutional arrangement. We also look at the combination of different types of capital flows times some key policies such as fixed or flexible exchange rates, closed capital account, the degree of openness of capital accounts and the level of indebtedness as these factors jointly affect inflation rates, as well as a brief account of the two most salient economic events in the 1990s, in developing countries, that impact capital flows: first, market-oriented reform and second, the composition of capital flows, as well as the benefit and cost of capital inflows.

4.1 Capital Flows in 1990s.

Two of the most important features of the new reality in 1990s have been the significant change in the composition of capital flows and the introduction of market-oriented reforms in developing countries. While capital flows initiated the movement, market-oriented reforms paved and smoothed the roads, increasing the attractiveness of emerging countries to international investors.

The capital flow boom is similar to earlier episodes in terms of its size and its close relationship with rapid growth and technological progress. But it is strikingly different in the variety of financial instruments used and the variety of

recipients in the increasing importance of equity between creditor and debtor countries.

A series of technological advances that have improved communications and the processing of information contributed in the 1990s to a rise in portfolio equity, bonds and foreign direct investment flows, compared with earlier episodes. Technological innovation, coupled with the spread of education and increasing cultural ties between developing and industrial countries, has increased the range and composition of participants among emerging market countries in recent cross-border capital flows. Moreover, the growing importance of the private sector in many developing economies has increased the share of total capital flows that go to private borrowers.

By 1990 the vast majority of the countries had initiated market-oriented reforms. Although program varied across countries, they exhibited three common components: First, the implementation of stabilization programs aimed at reducing inflation and generating a sustainable current account balance. In most countries fiscal retrenchment, including major tax reform, were at the core of these programs, while secondarily opening up of these economies to international competition. While every country reduced its trade barriers substantially, the approach toward capital account liberalization was quite diverse. In some countries capital controls were abolished and in others, some form of capital controls, especially in capital inflows was maintained. Thirdly, major privatization and deregulation programs aimed at reducing the importance of the state in economic affairs. As the reforms proceeded, many countries

implemented social programs targeted to the poor as a fourth component of the new development strategy.

4.2 Types of Capital Flows

The composition of private capital flows vary in different eras/ Whereas bonds had dominated the gold standard period, and syndicated bank lending the 1970s, the technological changes outlined above have made equity flows (direct and portfolio) the dominant form of long-term private capital flows to developing countries in the 1990s.

Forms of equity have changed considerably in developing countries, with portfolio equity flows being negative in the 70s and negligible in the 80s. In the 1990s together with foreign direct investment it became the most important source of capital flows in developing countries, but specially in Asia and Latin America (Eduards 1995A).

Foreign direct investment (FDI) has become by far the largest and most resilient source of flows and has diversified from being primarily directed at natural resources development into manufacturing, financing, and non-financial services. According to Hernandez et al (2001) today, a high proportion of current FDI flows to developing countries can be characterized as efficiency-seeking investments, associated with the globalization of production. Initially directed toward basic manufacturing, these flows are now increasingly going into high–value added and skill-intensive manufacturing sectors. Developing countries are also increasingly seeing FDI in services Opportunities for

investments in services and infrastructure have expanded significantly as a result of the stronger economic growth and investment deregulation in developing countries.

It has been said that FDI has responded more vigorously than all other capital flows because its driving factor has been the sustained improvement in domestic economic fundamentals. However, for portfolio flows, institutional investors have been the driving force behind the surge, especially in portfolio equity.

4.3 Some Benefits and Costs of Capital Flows

Capital flows among countries can yield significant benefits. They allow investors to diversify their risks and increased returns, and permit residents of recipient countries to finance rapid rates of investment and economic growth. They also increase consumption. For instances, generally industrial countries have a population that have a greater longevity than the population of most of developing countries. Therefore, it makes sense for those in industrial countries to purchase and invest more in developing countries than developing countries to sell or invest in industrial countries. This would allow industrial country residents to save for retirement by building up on future income in the developing countries while permitting residents of developing countries to borrow at lower interest rates than they could otherwise pay. Romer (1993) and Gruden & Mcleod (2000) present this argument in an opposite way by examining the lack of trade in a closed economy, which result in a higher

interest rates. Also, a closely related concept is that capital flows permit countries to avoid large falls in national consumption from economic downturns or natural disasters by selling assets to and/or borrowing from the rest of the world, for example, Germany and Japan after World War II. Also, capital flows permit a country to borrow in the present in order to improve their ability to produce goods and services in the future, such as individuals borrowing to finance an education. As an example, South Korea, between 1960 and 1980 borrowed funds from the rest of the world equal to about 4.3 percent of gross domestic (GDP) annually to finance investment during Korea's period of very strong growth. Chile also received about six to nine percent of GDP during the 1990s.

Another benefit from capital flows which has been recently emphasized by economists is technological transfer that often accompanies Foreign Direct Investment or the great competition in domestic markets that results from permitting foreign firms to invest locally (Eichengreen, et al, 1999). However, sudden shifts in capital flows can be devastating for recipient countries. For example Brazil's crisis in 1991, the collapse of the financial system in Mexico in December of 1994, the financial currency crises observed in East Asia in the summer of 1997, and Russia's crisis in 1998 are all partly attributable to a common denominator--the abrupt reversal of capital flows.

4.4 Regression Analysis of the Panel Data

The first set of regressions includes a) the degree of openness of trade and location dummies to account for regional effects; b) political instability and an index of bank dependence, and c) two interaction variables made up of the last two variables and the degree of openness as measured by the total share of trade in GDP as in Romer (1993). The second set of regressions focuses on gross foreign direct investment and gross other flows, net foreign direct investment and net other flows, as well as Short-term flows and Long-term flows. The third, fourth and fifth sets of regressions examine the impact of three policy variables: a) the exchange rate regimes, b) the degree of financial openness of the economy and c) the degree of financial restrictions.

4.5 Empirical Results and Interpretation

The results reported in tables 1 through 4 similar to that of Romer (1993), in which he found that over a large sample of countries over a broad time frame, there is a quantitatively large and statistically significant negative relationship between openness and inflation in developing countries. He also reported a negative relationship in industrial countries, but its t-value was not statistically significant.

Table 1: Inflation and Openness

Dependent Variable: The log of Average Inflation

Method: GLS (Cross Section Weights) and Pooled Least Squares (PLS)

Sample: five year average 1971 – 2000.

Cross Sections without Valid Observations Dropped

	GLS-Full sample				**PLS – Full Sample**			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Constant	2.7 *(53.2)*	2.82 *(53.5)*	4.32 *(19.9)*	4.60 *(17.9)*	2.79 *(34.7)*	3.0 *(35.2)*	4.2 *(10.5)*	4.6 *(10.0)*
Openness to trade	-0.01 *(-8.5)*	-0.01 *(-9.1)*	-0.01 *(-7.5)*	-0.01 *(-5.8)*	-0.01 *(-6.5)*	-0.01 *(-7.4)*	-0.01 *(-6.2)*	-0.01 *(-4.5)*
OECD		-0.70 *(-11.1)*	0.34 *(-4.7)*	-0.09 *(-1.1)*		-0.7 *(-7.1)*	-0.44 *(-3.2)*	-0.09 *(-0.6)*
Petroleum exporter countries		0.03 *(0.4)*	0.10 *(1.3)*	0.11 *(1.5)*		0.09 *(-0.7)*	0.05 *(0.3)*	0.02 *(0.2)*
The log of income per capita			-0.21 *(-7.4)*	-0.27 *(-8.8)*			-0.16 *(-3.0)*	-0.26 *(-4.5)*
Latin America & Caribbean				0.72 (8.3)				0.80 (5.5)
Asia				*-0.24 (-2.7)*				*-0.27 (-1.6)*
Africa				*0.05 (0.7)*				*0.03 (0.2)*
Total Panel Observations	589	589	548	545	589	589	548	545
Adjusted R^2	.79	.78	.83	.80	.07	.14	.15	.24
S. E. Of Regression	1.1	1.0	1.0	.97	1.1	1.1	1.0	.98
F- Statistic	2261	721	682	312	42	33	25	25

Note: t-statistic in parentheses.

Table 2: Inflation and Openness

Dependent Variable: The log of Average Inflation.

Method: GLS (Cross Section Weights) And Pooled Least Squares (PLS)

Sample: five year averages 1971 – 2000.

Cross Sections without Valid Observations Dropped

	GLS—Full Sample					
	Political Instability					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	4.97	4.5	4.5	4.97	3.5	3.3
	(26.6)	*(22.0)*	*(22.3)*	*(26.6)*	*(9.6)*	*(8.5)*
Openness to trade	-0.01	-0.01	-0.01	-0.01	-1.01	-0.01
	(-7.2)	*(-5.8)*	*(-4.3)*	*(-7.2)*	*(-10.8)*	*(-1.9)*
The log of Income per Capita	*-0.3*	*-0.31*	-0.31	*-0.30*	-0.20	-0.21
	(-13.2)	*(-11.0)*	*(-11.4)*	*(-13.2)*	*(-5.3)*	*(-5.4)*
Revolutions and coups		*0.6*	1.8			
		(3.8)	*(5.5)*			
Rev. and coups times openness			-0.10			
			(-4.7)			
Index of central Bank dependence					6.3	7.4
					(9.9)	*(8.6)*
Central bank dep. times openness						-0.03
						(-2.3)
Total Panel Observations	548	540	546	548	333	333
Adjusted R^2 **	.79	.68	.76	.79	.73	.71
S. E. Of Regression	1.0	1.0	1.0	1.0	1.0	1.0
F- Statistic	1050	387	453	1050	296	202

Note: t-statistic in parentheses.

** In GLS, R square under unweighted Statistics (no reported) is always equal to R square under PLS.

Table 3: Inflation and Openness

Dependent Variable: The log of Average Inflation.

Method: GLS (Cross Section Weights) And Pooled Least Squares (PLS)

Sample: five year averages 1971-2000.

Cross Sections without Valid Observations Dropped

	PLS-- Full Sample					
	Central bank dependence					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.0 *(15.3)*	4.2 *(11.6)*	4.3 *(12.0)*	5.0 *(15.3)*	2.9 *(5.4)*	2.7 *(4.8)*
Openness to trade	-0.01 *(-5.7)*	-0.01 *(-4.5)*	-0.01 *(-2.7)*	-0.01 *(-5.7)*	-0.01 *(-6.0)*	-0.00 *(-0.3)*
The log of Income per Capita	*-0.27* *(-6.8)*	*-0.22* *(-5.1)*	-0.23 *(-5.5)*	-0.27 *(-6.8)*	-0.15 *(-2.6)*	-0.16 *(-2.8)*
Revolutions and coups		*0.83* *(3.7)*	2.5 *(6.0)*			
Rev. and coups times openness			-0.07 *(-4.7)*			
Index of central Bank dependence					7.8 *(9.4)*	9.7 *(8.5)*
Central bank dep. times openness						-0.06 *(-2.3)*
Total Panel Observations	548	546	546	548	333	333
Adjusted R^2 **	.14	.16	.18	.14	.35	.36
S. E. Of Regression	1.0	1.0	1.0	1.0	1.1	1.1
F- Statistic	45	34	32	45	61	48

Note: t-statistic in parentheses.
** In GLS, R square under unweighted Statistics (no reported) is always equal to R square under PLS.

Table 4: Inflation and Openness.

Dependent Variable: The Log of Average Inflation.

Method: GLS (Cross Section Weights)

Sample: five year averages 1971-2000.

Cross Sections without Valid Observations Dropped

	Sample: LDCS					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	3.02 *(49.3)*	3.44 *(12.7)*	2.38 *(8.6)*	2.17 *(7.9)*	1.70 *(4.1)*	1.27 *(2.4)*
Openness to trade	-0.02 *(-9.6)*	-0.012 *(-7.3)*	-0.013 *(-7.3)*	-0.01 *(-2.8)*	-0.02 *(-9.0)*	0.003 *(0.2)*
The log of income per capita		-0.10 *(-2.6)*	0.06 *(1.8)*	0.06 *(1.7)*	-0.006 *(-0.1)*	-0.024 *(-0.5)*
LAT &Caribbean		0.51 (5.8)				
Asia		*-0.40* *(-4.3)*				
Africa		*0.06* *(0.8)*				
Revolutions and coups			0.44 (2.7)	*2.19* *(6.3)*		
Rev.and coups*openness				*-0.06* *(-55)*		
Index of central bank dependence					9.1 (6.6)	12.2 (4.8)
Index of central dep. * openness						*-0.14* *(-1.6)*
Total Panel Observations	422	389	392	392	187	187

Note: t-statistic in parentheses.

Even though we confirm his first findings in developing countries, we find that using GLS techniques or Pool Least Squares with fixed effects, the groups of industrial countries have the expected negative sign and its t-value is statistically significant. We also confirm his findings that political instability and central bank dependence are strongly and positively associated with the log of average inflation. Moreover, our results also show that using samples by regions such as Latin America, Asia and Africa, the political instability variable is positively related with the log of average inflation only in Africa.

We might mention three reasons for the difference in our findings: First, our data cover a larger period of time (1971-2000); second, we use panel data techniques, which is more effective than cross-section techniques; and third, the data of openness for industrial countries showed an increase of 22 percent in the average degree of openness between 1993 and 2000.

4.6 Total Gross and Total Net Capital Flows

As the empirical results in tables 5 through 8 suggest, the total gross flow is likely to be subject to a greater degree of volatility than the total net flow. This does not necessarily indicate that gross flow will be detrimental in all cases. But it may imply that this is an additional source of volatility. However, it may suggest that countries with a high level of this flow must maintain a good fundamental by implementing sound economic policies. In contrast, under a different scenario, gross flow consistently reduces inflation while net flow is inflationary, primarily because it is associated with an appreciation of the real exchange rate that is undoubtedly inflationary.

The first regression shows that total net and gross capital flows are negatively related with the rate of inflation, but neither flow is significant at the conventional levels. In addition net flow is negatively associated with the real exchange rate (an appreciation) that is inflationary, while gross flow is positively related with the real exchange rate (a depreciation). That is to say, it reduces inflation. Thus, gross flow has the tendency to be deflationary while net flow tends to be inflationary.

The second regression presents a scenario in which we have an open economy and the fixed exchange rate regime is used as a control variable. In this situation, net capital flow is inflationary, but it is not statistically significant in countries that have a fixed exchange rate regimes. However, it reduces inflation in countries that have flexible exchange rate regimes. At the same time net flows appreciate the real exchange rate (inflationary) in countries that have either fixed or flexible exchange rate regimes. This confirms our prediction from the TNT model that although total net flow increases inflation in countries with fixed exchange rates, it may reduce inflation with flexible exchange rate regimes and appreciates the real exchange rates in both regimes. Nevertheless, The impact of gross capital flow on the rate of inflation is to decrease it with both regimes, but the impact of gross capital flow, in countries with flexible exchange rate regimes, is stronger than in those with fixed regimes. At the same time, gross flow depreciates the real exchange rate (reduces inflation) in countries with both exchange rate regimes. These findings are consistent with monetary discipline hypothesis of Barro (1983) and Romer (1993).

In the third regression we propose an assumption of a fixed exchange rate regime so that both flows become deflationary only in countries that have fixed exchange rate regimes. Therefore, only gross flow is significant at the conventionally accepted level. Moreover, net flow appreciates the real exchange rate (inflationary) while gross flow depreciates the real exchange rate (reduces inflation), and both are statistically significant.

In the fourth equation, we resume the fixed exchange rate regime and also keep the open capital market as a premise. In this scenario, both flows reduce inflation in countries with open capital markets; however, the impact of gross flow is stronger. Both capital flows raise inflation in countries with closed capital markets, but once again gross flow shows a stronger effect. Net flow appreciates the real exchange rate (inflationary) in countries with open and closed capital markets, while gross flow appreciates the real exchange rate (inflationary) in countries with open capital markets and depreciates the real exchange rate (reduce inflation) in countries with closed capital markets. Neither net nor gross flow is statistically significant, but the impact of net flow is stronger in a closed economy.

Table 5: Inflation and Total Gross Flows

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.1* *(6.6)*	*2.9* *(9.5)*	*2.6* *(9.5)*	*2.0* *(6.0)*
Openness to trade	-0.02 (-7.5)	-0.01 (-9.7)	*-0.02* *(-9.2)*	*-0.01* *(-7.8)*
The log of income per capita	0.15 (3.9)	0.08 (2.1)	0.07 (2.0)	0.21 (5.2)
Open capital market (0,1)	*-0.20* *(-2.7)*	*-0.31* *(-4.3)*	*-0.23* *(-3.7)*	*-0.30* *(-2.9)*
Capital flows	-0.01 (-1.3)			
Fixed exchange rate regime (0,1)	-0.16 (-2.6)	-0.36 (-4.3)		-0.42 (-5.6)
Flows into flexible rate regimes		-0.02 (-8.1)	0.00 (0.3)	
Flows into fixed rate regimes		-0.01 (-2.7)	-0.01 (-2.3)	
Flows into capital open market				-0.01 (-1 7)
Flows into capital closed market				0.01 (1.9)
Total Panel Observations	302	322	322	236
Adjusted R^2	.89	.92	.93	.94
S. E. Of Regression	1.0	1.0	1.0	1.0
F- Statistic	501	679	878	669

Note: t-statistic in parentheses

Table 6: Inflation and Total Net Flows

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.2*	*2.5*	*2.2*	*1.6*
	(6.8)	*(7.7)*	*(7.2)*	*(4.6)*
Openness to trade	-0.02	-0.02	*-0.01*	*-0.02*
	(-7.6)	(-8.0)	*(-7.9)*	*(-8.0)*
The log of income per capita	0.15	0.14	0.14	0.27
	(3.9)	(3.4)	(3.5)	(6.5)
Open capital market (0,1)	*-0.24*	*-0.29*	*-0.24*	*-0.36*
	(-3.3)	*(-3.7)*	*(-3.7)*	*(-3.0)*
Capital flows	-0.02			
	(-0.8)			
Fixed exchange rate regime (0,1)	-0.22	-0.43		-0.46
	(-3.5)	(-5.1)		(-6.2)
Flows into flexible rate regimes		-0.11	-0.02	
		(-3.0)	(-0.6)	
Flows into fixed rate regimes		0.01	-0.03	
		(0.3)	(-1.2)	
Flows into capital open market				-0.05
				(-0.8)
Flows into capital closed market				0.01
				(0.5)
Total Panel Observations	309	320	320	242
Adjusted R^2	.89	.88	.92	.92
S. E. Of Regression	1.0	1.0	1.0	1.0
F- Statistic	528	410	788	475

Note: t-statistic in parentheses

Table 7: Real Exchange Rate Impact of Changes in Total Net Flows

Dependent Variable: Real Exchange Rate, RER = ep*/p so a rise in RER presents a depreciation of the RER

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.03*	*0.3*	*0.03*	*0.05*
	(1.2)	*(1.1)*	*(1.5)*	*(2.3)*
Openness to trade	0.01	0.01	*0.01*	*-0.01*
	(1.1)	(1.3)	*(1.2)*	*(-1.5)*
The log of income per capita	-0.004	-0.003	-0.004	-0.06
	(-1.2)	(-1.1)	(-1.2)	(-2.2)
Open capital market (0,1)	*0.01*	*0.01*	*0.01*	*0.01*
	(1.2)	*(1.2)*	*(1.1)*	*(0.5)*
Total net capital flows	-0.004			
	(-2.9)			
Fixed exchange rate regime (0,1)	0.01	0.01		0.01
	(1.6)	(0.9)		(1.5)
Flows into flexible rate regimes		-0.01	-0.01	
		(-2.0)	(-3.2)	
Flows into fixed rate regimes		-0.01	-0.003	
		(-2.3)	(-2.2)	
Flows into capital open market				-0.002
				(-0.7)
Flows into capital closed market				-0.003
				(-1.8)
Total Panel Observations	309	309	309	241
Adjusted R^2	.05	.04	.05	.11
S. E. Of Regression	.06	.06	.07	.06
F- Statistic	4.0	3.1	4.0	6.1

Note: t-statistic in parentheses

Table 8: Real Exchange Rate Impact of Changes in Total Gross Flows

Dependent Variable: Real Exchange Rate, RER = ep*/p so a rise in RER presents a depreciation of the RER

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.05*	*0.05*	*0.07*	*0.05*
	(2.5)	*(2.3)*	*(3.4)*	*(2.6)*
Openness to trade	0.01	-0.01	*-0.01*	*-0.01*
	(0.0)	(-0.3)	*(-0.1)*	*(-1.4)*
The log of income per capita	-0.01	-0.01	-0.01	-0.01
	(-2.6)	(-2.7)	(-3.1)	(-2.6)
Open capital market (0,1)	*-0.01*	*-0.004*	*-0.01*	*0.001*
	(-o.8)	*(-0.8)*	*(-1.2)*	*(0.1)*
Total gross capital flows	0.001			
	(2.2)			
Fixed exchange rate regime (0,1)	0.004	0.01		0.01
	(0.8)	(2.0)		(1.5)
Flows into flexible rate regimes		0.002	0.001	
		(3.3)	(2.6)	
Flows into fixed rate regimes		0.001	0.001	
		(1.6)	(2.5)	
Flows into capital open market				-0.001
				(-0.1)
Flows into capital closed market				0.001
				(0.0)
Total Panel Observations	302	302	309	243
Adjusted R^2	.04	.06	.05	.13
S. E. Of Regression	.06	.06	.06	.07
F- Statistic	3.3	4.3	4.2	7.0

Note: t-statistic in parentheses

4.7 Inflation and Capital Flows in Exchange Rate Regimes, Open or Closed Capital Markets

Table 9 shows a summary of the empirical results of the impact of total net and total gross capital flows over the log of average inflation. It also shows the effects of the three economic policies: exchange rate regimes, open capital market and closed capital market (in countries where they exist) over inflation. In other to facilitate the understanding of the results we use special symbols: (+ +) means inflationary and robust, (+) means inflationary, but insignificant or sensitive to specification, (- -) means deflationary robust and (-) means weakly deflationary.

Table 9
A Inflation & Capital Flows in Countries by Exchange Rate Regimes and Open or Closed Capital Markets

Flows term	Net flows	W2SLS	RER Depend	Gross flows	W2SLS	RER Depend
Capital flows	--	--	-- --	--	--	+ +
Capital flows into fixed rate regime	+	+	-- --	-- --	--	+
Capital flows into flexible rate regime	-- --	-- --	-- --	-- --	-- --	+ +
Capital flows into Open Capital Market	--	--	--	-- --	--	--
Capital flows into closed capital market	--	--	--	+ +	+	+

Table 9 shows gross flows reduce inflation except in closed capital market or a fixed exchange rate regimes (consistent with monetary discipline hypothesis).

Gross flows are not associated with a stronger real exchange rate (RER) as expected.

Net flows reduce inflation with flexible exchange rates and appreciate the real exchange rate (RER), as predicted by the TNT model.

WS2SL confirm most estimates, except disinflation impact of gross flows under fixed exchange rates—again this is consistent with Romer (1993) findings for trade openness.

4.8 Short-term and Long-term Flows

In tables 10 through 15 we report our findings about long-term inflows and short-term inflows. The structures of the equations for long-term capital inflows are exactly the same as those used for short-term capital inflows. Equation one in table 9 as well as equation one in table 10 for short-term capital inflows shows our basic specifications, which consist of a constant openness to trade and the log of real income per capita as control variables as per Romer (1993),. We would additionally add open capital market and a fixed exchange rate regime as control variables. The log of real per capital control variable is used as a measure of economic development that could catch factors that impact the log of average inflation. By the same token, the open capital market variable represents financial liberalization or capital account convertibility that will increase the elasticity of the demand for money. This has the effect of constraining the government's ability to inflate through fiscal deficit (see Gruben and Mcleod 2000). The a fixed exchange rate regime is the credibility factor that represents the monetary authorities (see Edwards 1997).

The empirical results are that long-term capital inflows, openness to trade, an open capital market and a fixed exchange rate regime reduce inflation. That is to say, they are negatively associated with inflation and statistically significant at the conventionally accepted level. In equation one in table 10 the results for short-term capital inflows are similar to those explained above, with the exception that short-term capital inflows are inflationary, but not significant at the conventional level.

In the second equation we add long-term capital stock that is the accumulation of long-term capital inflows from previous periods to the present. This variable happens to be inflationary. In other words, it is positively related with the log of average inflation, and statistically significant at the conventional level. While short-term capital inflow is negatively related with inflation, though not significant, short-term capital stock is inflationary and statistically significant.

The results that long and short-term stocks are inflationary are consistent with arguments of Dornbusch (1987) and Terra (1998) regarding the inflationary impact of large debt service payments or debt equity swaps.

Terra (1998) found a positive correlation between the level of indebtedness and the level of inflation. That is, the higher the level of indebtedness, the higher the level of inflation. One reason for this might be that the higher the level of external debt, the lesser resources that will be available to be allocated to promote economic growth. However, this argument will be reasonable for short-term stocks but not for long-term stocks. This is because the

proportion of external debt is long-term and when this is mainly used for direct investment, it benefits a debtor's economic development. In other words, long-term capital inflows should not be inflationary. Thus, we divide our sample in two sub-samples from 1971 to 1985 and 1986 to 2000. We find our first sub-sample to have an increase in its t-statistic from (4.0) to (9.5), and the second sub-sample to have a decrease in its t-statistic from (4.0) to (1.8). TO clarify, we hypothesized that who borrows (public sector versus private sector) was important. As previously stated, the first sub-sample covers the period in which most of the foreign borrowing was done by the public sector, and the second period, especially in the1990s, most of the foreign borrowing was done by the private sector. This clearly indicates how important is the proportion of private debt versus public debt.

The third equation in table 9 and 10 shows a scenario in which we have a fixed exchange rate regime, an open capital market and an interaction among long and short-term capital inflows with fixed and flexible exchange rate regimes, as well as with long and short-term capital stock interacting with the two types of regimes.

We find that countries with fixed exchange rate regimes have lower rates of inflation than countries that have flexible regime (see exchange rates). Besides, long-term capital stock is always inflationary with both regimes (see exchange rate section for an explanation). On the contrary, short-term capital inflows interacting with fixed rate regime increases inflation and is deflationary

with a flexible rate regime. However, short-term capital stock is inflationary with both regimes.

In equation four, the economy is still open, but we do not control for a fixed exchange rate regime. In this scenario we find both regimes to be deflationary, but a fixed exchange rate regime has the strongest influence, while a flexible exchange rate regime does not have significant effect on inflation because of its constant fluctuations. In contrast, short-term capital inflows are inflationary with a fixed exchange rate regime and deflationary with flexible rate regime, and with the stock being inflationary in both regimes.

In equation five, we resume the open capital market economy that has a fixed exchange rate regime as a control variable. In this scenario we find the interaction between long and short-term capital inflows with open and closed capital markets to be inflationary. However, both flows are significant only in a closed capital market. Besides, the interaction between open capital market and long and short-term capital stock reduces inflation, being significant at the conventional level only with short capital inflows, while the interaction between closed capital market and long-term and short-term capital stocks are inflationary and statistically significant. In other words, in a closed capital economy long-term and short-term capital stocks are positively related with the rate of inflation, and statistically significant at the conventional level.

The typical explanation for long-term capital stock to be inflationary in a closed capital market economy with a fixed exchange rate regime is based on

the theory of financial repression, while for short-term capital stock in an open economy reduces inflation, based on the disciplinary theory.

In two well-known papers, Mckinnon (1973) and Shaw (1973) indicate that financial repression generally involved some combination of controls on a) interest rate, foreign exchange rates, and credit allocation, b) government imposition of non-interest bearing reserves requirements, c) various legislative obstacles to the development of financial markets, and d) controls on inward and outward capital movements. Financially repressive policies were seen (in developing countries in the 1970s and 1980s) to have a number of adverse consequences on economic activity by discouraging financial intermediation, and maintaining a low financial depth of the economy as indicated by the ratio of M2/ GDP.

Financial repression allows the government to finance the government deficit through domestic credit creation at lower rates of inflation than would otherwise be possible. In order to implement these policies the government requires financial intermediaries to hold government debt issued at low rates of interest, interest rates ceilings and foreign exchange controls, as well as impose taxes on financial activities, usually with a high reserves requirement for commercial banks.

These tight restrictions on currency convertibility and on the acquisitions of foreign financial assets by residents allow authorities to keep domestic rates of interest low for savings while imposing a high rate of implicit taxation on domestic financial intermediation. At the same time capital controls allow

monetary authorities to generate significant revenues while keeping the rate of domestic inflation and nominal exchange rate depreciation low.

Under this scenario the typical speculative attack against the peg that induces an immediate loss of reserves is not possible because of the strict controls on capital account convertibility imposed in the economy.

However, the increase in reserves requirement allows the government to sustain large fiscal deficits under the exchange rate peg, but as the rise in reserve ratios and revenues stops, (government consumes reserves by trading nation's currency money for foreign currencies) we see that the reserves outflow accelerates, then strong expectations of devaluation soon emerges because of the loss of reserves by the central bank. Thus, the loss of fiscal and monetary disciplines often winds up fueling inflation and external imbalances further, which ultimately precipitates currency crashes.

Once again, the composition of capital inflows seems to have a different effect on the log of average inflation. In addition, short-term flow is not only important because it is positively correlated with the rate of inflation, but because it is short-term, i.e., it can make a country more vulnerable to sudden reversals. In other words, it can leave the country in short notice, becoming a detonator of financial crisis. Thus, it is understood that short-term flows may indirectly disciplined central governments. According to Rodrik (1999) short-term flows can play a useful role by serving as a pre-commitment. He also argues that in defining a financial crisis the focus must be on the proximate cause: a sharp reversal in capital flows. He adds that we have a crisis when there

is a turn-around in net private foreign capital flows of five percentage points of GDP or more.[4]

Long-term Flows are a combination of several types of capital flows, such as FDI, Equity Investment, Bonds, Commercial Loans, and others. It is well known, perhaps with Brazil as an exception, that FDI is the major component of long-term Flows. Thus, the finding that Long-term Flows reduce inflation, is consistent with the previous finding that Gross FDI has the strongest negative relationship with the rate of inflation.

[4] Rodrik defines private capital flows as loan from commercial banks and other private credit, excluding equity investments.

Table 10: Inflation and Capital Flows

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.0* *(6.7)*	*2.3* *(7.4)*	*2.1* *(6.3)*	*1.8* *(5.8)*
Openness to trade	-0.02 (-9.2)	-0.02 (-10.0)	*-0.02* *(-10.0)*	*-0.02* *(-10.0)*
The log of income per capita	0.18 (4.9)	0.15 (3.6)	0.16 (3.9)	0.18 (3.5)
Open capital market (0,1)	*-0.24* *(-3.1)*	*-0.35* *(-4.4)*	*-0.31* *(-4.0)*	*-0.23* *(-3.4)*
Long term (LT) flows	-0.06 (-3.0)	-0.03 (-2.1)		
Fixed exchange rate regime (0,1)	-0.28 (-4.3)	-0.41 (-5.8)	-0.25 (-2.5)	
Long term stock		0.02 (4.0)		
LT flows into fixed rate regimes			-0.04 (-2.0)	-0.03 (-1.3)
LT flows into flexible rate regimes			-0.01 (-0.2)	-0.04 (-1.0)
LT stocks for fixed rate regimes			0.2 (2.1)	0.04 (4.6)
LT stocks for flexible rate regimes			0.04 (3.3)	0.02 (1.9)
Total Panel Observations	304	316	316	313
Adjusted R^2	.89	.84	.85	.90
S. E. Of Regression	1.0	1.1	1.1	1.1
F- Statistic	471	278	225	429

Note: t-statistic in parentheses.

Table 11: Inflation and Capital Flows

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.4* *(7.8)*	*2.4* *(8.1)*	*2.0* *(6.9)*	*1.9* *(6.5)*
Openness to trade	-0.02 (-10.8)	-0.02 (-10.7)	*-0.02* *(-11.0)*	*-0.02* *(-9.8)*
The log of income per capita	0.16 (4.3)	0.14 (3.7)	0.17 (4.6)	0.17 (4.4)
Open capital market (0,1)	*-0.48* *(-6.1)*	*-0.46* *(-6.3)*	*-0.42* *(-5.9)*	*-0.38* *(-5.2)*
Short term (S T) flows	0.01 (0.9)	-0.01 (-0.4)		
Fixed exchange rate regime (0,1)	-0.42 (-7.0)	-0.40 (-6.4)	-0.23 (-2.6)	
Short term stock		0.04 (3.4)		
ST flows into fixed rate regimes			0.04 (2.0)	0.04 (2.0)
ST flows into flexible rate regimes			-0.05 (-3.8)	-0.04 (-1.8)
ST stock for fixed rate regimes			0.2 (1.5)	0.03 (2.0)
ST stock for flexible rate regimes			0.07 (3.7)	0.11 (7.1)
Total Panel Observations	317	317	317	312
Adjusted R^2	.94	.91	.91	.92
S. E. Of Regression	1.0	1.1	1.1	1.1

Note: t-statistic in parentheses

Table 12: Inflation and Capital Flows

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year average 1971- 2000.

Cross Sections without Valid Observations Dropped

	Long (1)	**Short (2)**
	(1)	(3)
Constant	*1.5*	*1.3*
	(5.3)	*(4.4)*
Openness to trade	-0.02	*-0.02*
	(-10.8)	*(-10.1)*
The log of income per capita	0.30	0.32
	(8.6)	(8.6)
Open capital market (0,1)	*-0.38*	*-0.30*
	(-2.3)	*(-2.9)*
Flows into open capital market	0.003	0.06
	(0.04)	(1.6)
Flows into closed capital market	0.04	0.04
	(2.1)	(3.0)
Fixed exchange rate regimes (0,1)	-0.60	-0.60
	(-8.8)	(-9.2)
Stock on open capital market	*-0.01*	-0.06
	(-0.2)	(-2.5)
Stock on closed capital market	*0.02*	0.02
	(4.5)	(2.6)
Total Panel Observations	246	246
Adjusted R^2	.96	.93
S. E. Of Regression	1.0	1.0
F- Statistic	890	451

Note: t-statistic in parentheses.

Table 13: Real Exchange Rate and Short-Term Flows

Dependent Variable: Real Exchange Rate

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.10* *(2.4)*	*0.10* *(2.5)*	*0.10* *(2.7)*	*0.07* *(3.2)*
Openness to trade	-0.00 (1.4)	0.00 (0.3)	*0.00* *(1.4)*	*0.00* *(0.5)*
The log of income per capita	-0.01 (-2.6)	-0.01 (-2.5)	-0.01 (-2.7)	-0.01 (-2.9)
Open capital market (0,1)	*0.00* *(0.1)*	*0.00* *(0.1)*	*0.00* *(0.3)*	*0.00* *(0.5)*
Short term (ST) flows	-0.00 (-4.3)	-0.00 (-3.5)		
Fixed exchange rate regime (0,1)	0.01 (4.3)	0.01 (1.0)	0.00 (0.3)	
Short term stock		0.00 (1.6)		
ST flows into fixed rate regimes			-0.00 (-18.8)	-0.00 (-3.2)
ST flows into flexible rate regimes			0.00 (1.3)	0.00 (0.1)
ST stocks for fixed rate regimes			0.00 (4.0)	0.00 (1.5)
ST stocks for flexible rate regimes			-0.00 (-0.01)	-0.00 (-0.4)
Total Panel Observations	301	317	317	312
Adjusted R^2	.68	.07	.67	.04
S. E. Of Regression	.06	.06	.06	.06
F- Statistic	7.0	5.0	80	3.0

Note: t-statistic in parentheses.

Table 14: Real Exchange Rate and Long-Term Capital Flows

Dependent Variable: Real Exchange Rate

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.05*	*0.05*	*0.05*	*0.05*
	(2.3)	*(2.3)*	*(2.4)*	*(2.6)*
Openness to trade	0.00	0.00	*0.00*	*0.00*
	(1.0)	(0.2)	*(0.6)*	*(0.5)*
The log of income per capita	-0.01	-0.01	-0.01	-0.01
	(-2.3)	(-2.2)	(-2.2)	(-2.4)
Open capital market (0,1)	*0.00*	*-0.00*	*-0.00*	*-0.01*
	(0.1)	*(-1.0)*	*(-1.0)*	*(-1.2)*
Long term (LT) flows	0.00	0.00		
	(0.1)	(1.0)		
Fixed exchange rate regime (0,1)	0.00	0.00	-0.00	
	(0.4)	(0.3)	(-0.4)	
Long term stock		0.00		
		(1.0)		
LT flows into fixed rate regimes			0.00	0.00
			(1.1)	(1.0)
LT flows into flexible rate regimes			-0.00	-0.00
			(-0.6)	(-0.7)
LT stocks for fixed rate regimes			0.00	0.00
			(1.5)	(1.5)
LT stocks for flexible rate regimes			-0.00	-0.00
			(-0.7)	(-0.5)
Total Panel Observations	304	316	316	313
Adjusted R^2	.02	.03	.06	.04

Note: t-statistic in parentheses.

Table 15: Real Exchange Rate and Long and Short-Term Capital Flows

Dependent Variable: Real Exchange Rate

Estimation Method: GLS (Cross Section Weights)

Sample: Five year average 1971- 2000.

Cross Sections without Valid Observations Dropped

	Long (1)	**Short (2)**
	(1)	(2)
Constant	*0.05* *(2.3)*	*0.06* *(2.5)*
Openness to trade	-0.00 (-0.7)	*-0.00* *(-0.8)*
The log of income per capita	-0.01 (-2.1)	-0.01 (-2.4)
Open capital market (0,1)	*-0.03* *(-1.8)*	*0.00* *(0.3)*
Flows into open capital market	-0.02 (-1.5)	-0.00 (-1.0)
Flows into closed capital market	-0.00 (-2.5)	-0.00 (-1.6)
Fixed exchange rate regimes (0,1)	0.00 (0.4)	0.01 (1.3)
Stock on open capital market	*0.00* *(1.6)*	0.00 (0.5)
Stock on closed capital market	*-0.00* *(-1.6)*	0.00 (0.8)
Total Panel Observations	234	234
Adjusted R^2	.15	.07
S. E. Of Regression	.06	.06
F- Statistic	6.2	4.0

Note: t-statistic in parentheses.

4.9 Inflation and Capital Flows with by Exchange Rate Regimes, Open or Closed Capital Markets

Table 16 shows a summary of the empirical results of the impact of long-term and short-term capital flows over the log of average inflation, as well as the effects of the three economic policies: exchange rate regimes, open capital market and closed capital market (in countries where they exist) over inflation. In other to facilitate understanding of the results we use special symbols: (+ +) means inflationary and robust, (+) means inflationary, but insignificant or sensitive to specification, (- -) means deflationary robust and (-) means weakly deflationary.

Table 16
Inflation & Capital Flows with by Exchange Rate Regimes
Open or Closed Capital Markets

Sample: LDCS						
Flows term:	Short flows	W2SLS	RER	Long flows	W2SLS	RER
Capital flows	+	+	-- --	-- --	-- --	+
Capital flows into fixed rate regime	+ +	+ +	-- --	--	-- --	+
Capital flows into flexible rate regime	-- --	-- --	+	--	--	--
Capital flows into Open Capital Market	+	+	--	+	+	--
Capital flows into closed capital market	+ +	+ +	--	+ +	--	-- --

Table 16 shows short flows increase inflation and with no predictable effect on the RER with fixed exchange rates (holds up under W2sls) – this is consistent with 3rd Generation currency crisis models.

Long-term flows into fixed exchange rate regimes reduces inflation and but has no predictable effect on the real exchange rate (RER) this is consistent with Generation 1 currency crisis models.

Short-term capital flows reduce inflation and with flexible exchange rates—this is consistent with monetary discipline hypothesis.

4.10 Gross FDI and Net FDI

In tables 17 through 20 we report the empirical results of the influence of gross FDI and net FDI on the rate of inflation. On one hand, gross FDI reduces inflation and depreciates the real exchange rate, with a clear tendency to decrease the rate of inflation. Alternately, net FDI reduces inflation, while at the same time appreciating the real exchange rate that is inflationary. The use of a fixed exchange rate regime as a control variable has a noticeable impact on the behavior of the net FDI. While gross FDI diminishes the rate of inflation in countries with both exchange rate regimes --flexible and fixed--net FDI reduces inflation only in countries with flexible exchange rate regimes when we use a fixed exchange rate regime as a control variable. However, it decreases inflation only in countries with a fixed exchange rate regime, if we do not control for a fixed exchange rate regime. Surprisingly, both flows behave in a very similar fashion in countries that either have open capital market or closed capital

market. In other words, in open capital market countries both flows diminish inflation and in closed capital market countries, they are inflationary but not statistically significant at the conventionally accepted level.

Table 17: Inflation and Gross FDI

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.8*	*2.4*	*2.3*	*2.3*
	(8.5)	*(7.4)*	*(7.5)*	*(7.8)*
Openness to trade	-0.02	-0.02	*-0.02*	*-0.02*
	(-8.4)	(-7.9)	*(-8.7)*	*(-10.7)*
The log of income per capita	0.08	0.14	0.12	0.19
	(2.0)	(3.3)	(3.1)	(5.3)
Open capital market (0,1)	*-0.36*	*-0.34*	*-0.25*	*-0.20*
	(-5.0)	*(-4.6)*	*(-3.9)*	*(-1.7)*
Capital flows	-0.06			
	(-5.3)			
Fixed exchange rate regime (0,1)	-0.26	-0.34		-0.47
	(-3.8)	(-4.0)		(-6.7)
Flows into flexible rate regimes		-0.09	-0.05	
		(-5.0)	(-2.5)	
Flows into fixed rate regimes		-0.05	-0.06	
		(-4.2)	(-5.7)	
Flows into capital open market				-0.20
				(-4.6)
Flows into capital closed market				0.01
				(0.7)
Total Panel Observations	300	288	297	239
Adjusted R^2	.86	.88	.91	.97
S. E. Of Regression	1.0	1.1	1.0	1.1
F- Statistic	386	361	653	1947

Note: t-statistic in parentheses

Table 18: Inflation and Net FDI

Dependent Variable: One plus Log Average Inflation

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*2.0*	*2.1*	*2.0*	*2.3*
	(6.3)	*(6.6)*	*(6.1)*	*(7.4)*
Openness to trade	-0.01	-0.01	*-0.01*	*-0.02*
	(-7.1)	(-6.7)	*(-7.1)*	*(-10.7)*
The log of income per capita	0.18	0.17	0.18	0.21
	(4.6)	(4.5)	(4.8)	(5.6)
Open capital market (0,1)	*-0.22*	*-0.20*	*-0.21*	*-0.33*
	(-3.3)	*(-2.8)*	*(-3.5)*	*(-2.8)*
Capital flows	-0.05			
	(-3.5)			
Fixed exchange rate regime (0,1)	-0.26	-0.37		
	(-4.2)	(-4.9)		
Flows into flexible rate regimes		-0.11	-0.04	
		(-4.4)	(-1.5)	
Flows into fixed rate regimes		-0.03	-0.04	
		(-1.3)	(-2.4)	
Flows into capital open market				-0.15
				(-3.1)
Flows into capital closed market				0.01
				(0.5)
Total Panel Observations	308	310	308	258
Adjusted R^2	.91	.91	.94	.95
S. E. Of Regression	1.0	1.0	1.0	1.0
F- Statistic	636	540	1023	926

Note: t-statistic in parentheses

Table 19: Real Exchange Rate Impact of Changes in Gross FDI

Dependent Variable: Real Exchange Rate, RER = ep*/p so a rise in RER presents a depreciation of the RER

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.04* *(1.9)*	*0.05* *(2.5)*	*0.04* *(1.9)*	*0.06* *(5.4)*
Openness to trade	0.01 (0.6)	0.01 (1.1)	*0.01* *(0.6)*	*0.01* *(0.5)*
The log of income per capita	-0.01 (-1.7)	-0.01 (-2.1)	-0.01 (-1.5)	-0.01 (-5.5)
Open capital market (0,1)	*0.01* *(0.2)*	*0.01* *(0.1)*	*0.01* *(0.1)*	*0.01* *(1.5)*
Gross FDI	0.001 (0.4)			
Fixed exchange rate regime (0,1)	0.001 (0.2)	-0.01 (-1.6)		-0.002 (-0.5)
Flows into flexible rate regimes		-0.003 (-3.1)	-0.002 (-2.1)	
Flows into fixed rate regimes		0.001 (1.2)	0.001 (0.6)	
Flows into capital open market				-0.002 (-1.4)
Flows into capital closed market				0.001 (0.5)
Total Panel Observations	300	297	297	336
Adjusted R^2	.04	.06	.05	.21
S. E. Of Regression	.06	.06	.06	.06
F- Statistic	2.0	4.3	4.2	16

Note: t-statistic in parentheses

Table 20: Real Exchange Rate Impact of Changes in Net FDI

Dependent Variable: Real Exchange Rate, RER = ep*/p so a rise in RER presents a depreciation of the RER

Estimation Method: GLS (Cross Section Weights)

Sample: Five year averages 1971- 2000.

Cross Sections without Valid Observations Dropped

Sample: LDCS

	(1)	(2)	(3)	(4)
Constant	*0.04* *(1.7)*	*0.05* *(1.6)*	*0.04* *(1.9)*	*0.06* *(5.0)*
Openness to trade	0.01 (2.6)	0.01 (1.2)	*0.01* *(1.2)*	*0.01* *(0.5)*
The log of income per capita	-0.01 (-1.7)	-0.01 (-1.5)	-0.01 (-1.5)	-0.01 (-5.3)
Open capital market (0,1)	*0.01* *(0.6)*	*0.002* *(0.5)*	*0.01* *(0.4)*	*0.01* *(1.1)*
Net FDI	-0.001 (-2.6)			
A fixed exchange rate regime (0,1)	0.003 (0.6)	0.002 (0.3)		0.002 (-0.7)
Flows into flexible rate regimes		-0.003 (-2.4)	-0.003 (-3.1)	
Flows into fixed rate regimes		-0.001 (-0.6)	-0.001 (-0.6)	
Flows into capital open market				-0.002 (-1.6)
Flows into capital closed market				-0.001 (-1.0)
Total Panel Observations	331	320	320	353
Adjusted R^2	.04	.06	.05	.12
S. E. Of Regression	.06	.06	.06	.06
F- Statistic	4.0	4.3	4.0	9.1

Note: t-statistic in parentheses

4.11 Inflation and Capital Flows with by Exchange Rate Regimes, Open or Closed Capital Markets

Table 21 shows a summary of the empirical results of the impact of gross FDI and net FDI over the log of average inflation, as well as the effects of the three economic policies: exchange rate regimes, open capital market and closed capital market (in countries where they exist) over inflation. In other to facilitate the understanding of the results we use special symbols: (+ +) means inflationary and robust, (+) means inflationary, but insignificant or sensitive to specification, (- -) means deflationary robust and (-) means weakly deflationary.

Table 21
Inflation & Capital Flows with by Exchange Rate Regimes
Open or Closed Capital Markets

Sample: LDCS						
Flows term:	Gross FDI	W2SLS	RER	Net FDI	W2SLS	RER
Capital flows	-- --	-- --	+	-- --	-- --	-- --
Capital flows into fixed rate regime	-- --	-- --	+	--	--	--
Capital flows into flexible rate regime	-- --	-- --	-- --	-- --	-- --	-- --
Capital flows into Open Capital Market	-- --	-- --	--	-- --	-- --	--
Capital flows into closed capital market	+	+	+	+	+	--

Table 21 shows gross FDI reduces inflation and has a tendency to depreciate the RER with fixed exchange rates (holds up under W2sls), while

reduces inflation with flexible exchange rate, but it appreciates the RER which is inflationary.

Net FDI into fixed exchange rate regimes tends to reduce inflation and it has also the tendency of appreciate the (RER). Both flows behave in similar fashion in open and closed economy.

4.12 Financial Openness or Open Capital Market

During the 1990s there was an upsurge in financial deregulation, in most developing countries that heightened international capital mobility, financial integration, economic growth as well as fostering a low rate of inflation. However, the path and pace to remove most of the restrictions have been marked by turmoil and slowness. The two most striking reasons are, first, the fear of weakening the power of policy makers to implement independent monetary and exchange rates policies; and second, the volatility which is likely to be much higher if flows are of a short-term, purely speculative nature than they would be if they primarily reflected the FDI which are presumably guided by long-term fundamentals.

With these changes, attentions are focused on how intensive to use capital controls to discriminate among different types of capital flows. Thus, capital controls have attained new importance since capital controls have been frequently used to sequence and fine tune liberalization policies in most developing countries. (This is consistent with Cardoso and Golgfajn (1998) who find that most of the capital control measures implemented during 1990s in

Brazil were not intended to reduce overall capital flows, but rather to change its composition).

This is the current dilemma. While developing countries need capital inflows to finance the basis for the development of infrastructure and national productive capacity, intellectual capital, transfers of technology and managerial talent, they are also a source of instability that sometimes lead to financial crises. Thus, developing countries are compelled to heighten the degree of financial deregulation, to keep fiscal disciplinary policy, to unify the exchange rates and to keep sound monetary policy that will enhance the welfare of these countries. In other words, for developing countries to reap the benefits derived from financial deregulation and the opening up of international capital flows, they must implement policies to maintain the resilience of the financial system and the real sector.

The empirical results for financial openness, shown in their respective tables above, seem to indicate that the larger the degree of financial openness in a country--measured as a reduction of the restriction in the sum of capital controls--the lower the level of inflation in that country. The reasons for this is described by Romer (1993) and Gruben & Mcleod (2000): Romer (1993) explains that the incentives to expand are low in highly open economies, and thus inflation will be low in these countries even in the absence of pre-commitment. Gruben & Mcleod (2000) make a similar argument, that when capital accounts are lifted, they raise the inflation elasticity for domestic currency, allowing foreign access to substitute the nation's currency. Therefore

there is a thread to substitute domestic currency, the higher the degree of openness of capital account. Thus, the higher the openness of capital accounts, the lower the level of inflation. Even though Romer uses imports of goods and services as a measure of openness and Gruben and Mcleod uses a semi-flexible exchange regime, the arguments are still related.

4.13 Financial Restrictions or Closed Capital Market.

The empirical results for financial restrictions shown in their respective tables above seem to indicate that the financial restrictions are positively related with the log of average inflation under different specifications. Indeed, these results are quite consistent with the contemporary literature. Hence, the results of different types of capital flows are quite different in countries with financial restrictions The above findings show that different types of capital flows, in countries with capital control programs, have different effects on the log of average inflation. These results may be in harmony with a finding by Cardoso & Goldfajn (1998) that a shock to capital controls reduce debt securities flows between the fourth and seventh months after introduction but the effect slowly fades away, and portfolio investment, however, net FDI remains stable and are not affected by a shock to change in capital control. The only shortcoming of this comparison is that the previously mentioned empirical study was conducted only in Brazil. Therefore, the legitimate question that arises is can we extrapolate this sole finding from Brazil to support a study of about 80 countries?

Nevertheless, Grilli and Milesi-Ferretti (1995) find that the data do not support the hypothesis that control programs affect economic variables, such as the volume and composition of private flows. But, Chile has been cited as an example of the effective use of capital controls, Valdes-Prieto and Soto (1996) find mixed results.

4.14 Real Exchange Rates and Capital Inflows

Most of the recent literatures about capital inflows to developing countries in the 1990's have been associated with real exchange rate appreciation. The claim is that capital inflows have increased the aggregate demand, putting pressure on domestic prices, and contributes to real exchange rate appreciation. Thus a country would lose international competitiveness. According to Calvo et al (1993) capital inflows have been accompanied by booming stock and real estate markets, faster economic growth, an accumulation of international reserves and an appreciation in the real exchange rate. They also claim that real exchange rates appreciation generated by increased capital inflows are not a completely new phenomenon, at least in Latin America. However, Hausman et al (2000) argue "that it may be quite misleading to attribute the exchange rate appreciation solely or even primarily to the capital flows. In many countries the timing of the exchange rate appreciation and associated changes in the current account match the timing of inflation stabilization more closely than that of the capital inflows. But whatever the causality, there is a clear correlation between changes in the real exchange rate and changes in the current account balance. While this association

between the current account and the real exchange rate does not establish causality, it does suggest strongly that the dominant shock to the current account was not a supply shock to the current account".

Edwards (1997) argues that how capital inflows appreciate the real exchange rate will depend on the type of exchange rate system while we add that it also depends on the kind of capital inflows that are occurring. Under a fixed exchange regime, the story would be the following: if there is an increase in capital inflows under a fixed exchange system, and the authorities are determined to defend it, they will intervene in the exchange rate market purchasing foreign exchange generated by the capital inflows. To do so, the central bank creates high-powered domestic money.

This expansion of the monetary base creates a corresponding expansion in broader measures of the money supply, lowering the interest rate. This action will trigger an expansion of the aggregate demand. If the economy possesses excess capacity, the short-run implications may be to increase domestic activity and cause the current account of the balance of payment to deteriorate. However, if the economy has limited capacity, the money expansion will trigger an acceleration of domestic inflation. If the fixed exchange rate is maintained, rising domestic prices will cause the real exchange rates to appreciate, encouraging the current account deterioration associated with the expansion in the aggregate demand.

If the increase in capital inflows takes place under a flexible exchange system, the increase in capital inflows will not necessarily translate into

inflationary pressure. The reason is that as capital flows in the nominal exchange rate will appreciates, reducing the nominal exchange rates ratio, but at the same time the capital inflows will pressure the price of non-tradable goods, increasing domestic price. For that reason, Edwards (1997) argues that when the nominal exchange rates decline (appreciates) and domestic prices increase, the final result is unambiguous. In other words, how capital flows will affect the rate of inflation under a system of flexible exchange rate is an empirical question. The reason is that the extent of the appreciation, Edwards continues, will largely depend on two sets of keys variables: the inter-temporal elasticity of aggregate, on the one hand, and the income elasticity of demand and supply elasticity for non-tradable goods, on the other.

4.15 Causality Tests

In tables 22 through 27 we report the number of Granger causality test results. We can see that the Granger causality runs only one way, from all capital flows to the log of average inflation. The exception is total net capital flows which correlate weakly as a cause of inflation; but lagged inflation also cause total net capital flows. In other words, with that exception, capital flows do have a significant impact on the log of average inflation, while the log of average inflation does not have any significant effect on the composition of capital inflows. Thus,, instrumental variables are needed for total net capital flows, but for other flows causality is not bi-directional--for example, capital flows have an exogenous component.

Table 22: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Gross FDI (Dependent Variable)	Inflation (Dependent Variable)
1) Lagged inflation	0.01	
	(0.1)	
2) Gross FDI (-1)	0.95	
	(21)	
1) Lagged inflation		0.71
		(18)
2) Gross FDI (-1)		-0.02
		(-2.5)
Total Observations	249	250
Adjusted R squared	.85	.91
S. E. of Regression	2.4	.96
F- statistic	703	1247

Note: t-statistic in parentheses.

Table 23: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Net FDI (Dependent Variable)	Inflation (Dependent Variable)
1) Lagged inflation	0.10	
	(1.9)	
2) Net FDI (-1)	0.73	
	(13.0)	
1) Lagged inflation		0.67
		(18.8)
2) Net FDI (-1)		-0.07
		(-7.4)
Total Observations	330	328
Adjusted R squared	.88	.95
S. E. of Regression	2.0	.92
F- statistic	1303	3242

Note: t-statistic in parentheses.

Table 24: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Total net flows (Dependent Variable)	Inflation (Dependent Variable)
1) Lagged inflation	0.26	
	(5.9)	
2) Total net flows (-1)	0.32	
	(5.7)	
1) Lagged inflation		0.67
		(15)
2) Total net flows (-1)		-0.24
		(-1.8)
Total Observations	296	294
Adjusted R squared	.91	.91
S. E. of Regression	.9	.8
F- statistic	703	1247

Note: t-statistic in parentheses.

Table 25: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Total Gross Flows (Dependent Variable)	Inflation (Dependent Variable)
1) Lagged inflation	0.16	
	(1.0)	
2) Total gross flows (-1)	0.65	
	(23.0)	
1) Lagged inflation		0.68
		(15)
2) Total gross flows (-1)		-0.09
		(-3.9)
Total Observations	267	295
Adjusted R squared	.89	.91
S. E. of Regression	5.0	.8
F- statistic	173	366

Note: t-statistic in parentheses.

Table 26: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Short Flows (Dependent Variable)	Inflation (Dependent Variable)
1) Lagged inflation	0.19	
	(0.1)	
2) Short-term Flows (-1)	-0.46	
	(-1.6)	
1) Lagged inflation		0.76
		(19.0)
2) Short-term Flows (-1)		0.25
		(3.4)
Total Observations	249	237
Adjusted R squared	0.06	.92
S. E. of Regression	3.2	.95
F- statistic	6.0	1376

Note: t-statistic in parentheses.

Table 27: Causality Test without Instrument Variables: Inflation and Capital Flows

Independent Variable	Long Flows (Dependent V.)	Inflation (Dependent V.)
1) Lagged inflation	-0.06	
	(-0.3)	
2) Long-term Flows (-1)	0.65	
	(19.6)	
1) Lagged inflation		0.79
		(18.0)
2) Long-term Flows (-1)		-0.39
		(- 2.5)
Total Observations	245	247
Adjusted R squared	.61	.94
S. E. of Regression	1.1	.95
F- statistic	195	1953

Note: t-statistic in parentheses.

Chapter 5

Conclusion

This empirical analysis suggests that the composition of capital flows have played an important role in the recent disinflation phenomenon in developing countries. This role has been emphasized by the implementation of some economic policies such as exchange rates regimes, financial openness and financial restrictions.

While the fixed rate regime variable itself reduces inflation with most of the capital flows, the flexible exchange rate regime reflects opposite results. Our findings demonstrate that the contribution of total gross capital flow and short-term capital inflow to reduce inflation is much more important in countries with flexible exchange rate regimes than in countries with fixed exchange rate regimes. Also, this impact is stronger in open capital market economy. This finding is interesting because in recent years some of the developing countries have switched from fixed to more flexible exchange rate regimes. These results suggest that this switch can help reduce inflation and that flexible exchange rates do not appear to be inflationary, as many feared in the 1970s. At the same time, the behavior of total gross capital inflows is consistent with the monetary discipline hypothesis of Barro (1983) and Romer (1993). The behavior of short-term flows is consistent with the discipline hypothesis as well as contributing to the validation of Chang and Velasco's (1999) argument that flexible exchange rates are more suited to high capital mobility environments.

Our results also indicate that the higher the degree of financial openness or open capital market countries the lower the rate of inflation. Financial openness shows the strongest negative relationship with gross Foreign Direct Investment than with the rest of the capital flows. On the other hand financial restrictions or closed capital market countries show that the higher the restrictions of capital flows the higher the rate of inflation.

These empirical results that the short-term flows show the strongest and most robust positive impact on the rate of inflation. Short-term flows are inflationary in countries with fixed exchange rates and appreciate the real exchange rates, which are also inflationary. This confirms our hypothesis that short-term flows are more likely to lead to currency or financial crises and fixed exchange rates make countries more vulnerable.

Net total capital inflow has a positive impact over the rate of inflation and appreciates the real exchange rates in countries with fixed exchange rates, which is inflationary. However, in countries with flexible exchange rate regimes, net capital inflows reduce inflation, but at the same time it appreciates the real exchange rate, which makes the final result clearly inflationary as predicted by TNT model. Gross total capital inflow reduces inflation in flexible exchange rate regimes, and does not appreciate the real exchange rate as was expected. Also, gross total capital inflow is inflationary in closed capital market economy and does not reduce inflation with a fixed exchange rate, which is consistent with monetary discipline hypothesis.

Gross FDI diminishes inflation while net FDI is inflationary basically because it appreciates the real exchange rate. Both capital flows increase inflation in countries with flexible exchange rate regimes because of the appreciation of the real exchange rate. But while gross FDI diminishes inflation in countries with a fixed exchange rate, the impact of net FDI depends on the presence of a fixed exchange rate as a control variable.

Long-term flow is inflationary in countries with a fixed exchange rate regime, but has no predictable effect on the real exchange rate. This is consistent with Generation 1 currency crisis models. Long-term flow is inflationary in closed capital market economy as capital inflows appreciate the real exchange rate. Moreover, countries with closed economies use capital inflows to engage in expansionary monetary policy, as indicated by (Mckinnon (1973) and Shaw (1973) financial repression.

Gross FDI reduces inflation in nontraded sector and diminishes inflation with flexible exchange rates and appreciate the real exchange rates (Samuelson-Balassa-effect), reduce inflation.

In the last decade, the nature of FDI has changed from being primary directed to resources extraction and import substitution to highly efficient investments which are associated with the globalization of production in high-valued-added and skill-intensive manufacturing sectors. It also acts as a transferor of high technology and managerial skill. FDI is less volatile, since it is related partly to irreversible investment projects. Short-term flows, on the other hand, are more volatile. Recent history reflects that shocks to short-term flows

are transmitted between countries far more readily than shocks to FDI. Thus, policy makers should be more concerned with attracting foreign direct investment than attracting short-term capital. Moreover, foreign direct investment directly contributes to economic growth.

Our results also indicate that the higher the degree of financial openness of a country the lower the rate of inflation. Total gross, gross FDI and short-term capital flows reduce inflation in countries with a high degree of financial openness. Thus our results confirm our third hypothesis, namely that the greater capital inflows and outflows--as measured by total gross capital flows into and out of a country--the elasticity of money demand and thus reduce the seigniorage-maximizing rate of inflation, particularly in countries with open capital markets..

Our findings also indicate that the tighter financial restrictions or capital controls, the higher the rate of inflation. The empirical results show that all capital flows are inflationary in countries with a high degree of financial restrictions. However, only short-term, long-term, and total gross are statistically significant.

This indicates that we find support for our fifth hypothesis that states that a) closed capital markets reduce the elasticity of demand for money raising inflation rates and b) capital inflows are more likely to be inflationary in fixed exchange regime countries with capital controls-inflation that is likely to be associated with a real exchange rate appreciation.

Policy implications:

The research summarized above has important policy implications for an increasing open and integrated world economy. While capital flows can increase or decrease inflation, these flows tend to be more benign in developing countries with open capital markets and floating exchange rates. This is good news for many countries in Latin America and Asia that have recently been heading--voluntarily or because of crises--in this direction anyway.

Our results also justify concern about the risks of high debt and volatile capital inflows. These warning as especially warranted for economies with fixed exchange rates and closed capital accounts. Most capital flows and high debt loads tend to be inflationary in these environments. Servicing high dollar denominated external debt tends to put too much local currency in circulation as the governments attempts to buy enough dollars to service its external debt and live another day.

One great macroeconomic puzzle is why inflation fell so rapidly in developing countries during the 1990s, a period of higher capital flows and exchange rate crises. We present evidence that the capital mobility–defined as greater gross capital inflows–can have a disciplining effect on monetary policy. This implies capital flows and capital account liberation may have contributed to disinflation trends in these economies.

Bibliography

Balassa, B. "The Purchasing Power Parity Doctrine: A Reappraisal", Journal of Political Economy 72 (1964): 584-596.

Barro, R. J., Gordon, D. "A Positive Theory of Monetary Policy in a Natural Rate Model", Journal of Political Economy 91 (1983): 589-610.

Barro, Robert J.. "Inflationary Finance Under Discretion and Rules", Canadian Journal of Economics 16 (1983): 1-16.

Blanchard, Oliver. Macroeconomics. First Edition. New Jersey: Prentice-Hall, Inc., 1997.

Bosworth, Barry P., and Susan M. Collins. "Capital Flows to Developing Economies: Implications for Saving and Investment.", Brookings Papers in Economic Activity, 1999.

Calvo, G. and E. Mendoza (1996) "Reflections on Mexico's Balance of Payments Crisis: A Chronicle of Death Foretold", Mendoza, Journal of international Economics, September 1996.

Campillo, Marta and Jeffery A. Miron. "Why does inflation differ across countries?",NBER Working Paper Series, NBER, 1997.

Cardoso, Eliana and LLan Goldfajn. " Capital Flows to Brazil: The Endogeneity of Capital Controls", IMF working Paper no.97/115. Washington, D. C.: International Monetary Funds.

Chang, Robert and Andres Velasco. "The Asian Liquidity Crisis" C.V. Starr Center for Applied Economics. New York University Faculty of Arts and Science Department of Economics Washington Square New York, NY 10003-6687. (1998).

Cukierman, Alex, Steven B. Webb, and Bilin Neyapti. "Measuring the Independence of Central Banks and Its Effects On Policy Outcomes", World Bank Economic Review (1992): 353 –399.

Grilli, Vittorio, and Milesi – Ferretti Gian Maria. "Economic Effects and Structure Determinants of Capital Controls", IMF Working Papers. International Monetary Fund, 1995 (517- 551).

Gruben, W. and Darryl Mcleod (2002) "Capital Account Liberalization and Disinflation", Economic Letters, October, 77, pp. 221-25.

Gruben, W. and Darryl Mcleod, "Capital Account Liberalization and Disinflation in 1990s", Draft Prepared for LACEA Rio 2000 Meetings, 2000 (1-17).

Hernandez, Leonardo, Pamela Mellado, and Rodrigo Valdes. "Determinants of Private Capital Flows in the 1970s and 1990s: Is there Evidence of Contagion?",IMF Working Papers. International Monetary Fund, 2001.

Kydland, F. E., Prescott, E. "Rules Rather Than Discretion: The Inconsistency of Optimal Plans", Journal of Political Economy, 85, (1977): 473-492.

Larrain, Felipe B. Capital Flows, Capital Control, and Currency Crises. First Edition. Michigan: The University of Michigan Press, 2000.

Lane, Philip R. and Milesi – Ferretti Gian Maria. "External Capital Structure: Theory and Evidence", IMF Working Papers. International Monetary Fund, 2000.

Mcleod, D." Class Notes on Currency Crisis" processed, Fordham University, New York , 2000.

Obstfeld, Maurice and Kenneth Rogoff. Foundation of International Macroeconomics. Fourth Edition. Cambridge, Massachusetts London, England: The MIT Press, 1999. (558 – 565).

Radelet, Steven and Jeffrey Sach. " The East Asian Financial Crisis: Diagnosis, Remedies, Prospects", Paper presented at Brooking Panel, (1998),Washington, D. C., 26 –27 March.

Rodrik, Dani. "Short-Term Capital Flows", National Bureau of Economic Research, (1999). NBER Working Paper Series 7364.

Rogoff, K. "The Optimak Commitment to an Intermediate Monetary Target", Quarterly Journal of Economics, 100, no 4, (1985b): 1169 – 1189.

Rogoff, K.."Can International Monetary Policy Coordination be Counter Productive?", Journal of International Economics, 18, (1985b): 199-217.

Romer, David. "Openness and Inflation: Theory and Evidence", Quarterly Journal of Economics 108 November (1993): 869- 903.

Sachs, Jeffrey D. and Felipe B. Larrain. Macroeconomics in the Global Economy. First Edition. New Jersey: Prentice-Hall, Inc., 1993. (327- 355).

Samuelson, P. A. "Theoretical Notes on Trade Problems", Review of Economics and Statistics 23 (1964): 1-60.

Sargent, Thomas J. and Wallace Neil. "Some Unpleasant Monetarist Arithmetic", Federal Reserve Bank of Minneapolis Quarterly Review 5, 3, (1985): 1 –17.

Sebastian, Edwards. Capital Controls, Exchange Rates and Monetary Policy in the World Economy. Edited by Sebastian Edwards, 1995. Cambridge University Press.

Sebastian, Edwards. "Exchange Rates, Inflation, And Disinflation: Latin America Experiences", Capital Controls Exchange Rates and monetary Policy In The World Economy. Edited by Sebastian Edwards, 1997. University of California, Los Angeles.

Terra, Cristina T.. "Openness and Inflation: A New Assessment", Quarterly Journal of Economics CX111 (1998): 641-8.

Terra, Cristina T. "Debt Crisis and Inflation". Revista de Econometria 17 (1997): 21-48.

Appendix

We use the following variables:

GDP, PPP is gross domestic product converted to international dollars using purchasing power parity rates of countries.

LOG (PC) is the log of income per capita as a share of GDP,PPP.

OECD is the Organization for Economic Cooperation and Development.

OIL is a dummy for Oil Producer Countries (0, 1).

LAT is a dummy for Latin America (0, 1).

ASI is a dummy for Asia (0, 1).

AFR is a dummy for Africa (0, 1).

PST is an index for political instability.

ICB is an index for central bank dependence.

PCFF is gross private capital flows as a share of GDP, PPP. Gross private capital flows are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial account, excluding changes in the assets and liabilities of monetary authorities and general government.

FDI is gross foreign direct investment as a share of GDP, PPP.

PKFF is net private capital flows as a share of GDP, PPP. It consists of private debt and non-debt flows. Private debt flows include commercial bank lending, bonds, and other private credits; non-debt private flows are foreign direct investment and portfolio equity investment.

FII is net direct foreign investment as a share of GDP, PPP.

GROSS FDI is gross foreign direct investment as a share of GDP, PPP.

GROSS OTHER FLOW is gross commercial bank, bonds, portfolio equity investment and other private credits, as a share of GDP, PPP.

NET FDI is net foreign direct investment, as a share of GDP, PPP.

NET OTHER FLOW is net commercial bank lending, bonds, portfolio equity investment and other private credits, as a share of GDP, PPP.

STDG is short-term stocks which include all debt having an original maturity of one year or less and interest in arrears on long-term debt money banks, as a share of GDP,PPP.

TEDD is long-term tocks which includes all debt having original maturity for more than one year, as a share of GDP,PPP. It includes three components: public, publicly guaranteed, and private non-guaranteed debt.

PFXX is a dummy from an index of pure fixed exchange rates system (0,1).

PFL = A dummy from an Index of Pure Flexible Exchange Rate Systems (0,1).

ONN is a dummy from an index of openness (0,1).

CLMO is a dummy from an index of closed (0,1).

GR is growth of GDP.

WGCF is world gross capital flows as a share of GDP, PPP.

PCG is growth of income per capita, as a share of GDP, PPP.

PP is gross domestic product converted to international dollars using purchasing power parity rates(GDP, PPP).

LP2 is ln (1+CPI), where Ln is the natural log and CPI is the five year average of consumer price index. Considering log inflation would not be appropriate if some countries had very low average rates of inflation, since the logarithmic transformation would give those countries undue weight. No countries in the sample have extremely low inflation, however: the lowest average rate (Singapore's) is 3.6 percent. Also we have a few countries with negative inflation (deflation) thus, we add the number one to the five year average consumer price index, and then, we take the natural log.

OPNN is openness of trade, where trade measures import as a share of GDP, PPP. This openness index was constructed by subtracting the proportion of years a restriction was in place during that five years period from one. Adding together the capital account, current account and surrender export proceed restrictions yields in index ranging from 0 to 3 with a larger value indicating a more open capital account. This composite index is a broader indicator of openness than the single capital account index employed by Grilli and Milesi-Ferretti (1995) and Rodrik (1998). See Gruben & Mcleod (2000) for more details. Then by using a frequency distribution the openness index was converted to a dummy variable of the type of zero to one, where one indicates the highest degree of openness. This is actually the openness variable that we use.

CLMO is an index for financial restrictions. This index of closed is created by subtracting the number three from the original index of openness, in such a way that the range of this index is from three to zero, where three indicates the

highest degree of closed. Then we use a frequency distribution in order to get a dummy variable, which range goes from zero to one, and where one represents the highest degree of closed.

Apolinar Mesa

BA, Lehman College

MA, Fordham University

Emerging Market Disinflation in the 1990s: The Role of Capital Flows

Dissertation directed by Darryl McLeod, PhD.

Despite the number currency crises, the decade of the 1990s was generally a period of increased capital flows and falling inflation, particularly in developing countries. . This dissertation uses a panel of 84 developing countries to explore the impact of capital flow on inflation rates. The results vary by exchange rates and capital market regimes. Short-term capital flows tend to be inflationary, but less so in floating exchange rate regimes. Net capital inflows are associated with inflationary real exchange rate appreciations, particularly in fixed exchange rate regimes. Higher capital mobility, as measured by to gross capital into and out of a country, tend reduce inflation, particularly in regimes with floating exchange rates and open capital markets. We review several models of inflation and currency crises consistent with the observed results. Overall our results suggest capital flows are associated with lower inflation, particularly in countries with flexible exchange rates and open capital markets.

Vita

Apolinar mesa, son of manuel Emilio mesa Ruiz and Fredesvinda Plasencia Sanchez, was born in Dominican Republic in 1954. He attended Elias Rodriguez high school in Bonao, Dominican Republic, and was graduated in Mathematics in June 1972.From 1972 to 1980 he worked as a Thermoelectric Generator Technician.

In 1980 he immigrate to United States of America with a dream: to become an economist. While he was working He entered Lehman College in 1981. During several years he worked as a Sewing Machine Operator, as a Foreman, as a Quality Control Inspector and then, in 1984 he commenced his own business: a Sewing Machine Factory. He received the degree of Bachelor of Arts, Magna Cume laude, in 1988. Then he explored other activities and business such as: Food Business, Financial Advisor and Real Estates Consultant until 1997.

In 1998 he began his graduate studies in the Department of Economics of Graduate School of Arts and Sciences of Fordham University. He received the Degree of Master of Arts in International Economics in 1999. He graduated with honor and became a member of Omicron Delta Epsilon in recognition of his high scholastic achievement in the field of Economics. Then he continued his graduated studies toward the PH.D. which he successfully concluded in 2003. While he was working in his dissertation he thought principle of microeconomic

at Fordham University as he held the position of Teaching Associate, during two years (2001-2003).