The Behavior of International Capital Flows to Emerging Markets

By
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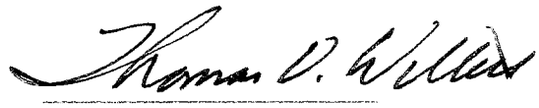

Thomas D. Willett

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Abstract of the Dissertation

The Behavior of International Capital Flows to Emerging Markets

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The surge of private capital flows to emerging market economies has been one of the major characteristics of the international financial world for the last 15 years. While these capital flows were initially welcomed, the significant capital reversals or 'sudden stops' during a series of currency crises have generated a major rethinking of appropriate policies toward such flows. There has been a vast amount of academic work done on the causes of currency crises; however, much less systematic research has been devoted to analysis of the roles of capital flows. This dissertation aims to fill this gap.

In the second and the third chapter, I investigate whether some types of capital flows are more likely to reverse than others during currency crises. Foreign direct investment is usually considered stable while portfolio investment is frequently depicted as the least reliable type of flow. Recent statistical testing has yielded conflicting results on this issue. A major problem with recent studies is that the degree of variability of capital flows during normal or inflow periods may give little clue to their behavior during crises and it is the latter that is most important for policy. Using data for 35

emerging economies for 1990 through 2003, I confirm that direct investment is the most stable category but find that bank loans on average are as reversible as portfolio flows.

In the fourth and the fifth chapter, I investigate the effects of surges in capital inflows on the probability of sudden stops. The empirical investigation based on 38 emerging market economies between 1990 and 2003 reveals that a surge in capital inflows significantly increases the probability of a sudden stop. In addition, a surge accompanied by weak macroeconomic fundamentals such as a large current account deficit or an appreciated real exchange rate has a higher probability to turn into a sudden stop. Finally, I find that a surge that is dominated by private loans and portfolio flows is more likely to end in a sudden stop. Foreign direct investment is stable and it does not cause other flows to suddenly stop during crises.

Dedication

In the memory of my uncle, Abdullah Yalabik.

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CHAPTER 1

Overview

The degree of international capital mobility has been increasing tremendously for the last 15 years. Throughout the 1990s, many developing nations witnessed a large surge of international private capital inflows. The surge was primarily fueled by advances in technology, favorable political and economic conditions and a series of market-oriented reforms in the form of trade and capital account liberalizations. While these capital inflows were initially welcomed, the significant capital flow reversals during a series of currency crises have generated a major rethinking of appropriate policies toward such flows. Most of the time, severe recessions followed crises. In the international finance field, these crises have become known as "sudden stops", because of the sudden ending of capital flows[1].

1.1 Statement of the Problem

Under the assumption of fully efficient financial markets, we expect free movement of international capital flows to improve the welfare of nations. Furthermore, in this ideal world, there should be no difference among the different types of capital flows, they are merely substitutes. They all flow into the locations where they are most efficient. Recent sudden stop

[1] The expressions 'sudden stop' and 'reversal' are used interchangeably throughout this dissertation. A reversal is defined as a large fall in capital inflows, a change from a high inflow state to a low inflow or outflow state.

episodes in emerging markets, however, showed that both of these expectations do not necessarily hold.

Surges in capital inflows to Mexico at the end of the 1980's were seen as natural and justified by the stabilization programs that increased the growth potential of this economy. Yet, by the end of 1993, only months before the crisis, the fundamentals that brought these high inflows were no longer favorable. Mexico had a large current account deficit, and a big external debt, yet the levels of capital inflows remained high. The same picture can be depicted for Asia. Before 1997, financial experts and economists were writing about the success of Asian economies. Several authors claimed that Asia was very different than Mexico. Capital inflows were financing investment and not consumption spending in Asia; these nations were sound borrowers and they were transforming capital inflows into wealth. In 1997, capital inflows suddenly stopped. Five Asian countries moved into financial crises followed by deep recessions. Both the crises in Mexico and Asia were associated with large drops in capital inflows and they are both preceded by surges in capital inflows. Other crises that followed the Asian crisis also had a similar pattern.

The composition of capital flow reversals during the Mexican and Asian crises were very different, however. In Mexico the reversals mainly came from portfolio investment. In Asia, they were largest in bank loans. In both episodes, foreign direct investment did not flee the countries.

Examples from recent history indicate that an increase in capital inflows towards an emerging market does not always just signal that a

country has been doing many things right. In certain situations they may also signal that the probability and potential magnitude of their reversal or sudden stop is also increasing. In addition, there is substantial evidence that not all types of capital flows behave the same way.

In order to understand the behavior of capital flows, one should relax the strict assumption of fully efficient markets. While this does not mean one needs to embrace the view of wildly irrational markets, it does require consideration of other views such as information problems, psychological biases in decision-making and perception, and principal agent problems. In this dissertation I take this approach and investigate the behavior of private capital flows to emerging markets.

1.2 Research Questions

I address the following questions about the behavior of international private capital flows:

1. Are some types of capital flows more likely to reverse than others during currency crises? Does the composition of capital flows matter in determining the potential magnitude of a reversal? If a certain type of capital flow is very volatile during inflow periods does this imply a higher degree of reversibility?

If all types of investors behave the same way during crises, then we would expect no difference in behavior among different types of capital

flows. However, this heroic assumption ignores the investors' incentives during crises. An investor who builds a factory in an emerging market will have different constraints and incentives than a foreign bank that lends heavily to domestic companies facing default or a hedge fund that owns a large share of stocks and bonds that plunge during the crisis.

2. Do surges in capital inflows have any effect, direct or indirect, on the probability of their sudden stops? Do weak fundamentals make surges more reversal prone? Does the composition of capital inflows during the surge increase the chances of a reversal?

Theoretically, surges in capital inflows and the probability of a sudden stop can be connected through two channels. The first is the indirect effect of high capital inflows on the likelihood of financial crises; this comes through the effects of inflows in causing deteriorating economic fundamentals. The second is a direct one. Rapid and large increases in capital inflows may imply an eventual downward adjustment if they exceed economically justified levels. In addition, deteriorating fundamentals paired with a surge in capital inflows would increase the vulnerability to a sudden stop. Finally, related to the first research question, we would expect the composition of capital flows influence the degree of vulnerability.

1.3 Contributions to the Literature

There has been a vast amount of research done on the causes of currency crises; however, much less systematic research has been devoted to analysis of the roles of capital flows. This dissertation fills this gap by investigating the behavior of international capital flows before and during financial crises.

The second and the third chapter of the dissertation provide a link between the "sudden stop" literature, which investigates the determinants and consequences of sudden stops of capital flows, and the "hot money" literature, which evaluates the volatility of different types of capital flows. The first literature has not focused yet on the components of capital flow behavior, while the latter has not sufficiently differentiated between crises and normal periods.

The fourth and the fifth chapters of the dissertation show the usefulness of including capital flow variables in crisis models. According to the second-generation crisis models, countries that have neither good nor bad fundamentals could be prone to speculative attacks if they are in a vulnerable zone, where a potential attack on the currency has the power to cause crisis. Previous empirical literature on currency and financial crises has typically neglected the role of large pre-crisis capital inflows in pushing a country into a vulnerable zone. I begin to fill this gap by investigating the effects of surges in capital inflows on the probability of one particular type of crisis, the sudden stops.

1.4 Scope and Outline

In Chapter 2, I identify and compare different types of private capital flows. Specifically, I investigate the behavior of three major types of private capital flows: Foreign Direct Investment, Portfolio Investment and Private Loans. After justifying my classification and discussing some of the measurement issues, I compare the expected behavior of different types of capital flow during crisis and normal times. In this chapter, I also review the previous literature on the volatility of capital flows. I stress the drawback of previous studies stemming from the limited observation periods dominated by large inflows and few crises.

In Chapter 3, I present empirical analysis that uses two different methodologies to measure reversibility of different types of flows. The first is the volatility approach that is used by the previous studies. I apply this methodology by focusing on a longer time period that includes quite a few number of currency crises. By identifying crisis periods, I evaluate the volatility approach and show that it is not necessarily a robust methodology to judge the reversibility of different types of flows. The second analysis is a simple linear regression model, where model parameters for each type of capital flow are compared to rank reversibility. I conclude that the composition of capital flows matters; foreign direct investment is stable. Contrary to the conventional wisdom that portfolio flows are far more dangerous than bank loans, I find that private loans are as reversible as portfolio flows.

In Chapter 4, I explore the theoretical linkages between surges in capital inflows and sudden stops of these flows. I lay out the indirect and the direct channels of surges' contributions to the probability of sudden stops. I describe the indirect channel by pointing out the negative effects of large capital inflows on the economy. I also explain the direct channel by reviewing various hypotheses for the existence of surges ranging from rational portfolio adjustment to irrational herding and information problems. In the chapter, I also go over the relevant empirical literature and show that the evidence is not clear to accept or reject the linkages.

In Chapter 5, I present my empirical findings on the linkages of surges and sudden stops. I construct two indicators, one for identifying surges and the other for identifying sudden stops. Then, using a probit regression model, and controlling for various explanatory variables, I tested the hypothesis that surges increase the probability of sudden stops. The results indicate that a surge in capital inflows significantly increases the probability of a sudden stop. Furthermore, if fundamental economic variables are worsening, in other words if the economy is in a vulnerable zone, surges become more dangerous. I also find that portfolio flows and private loans increase the probability of a sudden stop, whereas foreign direct investment does not have a significant effect. I show that these results are robust to a wide range of alternative ways to define surges and sudden stops.

In Chapter 6, I summarize my results and discuss some of the policy implications that arise from my dissertation and directions for future research.

CHAPTER 2

Background: Reversibility of Different Types of Capital Flows

2.1 Introduction

Currency crises that are accompanied by sharp reversals or "sudden stops" of capital inflows have severe effects on emerging market economies, including sizeable output losses (Calvo 1998, Hutchison and Noy 2002). The increased frequency of these types of financial crises over the last decade and the fact that many of these episodes were preceded by large capital inflows has generated heated discussions about international capital flows. There are several views in the literature regarding the role of capital flows in financial crises. One popular hypothesis is that some types of capital are more likely to reverse than others; in other words, the composition of capital inflows can have an important effect on an economy's vulnerability to a financial crisis.

The empirical studies that have investigated this hypothesis have generally evaluated the time series properties of different types of capital flows. Flows are labeled as "hot" or "dangerous" based on their relative volatility. The underlying rationale is that a more volatile form of capital will be more likely to fly out of the country in the event of a crisis. Conventional wisdom says foreign direct investment is the least volatile and that short-term flows are generally more volatile than long-term ones. Portfolio flows (stocks and bonds) are often singled out as being the most dangerous.

Recent empirical studies, however, do not always confirm these conventional views. For example, Claessens et al. (1995) find that by their measure foreign direct investment is as volatile as the other types of flows. The same study finds no significant difference between long-term and short-term flows. In contrast, Chuhan et al. (1996) reach the opposite conclusion. Sarno and Taylor (1997) find portfolio flows to be the most volatile type of capital, yet Willett et al. (2004) show that the largest outflows during the Asian financial crises were bank loans. Gabriele et al. (2000) conclude that all types of capital flow including the foreign direct investment contributed to instability during the 1990's.

In this chapter of the dissertation, I first describe various ways of classifying private capital flows. Previous studies do not adopt a common system, so I introduce the classification that is used in this study and present my justifications based on both practical and theoretical grounds. Then, I lay out the expected behavior of different types of capital flows during crises and argue that examining the volatility during normal periods is not necessarily very informative about their behavior during times of unexpected crises. The contradictory findings in the empirical literature are due at least in part to the limited time periods over which the volatility was investigated. Samples were often dominated by periods of large inflows. A detailed summary of these studies is also presented in the chapter. From a policy perspective, the magnitude of reversals during crises is more relevant than volatility during normal periods. Mean-reverting monthly or quarterly volatility causes relatively minor problems for balance of payments policy

compared to a relatively stable inflow that displays a large reversal during a crisis.

2.2 Classification of Private Capital Flows

International private capital flows can be classified in three different ways: by the functional types of investment (direct investment, equities, bonds, bank loans), by maturity (short-term vs. long-term), or by the source of the flow (domestic residents vs. foreign investors). In my empirical analysis, I have followed two principles to choose the right classification: data availability and applicability of theory to data. The first is a practical issue and it is a natural limitation. The second, on the other hand, is determined by the purpose of this research, which is to distinguish capital flows based on their reversibility during crisis.

My main data source is the IMF's International Financial Statistics (IFS). This database includes statistics from balance of payments of a wide range of countries. The financial account of balance of payments summarizes the total capital flow transactions in a given year. Table A.1 in appendix A presents the accounts reported under a typical balance of payments financial account.

The first way to group the balance of payments accounts is to divide them into liabilities and assets. Liabilities report the transactions of foreign investors. A positive figure shows an increase, and a negative figure shows a decrease. An increase in this case is a capital inflow and a decrease is a capital outflow. On the other hand, assets report the transactions of domestic residents. A positive figure represents a decrease in domestically

owned foreign assets and a negative figure represents an increase in domestically owned foreign assets. Just like in liabilities, an increase in assets is a capital inflow and a decrease in assets is a capital outflow. Therefore the sum of assets and liabilities give the net increase or decrease in capital flows.

Separating assets and liabilities provides a valuable opportunity to investigate the behavior of foreign and domestic residents. Unfortunately, data on assets are generally missing. Most of the emerging markets that I investigate in this dissertation do not have observations of assets for certain types of accounts. Therefore, I summed assets and liabilities for each type of account to get a net financing measure. This might be a serious drawback, since some countries only have either liabilities or assets, but it is the best I can do to conduct my empirical analysis.

The balance of payments also includes three distinct categories based on the functional types of investment: Direct Investment, Portfolio Investment and Other Investment. The last two of these categories are also classified by the type of transactor. These transactors are the general government, monetary authorities, banks and other sectors. The first two of the transactors report the official capital flows, so they are excluded from the empirical analysis.

The first main category under the financial account of the balance of payments is the foreign direct investment. It is defined as the category of international investment that reflects the objective of a resident entity in one economy obtaining a lasting interest in an enterprise resident in another

economy. It comprises not only the initial transaction establishing the relationship between the investor and the enterprise but also all subsequent transactions between them and among affiliated enterprises, both incorporated and unincorporated. FDI is subdivided into equity capital, reinvested earnings and other capital.

The second category is the portfolio investment. It is defined as cross-border investment in equity and debt securities. It also includes money market debt instruments, and financial derivatives.

The third category, other investment, is a residual group that includes many different kinds of investment. IMF states that in practice, it is not feasible to draw any further functional distinctions among the various types because the reasons underlying the flows are too numerous and varied. Therefore, other breakdowns are used to distinguish behavioral differences among components in this category. These are trade credits, loans, currency and deposits and other investment. Each component is further divided into long-term and short-term categories.

Once the assets and liabilities for each account are summed and net capital flows are calculated, the next step is to decide how to classify the major components of private capital flows. Previous studies that investigated the composition of capital flows do not have a common classification system. Table A.2 in Appendix A summarizes the breakdown of capital flows in the recent empirical studies. While FDI is almost always a separate component of its own, there are some major differences in the classification of portfolio investment and other investment.

A common approach is categorization based on maturity. In this case other investment is divided into two categories, short-term and long-term investment. In addition, portfolio debt flows are sometimes also included in these categories based on the maturity of the debt and portfolio equity flows become a separate category. There are, however, several drawbacks of this classification. First of all, the distinction between long-term and short-term flows is based on the formal criterion of original contractual maturity. This means that a long-term loan, that has one month left for maturity can still be considered as a long-term loan, making the distinction somewhat meaningless from a risk of reversibility point of view. In addition, innovations in financial markets have diminished the usefulness of such a distinction. A second problem is data availability. While it is easier to obtain maturity information for developed nations' capital flows, emerging market balance sheets have missing information.

Assessment of reversibility of different types of capital flows is possible if we can theorize certain behavior for certain types of capital flows. As a result it is crucial to separate capital flows that are expected to behave differently during crisis. The distinction between long-term and short-term flows is not clear, or at least the way it is measured. Therefore, I used a categorization based on the type of investor. Capital flows are divided into three major categories. Table 2.1 shows a simple version of the financial account of balance of payments. As mentioned earlier, assets and liabilities as well as the long-term and short-term sub accounts are summed and

government related accounts under each category are excluded whenever it is possible.

Table 2.1
Financial Account of Balance of Payments - Simple Representation

1. Direct investment
   1.1 Abroad
      1.1.1 Equity capital
      1.1.2 Reinvested earnings
      1.1.3 Other capital
   1.2 In reporting economy
      1.2.1 Equity capital
      1.2.2 Reinvested earnings
      1.2.3 Other capital
2. Portfolio investment
   2.1 Assets
      2.1.1 Equity securities
      2.1.2 Debt securities
         2.1.2.1 Bonds and notes
         2.1.2.2 Money market instruments
3. Other investment
      3.1.1 Trade credits
      3.1.2 Loans
      3.1.3 Currency and deposits
      3.1.4 Other assets

The first category is foreign direct investment into the emerging market. Direct investment flows from the emerging markets abroad are insignificant and from a policy perspective, and as such are not significant causes for concern. Therefore, they are excluded from the empirical analysis. The second category is the net portfolio investment account including both equity and debt accounts and the third category is the private loans account under the other investment account. It includes both bank and other sector loans. I excluded trade credits, currency and

deposits and other assets.[2] These flows are generally stable, and small compared to the size of private loans. In the next section, I argue that the changes in the incentives facing the investors of these three types of capital flows are the major determinants of the behavior during crisis. In addition to the three major categories, I define the net financial account of balance of payments as the total flows including both private and official capital flows. I analyze the behavior of total capital flows and compare it with its individual components in the following chapter. Table A.3 in Appendix A summaries both the computation of various capital flows and their data sources.

2.3 Major Components of Capital Flows

In this section, I briefly review the major categories of private capital flows investigated in this study and the arguments made about their likely relative volatility. I categorize private capital flows based on the types of investor. This leads to three distinct types of capital flows: foreign direct investments, portfolio flows and private loans.

2.3.1 Foreign Direct Investment

Foreign direct investment is generally viewed to be the most stable form of capital flows, both during normal and crisis periods. They mainly consist of fixed assets. They are highly illiquid and difficult to sell during crises. FDI is also influenced more by long-term profitability expectations

[2] See Budiman (2002) and Ramos (2002) for a detailed discussion and an empirical analysis on the assets and liabilities side of balance of payments.

related to a country's fundamentals, rather than speculative forces and interest rate differentials.

The stability view of FDI has several caveats, however. One must distinguish between the degree of reversibility of the bricks and mortar of investment as opposed to the full range of activities associated with the investment. Once the physical investment is made, it is irreversible but the flow of funds associated with that investment is not necessarily irreversible (Sarno and Taylor, 1997). While, most of the fundamental factors that determine FDI do not change suddenly during normal times, a sudden change in perceptions of these fundamentals during a crisis may disrupt these flows of funds. Direct investors may contribute to a crisis by accelerating profit remittances or reducing the liabilities of affiliates toward their mother companies (World Bank, 2000). These are all classified as non-FDI flows. This means that FDI may cause instability by allowing other types of flows to mask them. Flows may enter the country under the heading of FDI and leave under other accounts. If financed locally, FDI may also create outflows such as bank lending or portfolio outflows. Foreign investors can use the physical assets as collateral to obtain a loan from banks and can then place the funds abroad (Bird and Rajan, 2002). In addition, the distinction between portfolio flows and FDI can be somewhat arbitrary, since according to the IMF's classification, an equity investment of above 10 percent is considered FDI.

Much of the observed stability of direct investment flows is likely to be real, however. The depreciation that often accompanies as a crisis can

increase the profitability of many types of direct investment and where the market value of firms falls substantially further inflows may be generated to take the advantage of a perceived bargain (Krugman, 2000).

2.3.2 Portfolio Flows

Portfolio flows consist of both bond and equity investments. Portfolio investors can sell their stocks or bonds more easily and quickly than FDI and they are often considered to be the hottest of the various major types of capital flows.

Portfolio flows are also more susceptible to informational problems and herding behavior. For example, Calvo and Mendoza (2000) show how global diversification of portfolios and informational problems can cause rational herding behavior in financial markets.[3] Furthermore, Haley (2001) argues that mutual fund managers are small in number and they show similar patterns in their trading decisions. They tend to invest all at the same time or leave a market again at the same time causing high instability.

While these factors can explain high volatility of portfolio flows, they neglect an important feature of stock and bond markets. Concerns about portfolio flows come mainly from their high liquidity; at the first sign of trouble, investors can easily sell them. However, most of the time portfolio investors are too late to sell their assets without incurring large losses. To the extent that markets are efficient, the immediate hit to asset prices means that future increases are roughly as likely as decreases. With more

[3] Calvo and Mendoza's model applies primarily to portfolio flows.

price adjustment there is less incentive for future quantity adjustments. The price of these assets can adjust very quickly (Bailey et al. 2000, Willett et al 2004, Williamson 2001). Therefore, the high volatility of portfolio flows during normal times does not necessarily imply a large reversal during crises.

2.3.3 Private Loans

Private loans consist of all types of bank loans and other sector loans including loans to finance trade, mortgages, financial leases, repurchase agreements, etc. They have been a relatively neglected category.[4] Sarno and Taylor (1997) suggest that they are the least important fraction of capital flows in the 1990's in terms of relative size. They argue that: "Because of the liquidity of commercial loans to developing countries once they are made, one might expect commercial banks to look more closely at the underlying economic fundamentals before committing funds and therefore to be less prone to sudden changes of heart. Moreover, once funds are committed this way, it may seriously jeopardize a bank's chances of recovering its investment if lending is suddenly withdrawn." Gabriele et al. (2000) classify loan flows as somewhat volatile, in between portfolio flows and FDI, but not very important. As will be illustrated in the following sections, recent data provides a strongly contrasting picture. Especially during the Asian crises, private loans had the largest reversals.[5]

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[4] See, however, Bailey et al. 2000, Willett et al. 2004, and Williamson 2001.
[5] Ibid.

Due to the illiquid nature of bank loans, their prices do not adjust automatically, and thus banks adjust the quantity of lending instead. During times of financial distress, uncertainty and risk rise, which in turn is reflected in interest rates. Depending on the severity of the situation, rising interest rates further increase the probability of a default, making loan flows more risky. In this case, banks may have larger incentives to pull out from crisis countries in order to cut their losses (Bailey et al. 2000, Willett et al. 2004, Williamson 2001). Credit rationing takes place and foreign investors retrieve their short-term debt and halt lending and rolling-over existing long-term debt. This implies that volatility of loans may differ substantially during crisis and normal periods.

In summary, there are strong reasons to believe that FDI will be the most stable type of private capital flow, although the true degree of stability is likely to be somewhat less than is captured in official statistics. It is not clear, however, whether we should expect substantial differences in the degree of instability of portfolio investment versus loans. There are important counter arguments to the popular view that portfolio flows are the most dangerous and it is difficult, if not impossible, to judge *a priori* the relative importance of the arguments on each side. Thus, we must turn to the empirical evidence.

2.4 Literature Review

The existing systematic empirical studies focus on the overall volatility of capital flows. The implicit assumption is that if time series data shows high volatility for a particular type of flow, then this capital flow

component is "hot" and has a high potential for reversal in a crisis. These studies use various statistical methodologies ranging from simple standard deviation calculations to advanced econometric techniques, such as Kalman filtering and vector autoregression.

Claessens et al. (1995) analyze the distinction between short and long-term capital flows during the 1970's and 1980's.[6] They compared various volatility measures like standard deviations and coefficients of variation for flow types and conclude that there is no significant difference among them in terms of volatility. They also investigate persistence, i.e., whether an inflow is likely to disappear or reverse itself in the near future. They look at autocorrelations, half-life responses, and the predictability of flow series using an autoregressive model. They find very little evidence for significant distinctions among types of flows. One interesting result from their analysis is that the volatility of total flows is less than its components. This suggests some indication that capital flows are fungible, and highly substitutable. To investigate this, they examine how flows interact. Their results show that there is high negative correlation between long-term and short-term flows. Their main conclusion is that in most cases there are no significant distinctions between the time series properties of short and long term capital movements. They are all volatile and unpredictable.

[6] The time period varies across countries. Overall they cover the period between 1972 and 1992. Their long-term flows are bonds, longer maturity loans and reserves. Short-term flows are bank deposits, shorter maturity loans and other short-term official flows.

In a later study, Chuhan, Gabriel and Popper (1997) reach the opposite conclusion for the period between 1985 and 1994.[7] In the first part of their study, they perform similar persistence tests and come to the same conclusion as Claessens et al. Both the stationarity and autoregressive model tests show that there is little significant difference across flow types. Yet, Chuhan et al. argue that similar univariate patterns among series can mask substantial differences if one type of capital flow causes the other one, this can be discerned only when the series are viewed collectively. To illustrate this point, they first look at the Granger causalities for different types of inflows to the same country. They find evidence that short-term inflows follow other flows, but that direct investment does not. Second, they perform cross-country vector autoregressions. Their results show that short-term inflows are more sensitive to changes in short-term inflows elsewhere than is direct investment. In a short section of the paper, Chuhan et al. investigate the Mexican crisis. This is one of the few examples in the recent literature that examines the composition of capital outflows in a particular crisis episode.[8] They find evidence of Granger causality from Mexican short-term outflows to other short-term outflows in Latin American countries. They find no evidence of Granger causality from Mexican FDI to FDI in other emerging markets. Their main conclusion is that composition matters. They find univariate similarities in the sample, but they show that those similarities mask real differences. Multivariate

[7] They classified their capital flows into portfolio (equities and bonds), FDI and long-term and short-term other investments.
[8] See Willett et al. (2004) for another example.

analysis shows that short-term flows respond more dramatically to disturbances in the other flows and in other countries than does direct investment; therefore, short-term flows are hot. They also conclude that differences in long-term flows and portfolio flows are less pronounced.

Sarno and Taylor (1999) apply Kalman filtering to measure the relative size and statistical significance of the permanent and temporary components of various types of capital flows for 1988 to 1997.[9] They argue that the flows that are more likely to have sudden reversals would have large temporary, reversible components. They find that the permanent component in explaining the variance of flows is very large in direct investment, and that portfolio flows have a large temporary and reversible component, suggesting that portfolio investment is particularly dangerous. However, their study includes only a small portion of the Asian crisis in which bank flows show the largest reversal.

IMF (1999) uses sign changes and coefficients of variation of net capital flows to assess volatility during the 1980's and 1990's. They find that while FDI is the least volatile flow, long-term flows have been as volatile as the short term flows.

Gabriele et al. (2000) also employ coefficient of variation and standard deviation measures to assess the volatility and instability of capital flow types for the period 1975 to 1998.[10] They find that volatility and instability increased during the 1990's. They argue that instability overall has

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[9] They classified capital flows as bonds, equities, FDI, official flows and commercial bank credit.
[10] Their short-term flows include portfolio flows, short-term private loans, foreign currency and deposits and official short-term flows.

increased with foreign direct investment and that sudden withdrawals of FDI from East Asian economies during the Asian crises contributed to the reversals. They also investigate the relation between the inflows and outflows of different types of flows within the same period across countries by using Granger causality tests. Their results indicate that outflows and inflows move in the same direction during crisis periods, and in opposite directions during normal periods. Their main conclusion is that short-term flows are very volatile, and in general all types of capital flows contributed to the instability during the 1990's.

Budiman (2002) and Ramos (2002) evaluate the relative usefulness of different volatility indicators that were used by the previous studies.[11] Budiman shows that volatility calculated from inflow periods is a good indicator for size of reversals during crisis in Asia. She looks at the volatility of capital flows to nine Asian countries before the Asian crisis and concludes that other sector and bank loan flows are the most volatile types of capital flows and FDI is stable. She uses coefficient of variation and standard deviation measures to assess volatility for the period of 1988 to 1997. Ramos, on the other hand, focuses on nine Latin American countries and using a similar methodology, he finds that there is no consistent volatility ranking among bonds, equities or loans during non-crisis periods. He also looks at the size of reversals during Mexican crisis and Asian crisis. He

[11] They classified their flows as direct investment, portfolio investment and other investment. Within other investment category, they also separated long-term and short-term flows. In addition, they separately investigated the asset and liability side of each type of flow.

finds that size of pre-crises capital inflows explains the Mexican crisis flow type response and to a lesser degree Asian crisis.

An important problem of the previous studies is the limited time periods over which capital flow volatility has been studied (with the exception of Budiman (2002) and Ramos (2002)). Most of them focus on time periods dominated by inflows and include little data on the recent major currency crises in emerging economies. When volatility is analyzed for a longer sample period without a distinction between crisis and non-crisis periods, the implicit assumption is that components of capital flows behave similarly in both periods. As we discussed in the previous section, investors may act on different incentives during crises then they would have during normal times. To the extent that the difference in behavior is large, the volatility approach will be misleading, especially if crisis periods are under-represented in the sample.

CHAPTER 3

Empirical Assessment of Reversibility

This chapter presents the empirical analysis to assess reversibility of different types of capital flows. The first section examines the relationship between the size of reversals during crisis and volatility during normal periods. I present several measures of capital flow, two alternative volatility indicators based on these measures and simple correlation statistics of the relationship between the size of reversals during crisis and volatility. The second section presents an empirical framework for testing and comparing the reversibility of different types of capital flows using linear regression methods. Empirical results are summarized at the end of the chapter.

3.1 Volatility as a Measure of Reversibility

To assess reversibility of different types of capital flows, this section reapplies the volatility approach of the previous literature with separation of crisis and non-crisis periods. The sample contains 35 emerging market countries from 1990 to 2003. Countries are included in the sample if they are contained in the Emerging Markets Bond Index (EMBI+) or the Morgan Stanley Country Index (MSCI) following Fischer (2001). In addition, Bangladesh, Botswana, Croatia, Hong Kong, Romania, Syria, Uruguay and Zimbabwe are added to the sample due to their large capital inflows during the 1990's.

In order to differentiate between crisis years and normal periods, I employ the methodology of the currency crisis literature, where years of currency crises are identified using conventional exchange market pressure indices. Currency crises are constructed from "large" changes in an index of currency pressure, defined as a weighted average of monthly real exchange rate changes and monthly (percentage) reserve losses.[12] The weights are inversely related to the variance of changes of each component over the sample for each country. Crisis years are identified by changes in the pressure index that exceed the mean plus 2.5 times the country-specific standard deviation.[13] Table A.4 in Appendix A lists the years of currency crisis for the countries in my sample.

3.1.1 Capital Flows during Crisis

The tables that are presented in this section provide summary measures for the behavior of different types of capital flows during crisis periods. I present these measures for two different crisis period definitions. The first takes the crisis period as one year and the second presents the measures computed for the crisis year and the following year. This succeeding table is useful, especially if the crisis hit the emerging market at the end of the year. In these cases, only looking at the crisis year will not reveal the complete picture. In addition, a two-year window for the crisis

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[12] In the original formulation of crises index by Eichengreen et al. (1996) interest rates were also included but because of data problems interest rates have typically been excluded from the construction of these indices for developing countries. For further discussion of these issues see Willett et al.(2005) and the references cited there.

[13] Many studies use either two or three standard deviations. Our results are robust to alternative crises calculations.

period may indicate the longer term magnitude of these crises. In the first two rows of each table, average values for the whole emerging markets and the Asian crises countries are presented. The rest of the rows are for some of the recent well-known crisis episodes.

Tables 3.1.a and 3.1.b present sizes of net capital flows during crisis periods. As the table suggests, not all crises are associated with net capital outflows. In fact, the emerging market average is positive for total capital flows (1.2 billion dollars), indicating that on average emerging markets continued to receive capital inflows even during the crisis. Crises in Russia, Turkey and Asia, however, are associated with outflows mainly in the form of private loans. Table 3.1.b, the two year crisis definition, provides a slightly stronger effect of crisis for the recent crisis countries. Especially for the recent crisis episodes, we see larger outflows and smaller inflows. FDI seems to mitigate the effects of outflow in private loans. For example, for the emerging market average FDI inflows and private loan outflows double following the crisis year. Behavior of portfolio flows is difficult to generalize since we see outflows and inflows for different countries.

Table 3.1.a
Net Capital Flows during Crises (in millions of $) – One year Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1238	3495	-2796	1345
Asian Crises	-2632	3555	-8222	3325
Indonesia 97	-603	4677	-2205	-2632
Korea 97	-9195	2844	-26343	14384
Malaysia 97	2198	5137	-2327	-248
Philippines 97	6498	1222	5137	591
Thailand 97	-12056	3895	-15374	4528
Mexico 94	15787	10972	-216	7415
Russia 98	-11404	2764	-14677	6035
Turkey 94	-4194	608	-4792	1158
Turkey 01	-14644	3266	-11698	-4515

Table 3.1.b
Net Capital Flows during Crises (in millions of $) – Two years Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	2309	7052	-4946	1590
Asian Crises	-9471	6919	-18512	2646
Indonesia 97	-10241	4321	-13818	-4510
Korea 97	-17576	8256	-38088	13160
Malaysia 97	-352	7300	-7493	35
Philippines 97	6981	3509	4623	-337
Thailand 97	-26166	11210	-37782	4884
Mexico 94	5300	20498	-5655	-2962
Russia 98	-28838	6073	-28266	4408
Turkey 94	449	1493	-799	1395
Turkey 01	-13316	4304	-11373	-5108

Absolute sizes of capital flows make comparison difficult across countries. To control for the varying size of different emerging markets, I

scaled sizes of capital flows based on the Gross Domestic Product of each country. Tables 3.2.a and 3.2.b present net capital flows as a percentage of GDP for each type of capital.[14] The tables show that except for private loans, other types of capital continued to flow in to the emerging economies even during the crisis years. In general, foreign direct investment inflows are the largest. Portfolio flows decrease during crises, but net outflows only occurred from Indonesia, Malaysia and Turkey. Private loans on the other hand, flowed out from all crisis countries.

Table 3.2.a
Net Capital Flows during Crises as a Percentage of GDP* – One year Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1.1%	1.9%	-1.0%	0.1%
Asian Crises	0.3%	2.2%	-2.0%	0.9%
Indonesia 97	-0.3%	2.1%	-1.0%	-1.2%
Korea 97	-1.7%	0.5%	-4.7%	2.6%
Malaysia 97	2.2%	5.1%	-2.3%	-0.2%
Philippines 97	7.7%	1.5%	6.1%	0.7%
Thailand 97	-6.5%	2.1%	-8.3%	2.4%
Mexico 94	3.8%	2.6%	-0.1%	1.8%
Russia 98	-2.2%	0.5%	-2.8%	1.2%
Turkey 94	-2.3%	0.3%	-2.7%	0.6%
Turkey 01	-6.2%	1.4%	-4.9%	-1.9%

* Due to the effects of devaluations, dollar GDP values fall during crises. This would give a misleading measure of capital inflows. To prevent this problem, the previous year's GDP is used in calculations.

[14] We used GDP as a scale measure. Other possible alternatives are the money supply and international reserves.

Table 3.2.b
Net Capital Flows during Crises as a Percentage of GDP* – Two years Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	2.1%	3.4%	-1.6%	0.1%
Asian Crises	-2.8%	4.2%	-7.1%	0.5%
Indonesia 97	-4.5%	1.9%	-6.1%	-2.0%
Korea 97	-3.2%	1.5%	-6.8%	2.4%
Malaysia 97	-0.3%	7.3%	-7.4%	0.0%
Philippines 97	8.3%	4.2%	5.5%	-0.4%
Thailand 97	-14.1%	6.1%	-20.4%	2.6%
Mexico 94	1.3%	4.9%	-1.4%	-0.7%
Russia 98	-5.6%	1.2%	-5.5%	0.9%
Turkey 94	0.2%	0.8%	-0.4%	0.8%
Turkey 01	-5.6%	1.8%	-4.8%	-2.1%

* Due to the effects of devaluations, dollar GDP values fall during crises. This would give a misleading measure of capital inflows. To prevent this problem, the previous year's GDP is used in calculations.

Net flows during crises do not necessarily portray the severity of reversals or sudden stops. In a situation where previous capital inflows were large, a sizeable fall in inflows could cause a financing or adjustment problem. Thus, a capital account crisis does not necessarily require an outright reversal of capital flows; for example, a fall in capital inflows from five to one percent of GDP could cause more problem than a reversal from a one percent inflow to a one percent outflow. A measure that would capture the magnitude of the fall in capital inflows is the following:[15]

$$\frac{K_{t-1} - K_t}{GDP_{t-1}} \qquad (1)$$

where K is a capital flow component. A larger positive value for this ratio indicates a larger reversal.

[15] Radelet and Sachs (1998), and Rodrik and Velasco (1999) use this measure to identify capital account reversals.

Table 3.3.a
Net Capital Flows Reversals during Crises as a Percentage of GDP – One year Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1.6%	-0.4%	1.6%	1.1%
Asian Crises	8.2%	0.0%	6.4%	1.7%
Indonesia 97	5.1%	0.7%	1.4%	3.4%
Korea 97	5.9%	-0.1%	6.9%	0.1%
Malaysia 97	7.2%	-0.1%	7.5%	0.0%
Philippines 97	5.7%	0.4%	0.1%	5.6%
Thailand 97	17.0%	-0.8%	16.2%	-0.5%
Mexico 94	4.3%	-1.6%	0.6%	5.0%
Russia 98	2.8%	0.4%	0.4%	2.2%
Turkey 94	7.3%	0.0%	5.6%	1.5%
Turkey 01	9.8%	-1.0%	8.1%	2.3%

Table 3.3.b
Net Capital Flows Reversals during Crises as a Percentage of GDP – Two years Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1.4%	-0.6%	1.3%	0.9%
Asian Crises	6.4%	-0.4%	6.0%	0.6%
Indonesia 97	4.8%	-0.1%	2.0%	3.0%
Korea 97	4.8%	-0.2%	6.2%	-0.5%
Malaysia 97	5.4%	-1.0%	6.4%	-0.2%
Philippines 97	-1.4%	0.3%	-2.0%	0.7%
Thailand 97	18.4%	-1.0%	17.3%	-0.2%
Mexico 94	2.7%	-1.6%	2.3%	2.8%
Russia 98	-1.6%	0.0%	-0.9%	-0.3%
Turkey 94	4.4%	0.1%	3.5%	0.7%
Turkey 01	8.2%	-1.0%	6.4%	3.3%

Tables 3.3.a and 3.3.b present reversal measures. A good example for justification of this measure is the case of the Mexican crises in 1994.

Previous tables suggest that during crisis, portfolio inflows were positive and private loans were negative. On the other hand, the reversal measure provides a more accurate indication, as the fall in portfolio flows to Mexico was about five percent of GDP and the fall in the private loans was almost 10 times smaller than that.

In both tables, we see that except for FDI, all types of capital flows display large reversals during crises. The fall in capital inflows is largest for private loans during the Asian crises. Other emerging market crises witness similar falls in both portfolio and loan flows. The data also suggest that FDI usually does not reverse. On the contrary, it increases in some of the episodes, providing crude evidence for their stability. During the Asian crises, the largest outflows were from the private loan category, presumably mainly bank loans. Thailand, for example, experienced a fall in capital inflows of 17 percent of GDP and almost all of this fall was in private loans. Reversals in Indonesia and Philippines were predominantly from portfolio investors. Both crises in Turkey were associated with reversals in private loans, while the reversals in Russia and Mexico were mainly portfolio flows. There is no clear-cut conclusion in terms of reversal sizes across different crises episodes for private loans and portfolio flows. When all reversals are averaged across emerging markets, reversal sizes are similar.

3.1.2 Volatility of Capital Flows

Next, volatility for each type of flow is calculated. Previous studies have employed several different methodologies, the most popular ones being

the standard deviation and coefficient of variation. At this point, it is worth mentioning some of the issues with the measurement of the statistical indicator of volatility. The choice of the indicator will have important effects on the comparison of volatilities across capital flow types and countries.

The standard deviation provides an absolute measure of variability, but does not allow for comparison with other countries and provides a weak basis for interpretation. For example, an annual standard deviation of 100 million dollars would have a miniscule effect on financial markets of a country receiving large amounts of capital inflows like China, but such fluctuations could cause serious financial instability in a smaller economy like Ecuador.

Another problem with the standard deviation is that it may be biased if capital flows are non-stationary. Surges of capital inflows preceding crises have substantial time trends, which would bias the standard deviation measure to be larger than if the trend component were removed. Yet with a limited number of observations, this could be a serious challenge.

The coefficient of variation, the ratio of standard deviation to its mean, provides a measure of volatility than can be compared across countries. It is a popular indicator, but the type of volatility it indicates is of little policy relevance because it does not take size into account. For example, consider two types of capital inflows. The first has a mean of two and a standard deviation of four. The second has a mean of five and a standard deviation of 10. The coefficient of variation is two for both of them. Both of these flows are equally volatile. Without additional information on

the relative sizes of these countries we cannot conclude which volatility is more important.

From a policy perspective, the size of absolute variation or variation in relation to the average level is not likely to be as important as the variation in relation to the size of the country's international reserves, national income or financial sector. The standard deviation of the reversal term (1) satisfies this requirement and handles the caveats of standard deviation as an indicator of volatility: GDP as a denominator enables comparison of variability across countries and conveys policy relevant information about the magnitude of flows. Furthermore, taking the difference of capital flows usually takes care of potential non-stationarity problems.

Table 3.4.a, 3.4.b and 3.4.c present the standard deviations of the reversal measure. There are several consistent patterns. First, FDI has the lowest volatility among all flows and it does not differ substantially between volatility calculated from the whole period and non-crisis periods. This is evidence of the stability of this type of flow, and is consistent with the conventional wisdom and most previous studies. A second pattern is that the volatility of private loans is usually close to or higher than the volatility of portfolio flows. Third, volatilities calculated for the whole period are higher than non-crisis period volatility for total flows, and with some exceptions, this also applies to private loans. On the other hand, excluding crisis years does not decrease the volatility of portfolio flows.

Table 3.4.a
Volatility of Capital Flows: Standard Deviation of the Reversal Measure* – One Year Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.4%	1.9%	3.8%	3.0%
Asian Crises Countries	3.7%	1.4%	4.1%	2.1%
Indonesia	2.7%	1.6%	3.1%	0.6%
Korea	2.0%	0.5%	1.4%	1.6%
Malaysia	6.5%	2.4%	6.0%	1.6%
Philippines	4.3%	1.1%	6.4%	4.9%
Thailand	3.0%	1.2%	3.7%	1.8%
Mexico	3.4%	0.9%	2.2%	2.9%
Russia	5.4%	0.3%	3.6%	2.6%
Turkey	3.9%	0.4%	3.1%	2.1%

*Standard deviation of ratio of first difference of net capital inflows to previous years GDP.

Table 3.4.b
Volatility of Capital Flows: Standard Deviation of the Reversal Measure* – Two Years Crisis Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.2%	1.9%	3.7%	2.8%
Asian Crises Countries	3.6%	1.3%	4.1%	2.1%
Indonesia	2.3%	1.5%	2.8%	0.6%
Korea	2.1%	0.5%	1.3%	1.3%
Malaysia	6.6%	2.2%	6.2%	1.6%
Philippines	4.0%	1.1%	6.7%	5.3%
Thailand	3.1%	1.0%	3.5%	1.7%
Mexico	2.8%	0.9%	2.2%	2.6%
Russia	5.7%	0.3%	3.9%	2.7%
Turkey	3.0%	0.1%	2.2%	2.2%

*Standard deviation of ratio of first difference of net capital inflows to previous years GDP.

Table 3.4.c
Volatility of Capital Flows: Standard Deviation of the Reversal Measure* - Whole Period

	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.5%	1.9%	3.9%	3.0%
Asian Crises	4.5%	1.3%	4.7%	2.1%
Indonesia	3.1%	1.6%	3.0%	1.2%
Korea	2.7%	0.5%	2.6%	1.5%
Malaysia	6.6%	2.3%	6.2%	1.5%
Philippines	4.2%	1.0%	5.9%	4.8%
Thailand	5.7%	1.2%	5.9%	1.7%
Mexico	3.6%	0.9%	2.1%	3.2%
Russia	5.2%	0.3%	3.4%	2.6%
Turkey	5.3%	0.5%	4.3%	2.1%

*Standard deviation of ratio of first difference of net capital inflows to previous years GDP.

To evaluate and to compare the policy relevance of other indicators, I also computed coefficient of variations and standard deviations of each type of capital flow, based on the three measures that I present in the preceding section: size of capital flows, size of capital flows scaled to GDP and the capital flow reversal measure (1). These measures are presented in Table B.1 through Table B.10 in Appendix B. The bottom panel in each table shows the volatility calculated using the whole sample. The upper panel presents calculated volatility that excludes the crisis periods. Again, here I report two versions for each table: one that takes the crisis period as a single year, and one that defines both the crisis year and the following year as crisis. Tables B.1 through B.6 report standard deviations of size of capital flows and size of capital flows when scaled by GDP. Tables B.7 through B.10 present the same measures using the coefficient of variation.

When the coefficient of variation is used as the volatility measure I do not find any clear pattern across countries and across different flows. The sizes of coefficients are very sensitive to the inclusion of crisis years in the sample. These simple statistics can be interpreted in two ways. One is that there is no systematic difference in terms of volatility among different types of capital flows. The other is that the coefficient of variation is not a reliable indicator of policy relevant volatility. I am inclined towards the second explanation.

On the other hand, standard deviation always provides more consistent patterns compared to the coefficient of variation. Tables B.7 through B.10 are also in line with the previous analysis. FDI has lowest volatility and private loans have higher volatility than portfolio flows.

3.1.3 Volatility and Reversals

So far the evidence suggests that private loans are as volatile as portfolio flows and that FDI is stable. The relevant question for policy is whether a higher volatility implies a higher reversibility. Next, I present the correlations of capital flows during crises and volatility calculated from the whole period and from non-crisis periods for each type of flow.

Tables 3.5.a and 3.5.b report the correlations of reversal size during crisis and volatility based on the standard deviation of reversal measures. When crisis years are excluded from the standard deviation calculations, the correlation coefficients are low for total flows and private loans (0.22 and 0.37 in Table 3.5.a and 0.26 and 0.21 in Table 3.5.b). Since private loans

represent the largest share of capital flow reversals in most crises, this finding shows that their volatility during normal times has little, if any, explanatory power for behavior during crisis periods. Correlations increase dramatically when crisis years are included.

Coefficients for portfolio flows and FDI are higher and do not change much with the inclusion of crises. FDI has a negative correlation, however, implying that a higher volatility for FDI under normal periods is associated with a lower size of reversal during crises. This peculiar result is caused by the tendency of FDI to increase during crises and it implies that volatility during normal periods does not necessarily imply a larger reversal during crises for every type of flow. To summarize, the volatility-reversal relationship is sensitive to the inclusion of crises years for private loan flows, stronger for portfolio flows, and is counter-intuitive for FDI. This suggests that a different methodology is required to analyze the reversibility of capital flows.

Table 3.5.a
Correlations of Reversal Size and Volatility – One Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	0.22	0.39
FDI	-0.52	-0.57
Private Loans	0.37	0.57
Portfolio Flows	0.53	0.64

Table 3.5.b
Correlations of Reversal Size and Volatility – Two Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	0.26	0.39
FDI	-0.51	-0.57
Private Loans	0.21	0.57
Portfolio Flows	0.5	0.64

Correlations are very low when the coefficient of variation is used as the volatility indicator regardless of the measure used (Tables B.11 through B.13 in Appendix B). Standard Deviation, on the other hand, provides high correlations when absolute and scaled measures of capital flows during crisis are used (Tables B.14 and B.15 in Appendix B). However, as I have argued before, these volatility measures are questionable and high correlations do not necessarily mean that a high volatility is associated with high reversibility, since not all correlations are positive. For instance, we see positive correlation for portfolio flows, meaning that higher volatility of this type of flow during normal times indicates higher levels of inflows during crisis. This is the exact opposite of what previous studies assumed about the behavior of portfolio flows.

3.2 An Alternative Empirical Model of Reversibility

In discussions of sudden stops and the variability of capital flows it is often assumed that international capital will act, at least to some degree, differently from domestic capital. On this assumption a country is likely to have larger outflows in a crisis, the greater is the amount of foreign capital

already in the country, i.e. the larger have been the previous capital inflows. I therefore also investigate the size of net outflows in relation to the preceding cumulative capital. We know, of course, that domestic capital also tends to flow out during crises. Indeed, many countries that have attracted little foreign capital have had huge capital outflows from capital flight. Thus, we should not expect to find a strong regular relationship between outflows during crises and previous capital inflows. Ideally, I would like to analyze separately reversals of both domestic and foreign flows. Unfortunately, data that would allow me to conduct such analysis is not publicly available on a broad basis.[16]

Consider the following equation for the size of reversals:

$$\text{Reversal}_{j,i,t} = \alpha_j + \beta_j A_{j,i,t} + \varepsilon_{j,i,t} \ , \qquad (2)$$

$j = 1,2,...J$
$i = 1,2,...N$
$t = 1,2,...T$

where j indexes the type of capital flow, i indexes countries and t indexes crisis periods. The dependent variable is the reversal measure for the capital flow type j in country i during the crisis in year t. $A_{j,i,t}$ is the accumulated previous capital inflows; it is constructed as the sum of the previous years of capital flows relative to GDP.

Heterogeneity across types of flows is introduced through the constant term, slope coefficients and error terms. If components of capital

[16] Domestic residents' transactions are represented by the assets on the balance of paymentsstatistics. Data on these are limited for portfolio flows and private loans. Our net capital inflow measure includes assets for some countries, but it is not possible to assess the size of possible asset outflow during a crises with the available data.

flows differ in terms of their reversibility, then by comparing the significance and size of the parameters of the model for different values of *j*, a reversibility ranking could be established. Therefore, the expected sign for the slope coefficient is positive. Based on equation (2), four alternative model specifications are tested. The results for the first three models are in Table 3.6 and the fourth model is in Table 3.7.

Table 3.6
Cumulative Inflows and Reversals: Models 1, 2, and 3

	1. OLS (Total Flows)	2. Pooled OLS	3. Least Square Dummy Variable Model
Cumulative Inflows	0.104 (-0.106)	0.102 (-0.061)	0.135 (-0.038) ***
Constant	0.004 (-0.018)	0.005 (-0.005)	0.014 (-0.004) ***
FDI Dummy			-.026 (-0.006) ***
Portfolio Dummy			-0.008 (-0.007)
R Square	0.06	0.06	0.18
# of Observations	40	100	100

Standard deviations are in parenthesis.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table 3.7
Cumulative Inflows and Reversals: Model 4

	IV. Seemingly Unrelated Regressions Model		
	FDI	**Loans**	**Portfolio**
Cumulative Inflows	-0.034	0.295	0.203
	(-0.055)	(-0.074)***	(-0.056)***
Constant	-0.003	0.012	0.003
	(-0.005)	(-0.008)	(-0.004)
R Square	0.01	0.26	0.3
# of Observations	27	27	27

Standard deviations are in parenthesis.
* Significant at 10%; ** significant at 5%; ***significant at 1%

3.2.1 Ordinary Least Squares Model for Total Net Capital Flows

Emerging market economies receive large amounts of capital inflows during normal periods and the composition of these inflows varies. If different types of capital flow have different reversal potential, then without taking the composition into consideration, previous total net capital flows should not explain the size of total reversal. To test for this, I take the reversal of total capital flows as the dependent variable and regress it on its cumulative flows. The coefficient for accumulated inflows and the overall fit of the model are insignificant; previous total cumulated capital inflows have no explanatory power over the size of total reversals during crises.[17]

3.2.2 Pooled OLS Model with a Robust Covariance Structure

[17] Several studies have found the size of total capital flows to be significant in explaining crises likelihood (See for example: Radelet and Sachs 1998, Domac and Peria 2000). What makes our analysis different is the focus on the reversal size instead of the crisis probability.

Countries sometimes receive outside financial help from developed nations and the IMF during crises. Since total capital flows are represented by the financial account of the balance of payments, bailouts and emergency loans may be included, and this may not reflect the correct size of a reversal. To test for differences of reversals across capital flow types, observations for the three major types of capital flows are pooled. In this model, the slope coefficient and the constant term are assumed to be the same for all types of capital flows. Differences across types of capital flows may arise from different variances or from the co-variances of the disturbances of the equations. The model is estimated with the feasible generalized least squares method. I control for the groupwise heteroscedasticity, where each group is a major type of capital flow. The results are similar to the first model. All coefficients are insignificant and the overall fit of the model is very low.

3.2.3 Least Squares Dummy Variable Model

Results from the first two models show that we cannot explain the size of reversals with accumulated inflows if we assume that all types of capital flows have the same behavior during crises. The composition of capital flows needs to be taken into consideration.

Capital flow types might have different degrees of reversibility due to some unobservable factors. The fixed effects approach takes α_j to be a flow type specific constant term in the regression model. The unobserved effects are reflected in this constant term. Using the same pooled observations

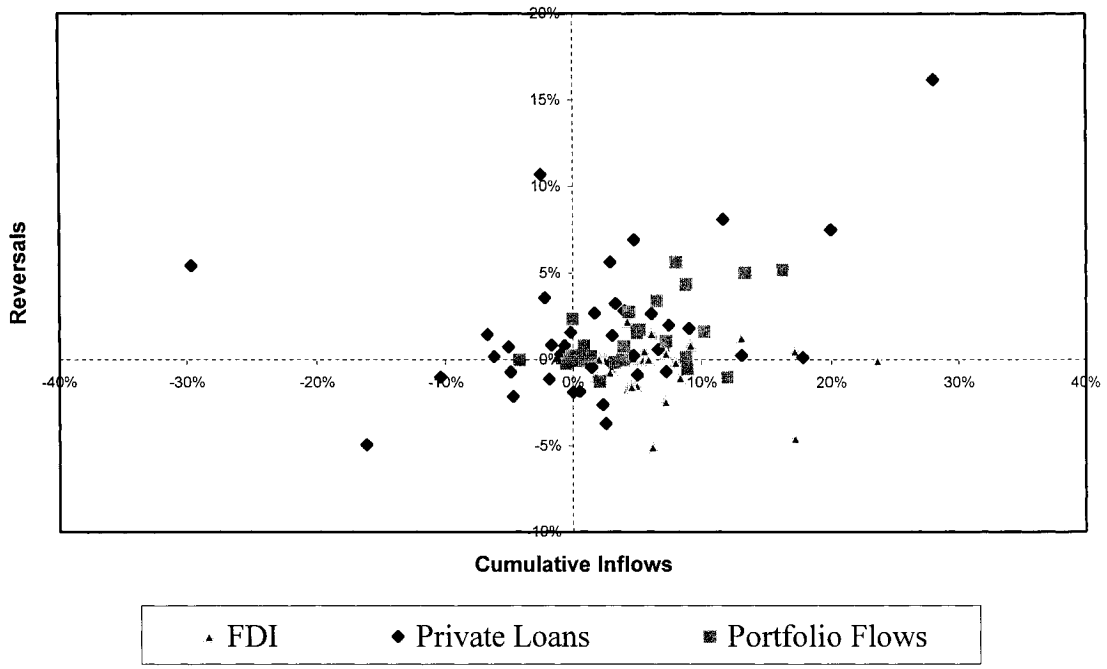
from the previous model, I add two dummy variables, one for portfolio flows and one for FDI. The dummy for private loans is excluded from the regression so the constant term becomes the base for this type of flow. The dummy coefficients for the remaining capital flow types measure the extent to which they differ from private loans. In this case a negative sign for these dummies indicates less reversibility relative to private loans, and a positive and significant constant term would reflect the reversibility of private loans.

Results indicate that the constant term is positive and significant, indicating a high reversibility of private loans. The dummy coefficient for portfolio flows is close to zero and insignificant; portfolio loans are as reversible as private loans. The coefficient for the FDI dummy is negative and significant. Accumulated FDI flows actually "cause" FDI to increase during crises, a finding that confirms the stability of FDI as the volatility measurements from the previous section indicated. The slope coefficient is positive and significant.

3.2.4 Seemingly Unrelated Regressions Model

So far the slope coefficients have been restricted to be the same across flow types. It is quite plausible that the slopes would differ across capital flow types. In this case the slope coefficient would also provide an indication of reversibility. For example, based on my previous findings, one would expect a lower coefficient of accumulated inflows for FDI. Figure 3.1 illustrates the relationship of cumulative flows and reversal sizes; it provides some preliminary evidence in favor of this model.

Figure 3.1
Capital Flow Reversals and Accumulated Inflows*



* The reversal measure is the ratio of difference of crises year net capital inflows and the previous year net capital inflow divided by the previous year's GDP. The cumulative inflows are defined as the sum of total capital flows in the five years preceding the crises divided by the GDP of the year before crisis. See the text for details.

One way to estimate the slopes is running OLS regressions for each flow type then comparing coefficients. However, a more realistic approach is to assume that disturbances for each flow type during a given crisis are correlated. During unexpected crises, risk perceptions and expected returns for all types of capital flows can change dramatically, and it is safe to assume that these changes have some common terms. The main question is whether the magnitude and direction of these changes are equal, which would otherwise reflect on the varying size of the reversals. By relaxing the

constraint that all three types of flows have the same slopes, we obtain a three-equation seemingly unrelated regression model.

The results are shown in Table 3.7. The slope coefficient for private loans is significant and larger than any other flow type's slope coefficient. If one ranks the slope coefficients as well as the constant terms, the same order is reached as in the previous model. Private loans have a slope coefficient of 0.29, larger than the portfolio slope coefficient of 0.20. However, the difference is not statistically significant. Both of these coefficients are significantly larger than the FDI coefficient. I find a negative and insignificant coefficient for FDI. This also confirms that FDI does not tend to reverse during crises. The explanatory powers of the models are also stronger compared to previous models. Except for the FDI regression, both private loan and portfolio flow regressions have larger R squares.

3.3 Summary

In this chapter, I present my empirical findings on the reversibility of components of capital flows to emerging markets. The central focus is on differentiating crisis from non-crisis periods. My empirical analysis confirms that foreign direct investment is the most stable type of capital flow during crises. Contrary to popular view, portfolio flows are not clearly the most reversible; private loans, a neglected type, are as reversible as portfolio flows. I also find that volatility of capital flows is not a good predictor of the size of their reversal.

CHAPTER 4

Background: Surges and Sudden Stops of Capital Flows

4.1 Introduction

The rash of major emerging market financial crises over the past decade has led to a good deal of fundamental re-thinking about what we thought we knew about international financial flows. Most of these financial crises have been characterized by a reversal or 'sudden stop' (Calvo, 1998) of capital flows followed by sizeable output loss. Often there has been a preceding surge of private capital flows fueled by such factors as economic reforms and reductions in capital controls. Recent crises in Mexico in 1994 and in Asia in 1997 are well-known examples of the speed and magnitude of capital inflows and their reversals accompanied by severe financial crises.

The possible detrimental effects of "excessive" capital inflows have often been discussed, but hardly any empirical studies systematically investigate this issue. Out of 56 empirical cross country crisis studies that have been surveyed in Kaminsky, Lizondo and Reinhart (1998) and Abiad (2003) only six of them include an individual measure to control for a component of previous capital inflows. Among this six, only one of them has a variable for total capital inflows (Sachs, Tornell and Velasco, 1996).

Chapter 4 and Chapter 5 of this study fill this gap by investigating the effects of surges in capital inflows on the probability of one particular type of crisis, the sudden stop. I focus on the sudden stop episodes for 38

emerging markets for the period 1990 to 2003. More specifically, I construct and test several hypotheses dealing with the following three questions:

- Do surges in capital inflows have any effect, direct or indirect, on the probability of their sudden stops?
- Do weak fundamentals make surges more reversal prone?
- Does the composition of capital inflows during the surge increase the chances of a reversal?

Sachs, Tornell and Velasco (1996), provide the only study that empirically investigates all of these issues and they find that neither high capital inflows nor their composition has any significant effect on currency crises. However, their study focuses on 20 emerging market economies only during the 1994 Mexican currency crisis and it does not include the second half of the 1990's. As a result it leaves out many recent emerging market crises. This study is the first to specifically investigate the connection between large capital inflows and a sudden stop crisis in a cross country panel setting.

In this chapter of the dissertation, I summarize some of the theoretical linkages between surges in capital inflows and sudden stops. These theoretical linkages also provide a basis for constructing my hypotheses. After I lay out my four hypotheses, I go over the recent literature on related issues.

4.2 Linkages between Surges and Sudden Stops

4.2.1 Indirect and Direct Effects

Why would a large increase in capital inflows increase the likelihood of its reversal? Theoretically, surges in capital inflows and the probability of a sudden stop can be connected through two channels. The first is the indirect effect of high capital inflows on the likelihood of financial crises, which is through the effects of inflows in causing deteriorating economic fundamentals. The second is a direct one. If a rapid and large increase in capital inflows is not warranted by the economic fundamentals, then it may imply an eventual downward adjustment.

4.2.1.1 Indirect Effects

Through several open economy macro effects, surges in capital inflows indirectly increase the likelihood of financial crises and therefore may cause their own sudden stop. Large capital inflows are likely to affect the following macroeconomic variables:

Real Exchange Rate and Current Account Balance

By influencing the relative prices they are very likely to cause substantial real exchange rate appreciation, which worsens the competitiveness of the export sector.[18] Loss of competitiveness would lead to

[18] See Edwards (1998) for empirical evidence.

a sizeable widening of the current account deficit and increase in the likelihood of a default on external debt.

Under a flexible exchange rate system, large capital inflows cause both the nominal and the real exchange rate to appreciate. Under a fixed exchange rate system, central banks will intervene in the foreign exchange market to prevent the domestic currency from appreciating. This means an increased supply of domestic currency and accumulation of international reserves by the central bank. Unless sterilized, this type of intervention will push the domestic prices up, and cause the real exchange rate to appreciate. While, under both exchange rate regimes, large capital inflows cause real exchange rate appreciation whether through prices or the nominal exchange rate, under the fixed exchange rate regimes the economy becomes particularly vulnerable to currency crisis. Real exchange rate appreciation increases the probability of an exchange rate adjustment, which may in turn trigger a speculative attack on the currency.

Domestic Credit

Domestic intermediation of large capital inflows with banks and other institutions can also cause rapid expansion of domestic credit. The abundance and ease of obtaining credit will attract all types of investment projects including highly risky ones. This type of credit expansion may also increase the share of non-performing loans and therefore put the financial system in a very vulnerable situation. Even though the domestic projects are sound, banks, by borrowing at shorter maturities abroad and by

financing long-term projects domestically, increase the liquidity risks in the financial sector. While such effects could likely be offset by domestic authorities, we see that in many developing countries macroeconomic policies have been pro- rather than counter-cyclical.

Stock Prices

When the capital inflows are in the form of portfolio investment, they will have a direct effect on the stock prices. Most of the emerging market stock indices in Asia outperform the US and European indices during the surge period of capital inflows.

Budget Balance and National Debt

Finally, large capital inflows may have effects on the budget balance and national debt as well. One hypothesis is that large capital inflows make it easier for sovereign governments to borrow from abroad and therefore finance budget deficits (Kaminsky, Reinhart and Vegh, 2003). Without any credit constraints, high capital mobility basically creates incentives for politicians to engage in expansionary fiscal policies. Another problem arises if the central bank sterilizes these inflows by selling treasury bills. Since the interest rates are higher domestically, the central bank sells high-yielding treasury bills and accumulates low-yielding international reserves. Since sterilization maintains the interest rates at their high levels, continuation of the intervention by the central bank means accumulating national debt and

an increase in budget deficits due to the interest costs (Calvo, Leiderman and Reinhart, 1996).

4.2.1.2 Direct Effects

The second channel that is not mutually exclusive from the open economy macro effects is based on the likely instability of surges. Considering the high volatility and reversibility of international capital flows, a downward adjustment of inflows becomes a high possibility if they exceed their justified levels. While it is extremely difficult to determine the "justified levels," one can assess a probability whether the changes in capital inflows are moving away or moving to justified levels. For example, if the current account deficit is widening and the surge in capital inflows is continuing, then a high probability can be assigned to the claim that capital inflows are not justified. In this case, the probability of a slow down or reversal will increase as well. The important issue is whether this adjustment would be smooth or sudden.

In a world with perfect information, as surges in capital inflows begin to push the economy into a vulnerable zone, investors would realize this, expected returns would fall and risk would rise, and capital inflows would gradually decrease. So we would expect smoother movements in capital flows.

Portfolio Adjustment

Yet, in this perfect world, sharp changes in capital flows are still a possibility. A large increase in capital inflows could be caused by unexpected favorable news about the emerging markets' economic prospects. This would increase the expected returns and decrease the perceived riskiness of investment, which in turn would cause foreign investors to increase their portfolio shares towards these countries. This is a stock adjustment process and may require large flow adjustments in the short-run causing the surges in capital inflows (Bacchetta and Vincoop, 1998; Edwards, 1998). The only circumstance that would turn these inflows into a sudden stop is unexpected news that would change portfolio allocation decisions in the opposite direction. Otherwise a gradual adjustment towards a steady state is expected in the long run.

Herding

If the assumption of perfect information is relaxed, then surges may be associated with a 'bubble' like behavior for capital inflows. There is an extensive theoretical literature on bubbles and behavioral and informational problems of the financial markets, going back all the way to Keynes' famous beauty contest analogy. In a beauty contest the prize is awarded to the competitor whose choice best predicts the average competitors' as a whole. This leads to each competitor picking, not those faces, which they think are the most beautiful, but those they think other competitors will vote for. In the context of international capital flows, this type of behavior leads to

herding, investors rushing into emerging market assets, not based on the fundamentals but based on making money by expecting other investors decisions.[19] This type of herding behavior could lead to mass psychology and could be very volatile. On the other hand, herding in financial markets could also be based on rational behavior. Calvo and Mendoza (2000) show that globalization of asset markets can reduce incentives for information collection and produce herding and high volatility. This occurs because globalization makes diversification much easier so the individual investors do not need to invest in country-specific information or because of reputation costs portfolio managers find it optimal to mimic arbitrary market portfolios.[20]

Psychological Biases

Combining the concepts of credit rationing and uncertainty with psychological biases, Guttentag and Herring model a financial crisis that is preceded by excessive investments.[21] In the model, credit constraints are relaxed initially (financial liberalization), which triggers investors to rush into the market. They argue that due to uncertainty these investors do not know the distribution of disastrous outcomes and their perceived risk is below the true level. This behavior is called 'disaster myopia.' One important element of disaster myopia is psychological biases that include the 'cognitive dissonance,' which appears when new information is

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[19] See Bikhchandani and Sharma (2000) for a review of herding in financial markets.
[20] Their formal model focuses on capital outflows and contagion but it also applies to surges in capital inflows.
[21] See Griffith-Jones (1998) for a survey on financial fragility approach.

interpreted in the direction that the investor chooses. This type of behavior justifies the previous actions taken by the investors and gives them a feeling of comfort. If we apply this to the capital flows, the period where capital inflows start to converge their true levels, can be considered as the stage of disaster myopia. Cognitive dissonance prevents investors from evaluating the new information about the riskiness of their investments and they continue to invest until a shock reverses all the beliefs.

Moral Hazard

Surges in bank lending can be explained by moral hazard (Krugman, 1998; Corsetti, Pesenti and Roubini, 1998). According to these types of models, even if the investors know the true distribution of returns, they will not change their portfolio shares to the extent that they expect to be bailed out in the case of a crisis. International investors in Mexican government securities were bailed out during the Mexican crisis, and many commentators believe this was the major reason behind surges in capital flows to Asia.[22]

Institutional Decisions

One other explanation for the surges in capital flows over their fundamentally sound levels also involves rational institutional decisions. Large financial institutions lending internationally are concerned about their market share. In order to keep or increase their market share, sometimes

[22] Willett et al. (2004) provides statistical evidence against the strong form of the moral hazard argument for the Asian crises.

they may have to ease on the credit criteria applied to loans. Of course this would increase both risks and the level of loans to emerging economies.

All of these arguments imply that foreign investors' portfolio decisions are not purely based on country fundamentals or may be influenced by informational problems and psychology. It is evident that international investors neither always behave according to the farsighted rational expectations view, nor only generate unwarranted reversals of investment. However, the abundance of explanations for instability of capital flows presents the possibility that international investors may not adequately foresee problems, and they may overreact once the problems occur.[23]

The existing explanations of the surges in capital inflows are sufficient to justify an empirical study of their effect on the probability of large reversals or sudden stops. The first and the central hypothesis that will be investigated in this study is:

Hypothesis 1: A surge in capital inflows directly and indirectly increases the probability of a sudden stop.

The first hypothesis is simple and restrictive. A surge may increase the probability of a sudden stop, but what are the other factors that would make a surge more likely to turn into a sudden stop?

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[23] See Willett (2000) for discussions of different forms of such hypotheses.

4.2.2 Role of Weak Fundamentals

Besides the effects of high capital inflows on economic fundamentals, their interactions with these fundamentals may increase the probability of a sudden stop. During periods of high and persistent capital inflows, worsening fundamentals will increase the gap between the justified levels and the actual levels of these capital inflows. As a result, both the size of the capital flow bubble and the probability of it bursting will increase. For example, the large capital inflows to Mexico at the end of the 1980's were seen as natural and justified by the stabilization programs that increased the growth potential of this economy. However, towards the end of 1993, only months before the crisis, the fundamentals that brought these high inflows were no longer favorable. Mexico had a large current account deficit, and a big external debt, yet the levels of capital inflows remained high.

Any factor that would cause investors to re-evaluate their investment strategies will also increase the likelihood of the bubble bursting. This may lead to an abrupt change rather than a smooth adjustment in portfolio allocations. For instance, a large current account deficit may not be perceived as dangerous until another emerging market with a similar current account deficit gets hit.[24] The spread of financial crisis from one country to another, i.e. contagion, is more likely to occur when countries witness surges in capital inflows just before the crisis (Kaminsky, Reinhart and Vegh, 2003).

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[24] This is also known as the "wake-up call hypothesis."

Another reason why weak fundamentals and high capital inflows can be a dangerous cocktail is due to the possible existence of multiple equilibria. According to the second generation crisis models, countries that have neither good nor bad fundamentals could be prone to speculative attacks if they are in a vulnerable zone, where a potential attack on the currency has the power to cause crisis (Obstfeld, 1995). Likewise, a combination of high current account deficits and high capital inflows can push the country into a vulnerable zone of this kind (Calvo, 2000). If investors suddenly decide not to finance the deficit, this would create severe adjustments to the current account, and a very high possibility for default on external debt. A current account mainly financed by capital inflows would cause a higher probability of crisis and since the investors would recognize this, it leads to the possibility of multiple equilibria and may cause a self-fulfilling crisis. If fundamentals are sound, then capital inflows, even if not justified, would be more likely to adjust down smoothly, and if the fundamentals are bad, the attack is inevitable anyway. Therefore, the second hypothesis is:

Hypothesis 2: A surge accompanied by deteriorating fundamentals is more likely to turn into a sudden stop.

4.2.3 Role of Composition

Some types of capital flows may have a larger potential for sharp reversals than others.[25] The recent crisis episodes in Mexico, Asia, Russia and Turkey show that portfolio flows and private loans have larger reversals and FDI is very stable during crises. This may also imply that not every surge in capital inflows is the same; composition of capital inflows may play a crucial role. The reversibility, how much the capital flows out during a crisis or because of a shock, is an important determinant of the probability of a sudden stop. The emerging markets during the 1990's were primarily subject to three major types of private capital inflows: Foreign Direct Investment (FDI), portfolio flows and private loans.

Foreign direct investment is widely considered to be the most stable form of capital flows, both during normal times and crisis periods. It mainly consists of fixed assets, highly illiquid, and very difficult to sell during crises. FDI is also typically influenced more by long-term profitability expectations related to a country's fundamentals, rather than short-run speculative forces. Stability of FDI is a stylized fact; nevertheless, this may be misleading. Several studies emphasized that FDI may cause instability by allowing other types of flows to mask themselves (Sarno and Taylor, 1997; Bird and Rajan, 2002). Other types of flows may enter the country under the title of FDI and leave under another title. FDI may be stable during crises but surges of FDI may still have an effect on the probability of crisis. We propose the following testable hypothesis to clarify these issues:

[25] See Chapter 3 for an empirical assessment of reversibility of different types of capital flows.

Hypothesis 3: Larger inflows of FDI do not increase the likelihood of a sudden stop.

The second component of private capital, portfolio flows, is expected to be more volatile than FDI. Portfolio investors can sell their stocks or bonds more easily, quickly and with smaller losses than FDI. The third component, private loans, is mainly constituted by bank loans. Despite the illiquid nature of bank loans, banks may have higher incentives to pull out in order to cut their losses during a crisis (Bailey et al., 2000; Willett et al., 2004; Williamson, 2001). Since the prices of loans do not adjust automatically, banks adjust the quantity of lending instead. Both the portfolio flows and private loans have had high reversals during the recent currency crises in emerging markets; therefore, our fourth and final hypothesis to test is:

Hypothesis 4: Larger inflows of portfolio flows and private loans increase the likelihood of a sudden stop.

4.3 Literature Review

Sachs, Tornell and Velasco (1996) investigated all of the hypotheses that were laid out in the previous section in the context of currency crises.[26] They find evidence against the first, second and the fourth hypothesis. The average ratios of capital inflows to GDP and the percentage change in this

[26] They investigate these issues in a small section of the paper.

variable do not help explain why some countries experienced greater financial crises than others in the aftermath of the Mexican crisis in 1994. They argue that any explanatory power the capital inflow variable does have is through its effect on the real exchange rate and credit to private sector; therefore, the effect of high capital inflows is an indirect one. They apply the same measures to short-term capital inflows and find only weak evidence that short-term inflows have an effect on crises.[27] They conclude that the composition of capital inflows is not an important factor. The authors also partially test the second hypothesis. They look whether current account deficits cause currency crises during the period of inflows, and find that the effects are not significant. Their study focuses on the Mexican crisis and therefore misses out on the major crises in Asia and other emerging markets in the second half of the 1990's.

While there are no other studies that directly test for the effect of a surge in capital flows on crisis, one group of studies uses variables that partially capture this effect. For example, Radelet and Sachs (1998) find a significant relationship between the ratio of previous capital inflows to GDP and the probability of a capital flow reversal in Asia. Studies that use previous FDI to GDP ratios as explanatory variables find either a negative or an insignificant effect, supporting the third hypothesis (Frankel and Rose, 1996; Aziz, Caramazza and Salgado, 2000; Kamin, Shindler, and Samuel, 2001; Kumar, Moorthy and Perraudin, 2002; Osband and Van Rijckeghem, 1998; Cavallo and Frankel, 2004; Calvo, Izquierdo and Meija, 2004).

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[27] Their short-term flows include portfolio flows and other short-term investments.

Regarding the fourth hypothesis, Kumar et al. (2002) find that portfolio flows increase the probability of a sudden stop, but Aziz et al. (2000) show that excessive short-term capital flows played a very small role.

Most of the other empirical crisis models include a measure for short-term foreign debt, which could be interpreted as an imperfect proxy for surges in short-term capital flows, since it might represent capital inflow accumulation. These studies generally support the fourth hypothesis that short-term debt increases the probability of a sudden stop.[28]

Another group of studies focus on the volatility and persistence of different types of capital flows and therefore indirectly test the third and fourth hypothesis. If a certain type of flow exhibits high volatility and less persistence then it is considered "hot" and has a higher potential to flow out with the first sign of trouble. This conclusion naturally leads to the assumption that high inflows of the "hot money" flow would increase the probability of a sudden stop.

Recent empirical studies on these issues find conflicting results. For example, Claessens et al. (1995) find that foreign direct investment is as volatile as the other types of flow. The same study finds no distinction between long-term and short-term flows. However, Chuhan et al. (1996) reach the opposite conclusion. Sarno and Taylor (1997) find portfolio flows to be the most volatile type of capital. yet the largest outflows during the Asian financial crisis were in bank loans (Willett et al., 2004). Gabriele et al. (2000) conclude that all types of capital flows including the foreign direct

[28] See Kaminsky et al. (1998) and Abiad (2003) for a detailed survey.

investment contributed to the instability during the 1990's. The common drawback in these studies is the limited time periods over which capital flow volatility has been studied. Most of the previous studies focus on time periods dominated by inflows and they leave out the recent major currency crises in emerging economies.[29]

[29] Only Gabriele et al. (2000) includes Asian crises in their sample.

CHAPTER 5

Empirical Analysis: Surges and Sudden Stops of Capital Flows

5.1 Methodology and Data

5.1.1 Defining Sudden Stops

Research on sudden stops is fairly new. The concept is also called "capital account reversal" and has been used as a way to identify currency crisis (Radelet and Sachs, 1998; Rodrik and Velasco, 1999). With the increased occurrence of this type of crises in the second half of 1990's, the phrase "sudden stop" typically replaced this term (Calvo, 1998). Usually sudden stops are defined as large and abrupt falls in capital inflows (Calvo et al., 2004; Edwards, 2005), or the simultaneous occurrence of currency crises and capital account reversals (Calvo, 1998; Hutchison and Noy, 2002).

The studies up to now have not adopted a common statistical identification method. In this study, I follow Radelet and Sachs (1998) and Rodrik and Velasco (1999) and construct a sudden stop dummy variable (Stop_t) that takes the value of 1 if:

$$\frac{K_{t-1} - K_t}{GDP_{t-1}} > \tau \quad \text{and} \quad K_{t-1} > 0 \tag{1}$$

where t is the year, K is total capital flows excluding foreign direct investment and τ is an arbitrary threshold.

The first condition is to identify large falls in capital inflows.[30] The second condition prevents picking observations preceded by net capital outflows. Furthermore, the year following a sudden stop episode is dropped from the sample. The key feature that differentiates my measure from the previous ones is the exclusion of FDI in the definition of capital flows. Because FDI flows are usually very stable during crises, excluding these flows from the total capital flows should give a more accurate measure of sudden stops. Later on, this will also aid me in interpreting the effects of FDI on the probability of sudden stops in other types of capital flows.

5.1.2 Defining Surges

Empirical literature has not produced a statistical identification methodology for surges in capital flows yet. Therefore, I construct a dummy variable similar to the sudden stop's. A surge is a large and abrupt increase in capital inflows. The surge dummy takes the value of one if the behavior of capital flows meets all of the following criteria in a given year:

$$\frac{K_{t-k} - K_t}{GDP_{t-k}} < -\eta \quad ; \quad \frac{K_t}{GDP_t} > \mu \quad \text{and} \quad \text{Stop}_t = 0$$

where K is total capital flows.

[30] Measurement also varies across different studies. When capital flows data are monthly or quarterly, studies identify the sudden stop by comparing the observations with the country specific mean. When only annual data is available, usually arbitrary thresholds are used to decide whether the fall in capital inflows are large enough to be defined as a sudden stop.

The first criterion identifies abrupt and large increases in capital inflows over a k-year period. The rationale for not using a single year lag is that the capital inflows may increase suddenly in one year and continue to be very high for consecutive years without another abrupt increase. In such a case, if the surge is defined as a one-year difference in capital inflows, the measure will only detect the beginning of the surge but will miss the end. The second criterion ensures that the size of inflows is large enough relative to GDP. This condition allows us to filter episodes of sudden increases from large outflows to small inflows. Finally, we set the surge dummy to one if we identify a sudden stop episode in the same year. This is possible if there are large inflows of FDI and large outflows of other types of capital in the same year.

To detect surges, I looked at three-year changes in capital inflows (k=3) and used four percent thresholds for both the sudden stop and the surge dummy ($\tau = \eta = \mu$ =0.04). These values make up my base criteria, but my regression analysis results are not sensitive to the numerical values used for the sudden stop and surge indicators. Section 5.3 of this chapter summarizes the robustness checks that I perform by altering the parameters of the surge and sudden stop indicators.

5.1.3 Data and Basic Statistics

I searched for surge and sudden stop episodes in 38 emerging market economies for the period between 1989 and 2003. Countries are included if they are contained in the Emerging Markets Bond Index (EMBI+) or the

Morgan Stanley Country Index (MSCI) following Fischer (2001). In addition Bangladesh, Botswana, Croatia, Hong Kong, Romania, Syria, Uruguay and Zimbabwe were added to the sample due to their large capital inflows during the 1990's.

Table 5.1 presents frequencies of surges and sudden stops produced using the base criteria. Out of 44 sudden stop episodes, 27 of them are preceded by a surge in capital inflows (61percent). Out of 83 surge episodes, 27 of them ended up with a sudden stop (33percent). If the consecutive surge episodes are taken as one extended surge, then there are a total of 49 such episodes, 27 of them ending up with a sudden stop (55percent).

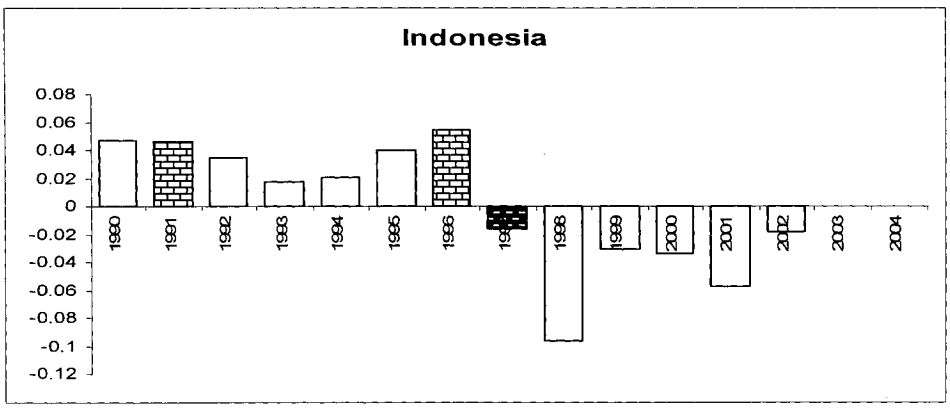
Table 5.1: Frequencies of Surges and Sudden Stops

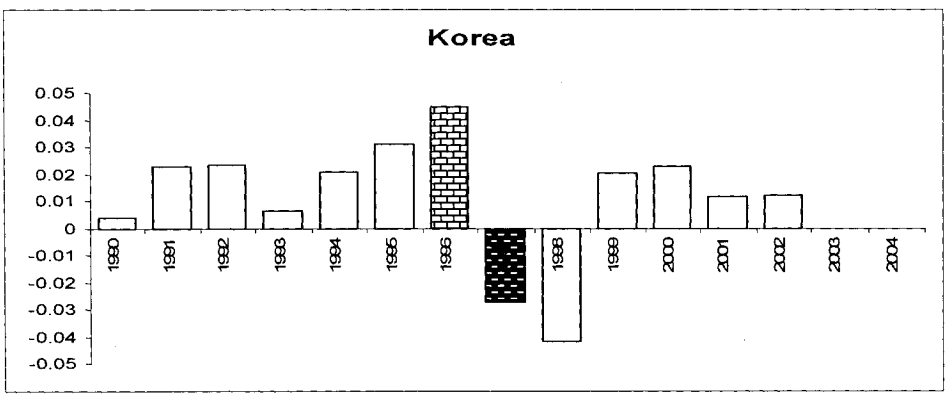
	No Surge	Surge	Total
No Sudden Stop	343	56	399
Sudden Stop	17	27	44
Total	360	83	443

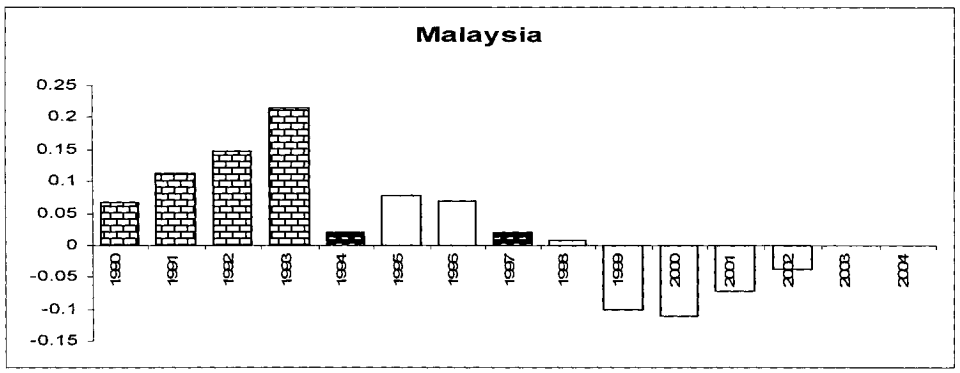
Figure 5.1 spots both the surge and sudden stop episodes for Indonesia, Korea, Malaysia, Mexico, Philippines, Thailand and Turkey. These graphs are plotted using the base criteria for thresholds and other parameters of sudden stop and surge indicators. There is a clear pattern of surges preceding sudden stops and currency crises for these countries. In Indonesia, Korea, Mexico, Philippines and Thailand, sudden stops and

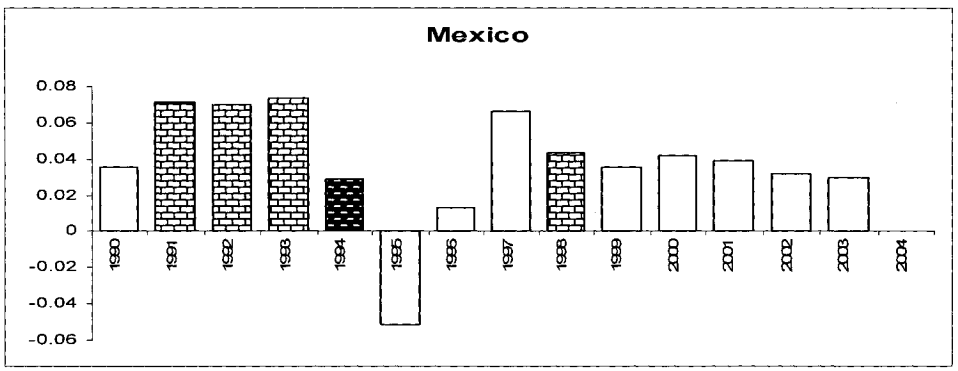
currency crises are precisely preceded by the surges in capital inflows. In fact, in all of these episodes, surges reach the highest levels since 1990. There is a sudden stop in Malaysia in 1994 preceded by three-year surge periods, but the major currency crisis was in 1997 in this country. Also for Turkey, currency crises in 1994 and 1997 are preceded by large capital inflows, but these are not identified as surges by the base criteria that I used. Nevertheless, the overall pattern is still indicating a clear relationship.

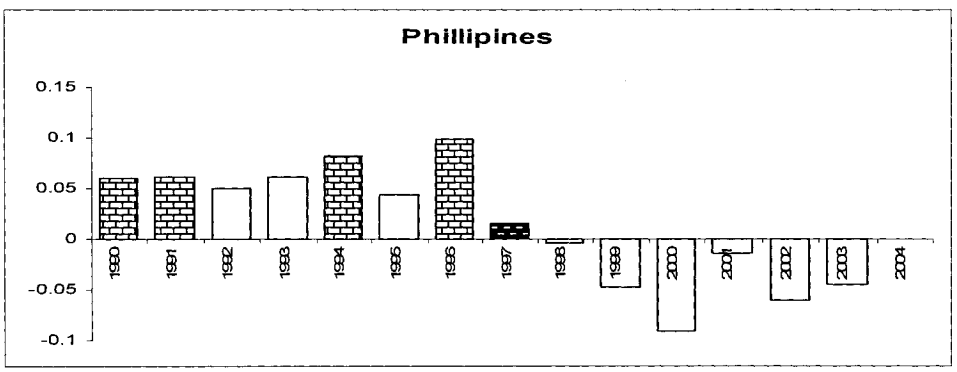
Figure 5.1
Total Capital Flows, Surges and Sudden Stops – Selected Emerging Markets

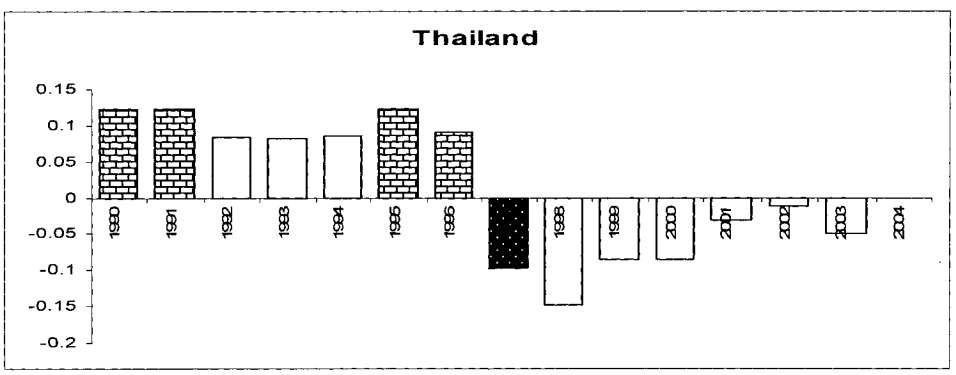


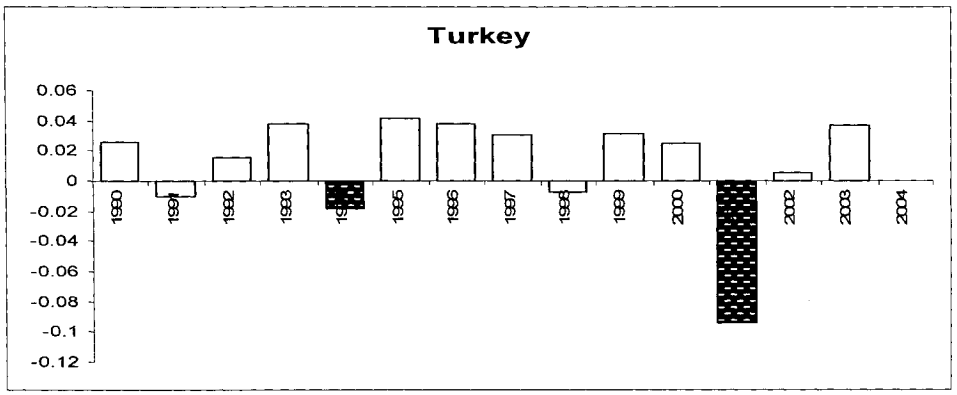












Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Figure C.1 in Appendix C presents surges and sudden stops in all of the countries in my sample. A casual inspection of these figures shows the close relationship with surges and sudden stops. However, it is also evident that some of the surge and sudden stop episodes are not identified by my measures. Instead of relying on qualitative judgment to include the left out surge or sudden stop episodes, I choose to strictly follow the arbitrary rules.

5.1.4 Regression Methodology and Other Variables

I use the following probit model to test the four hypotheses discussed in Chapter 4.

$$prob[Stop_t = 1] = \Phi[\beta_0 + \beta_1 Surge_{t-1} + \beta_2 X_{t-1}]$$

The dependent variable is the sudden stop dummy and the key independent variable is the lagged surge dummy. X represents all the other factors that would increase the probability of a sudden stop. To control for the other possible causes of sudden stops, I follow the related literature on

determinants of currency crises and sudden stops and included the following set of control variables:[31]

- *Current account balance/ GDP ratio:* a positive value indicates a current account surplus.
- *Real exchange rate appreciation*: a positive value represents real exchange rate appreciation.
- *Budget balance/ GDP ratio:* a positive value indicates a budget surplus.
- *Domestic credit growth (relative to GDP):*
- *Short-term debt / reserves ratio*

These variables are also considered to be the potential channels of the indirect effects of surges. Therefore, controlling for them enables me to measure the direct effect of surges on sudden stops. In addition, the non-linear nature of the probit estimation makes it possible to observe the effects of a surge at different levels of these control variables. Table C.2 in Appendix C summarizes the descriptive statistics for the control variables.

Variables to test the effect of the composition of capital flows are also added to the regressions in the subsequent stages of the analysis. I tested the effects of two types of capital flows: foreign direct investment (FDI) and hot money flows (HOT) that are the sum of portfolio flows and private loans.

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[31] See Table C.1 in Appendix C for a description of the data set.

These measures are constructed as the size of the type of capital flow (FDI or HOT) relative to GDP.

5.2 Regression Results

Table 5.2 presents results for the benchmark model without the surge dummy. I ran the sudden stop indicator on five control variables. Results are consistent with the previous studies' findings. Both current account deficits and real exchange rate appreciation significantly increase the probability of a sudden stop. There is a fall in the current account balance coefficient with the inclusion of real exchange rate appreciation. This is expected since high deficits are a reflection of real exchange rate appreciation and these two variables are highly correlated.

The other variables do not have statistically significant effects. Coefficients for credit growth and for the short-term debt/ reserves ratio have the expected signs (except in the third model credit growth has a negative effect). Budget deficits on the other hand seem to decrease the probability of a sudden stop. Previous studies also failed to find a significant effect of budget deficits on recent crises.[32] These results are used as a base to evaluate the contribution of surges on the probability of a sudden stop. Since there is no control for capital inflows in this regression, the implicit assumption is that the effects of surges are reflected on the other variables' coefficients.

[32] Brazil and Argentina are, of course, exceptions.

Table 5.2: Determinants of Sudden Stops – Without the Surge Dummy

	(1)	(2)	(3)	(4)	(5)
Current Account /GDP	-8.88***	-13.02***	-12.64***	-12.38***	-11.89***
	(2.22)	(3.15)	(3.22)	(3.24)	(3.6)
Real Exchange Rate Appreciation		1.53***	1.77***	1.63***	1.46**
		(0.49)	(0.57)	(0.62)	(0.6)
Credit Growth			-0.04	0.22	0.19
			(0.08)	(0.24)	(0.27)
Budget Balance / GDP				2.91	1.58
				(2.38)	(2.14)
Short-term Debt / Reserves					-0.11
					(0.11)
Constant	-1.46***	-1.73***	-1.72***	-1.67***	-1.56***
	(0.12)	(0.14)	(0.14)	(0.14)	(0.2)
# of Observations	455	376	344	300	255
Log-Likelihood	-134.2	-96.8	-87.9	-81.4	-75.0
Pseudo R^2	0.09	0.17	0.17	0.17	0.15

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

5.2.1 Direct and Indirect Effects

Table 5.3 provides support for hypothesis 1: Surges directly and indirectly increase the probability of a sudden stop. The surge dummy has a positive sign and is highly significant. Furthermore, these results withstand the inclusion of the control variables.

We observe two interesting changes in the coefficients of the control variables. First is the overall decrease in the effect of current account deficits on the probability of sudden stops. It seems likely that the high coefficient of this variable in the benchmark model was due in part to the hidden effects of surges in capital inflows. Once we control for this, the effect weakens in magnitude. The second change is the sign reversal of the

budget balance coefficient. While this coefficient is still insignificant, the peculiar effect in the benchmark model turns around and now a larger budget deficit increases the probability of a sudden stop as theory suggests. The other control variables' effects are similar to their effects in the benchmark model. These results suggest that the primary indirect effect of surges in capital inflows is generally reflected in current account balance, and direct effect is stronger than the indirect ones.

Table 5.3: Determinants of Sudden Stops - With the Surge Dummy

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.22***	1.02***	0.84***	0.83***	0.97***	0.87***
	(0.18)	(0.19)	(0.24)	(0.24)	(0.29)	(0.3)
Current Account /GDP		-4.87**	-9.13***	-8.49***	-7.16**	-7.21**
		(1.99)	(2.89)	(2.78)	(3.08)	(3.43)
Real Exchange Rate Appreciation			1.70***	1.88***	1.81***	1.67***
			(0.53)	(0.58)	(0.66)	(0.63)
Credit Growth				-0.02	0.25	0.23
				(0.08)	(0.25)	(0.27)
Budget Balance / GDP					-1.25	-1.74
					(1.98)	(1.78)
Short-term Debt / Reserves						-0.08
						(0.11)
Constant	-1.67***	-1.70***	-1.94***	-1.92***	-1.99***	-1.86***
	(0.11)	(0.12)	(0.15)	(0.14)	(0.16)	(0.19)
# of Observations	443	443	369	341	300	255
Log-Likelihood	-120.8	-117.9	-87.0	-81.5	-74.5	-69.9
Pseudo R^2	0.16	0.18	0.23	0.23	0.24	0.21

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

5.2.2 Role of Weak Fundamentals

Figures 5.2 and 5.3 provide support for hypothesis 2: surges accompanied by weak fundamentals increase the probability of a sudden stop. To evaluate the effects of surges on the sudden stop probabilities, the

marginal effects of the surge variable are computed for different levels of the control variables based on Model 8 in Table 5.3.

Figure 5.2: Predicted Probabilities of Sudden Stops and the Current Account Balance

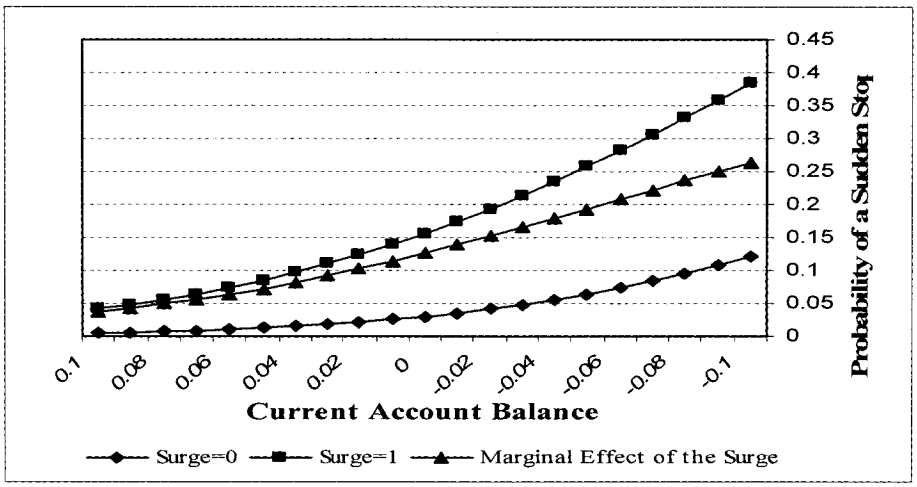


Figure5.3: Predicted Probabilities of Sudden Stops and the Real Exchange Rate Appreciation

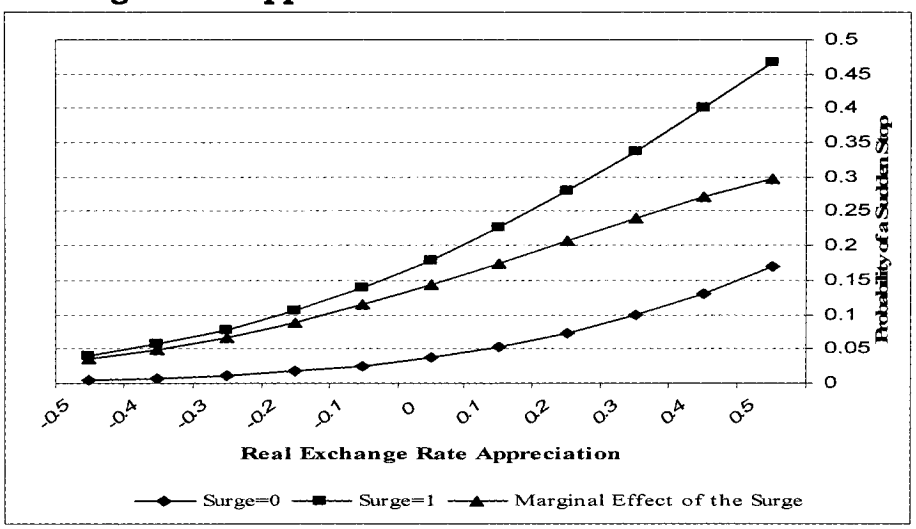


Figure 5.2 depicts the probability of a sudden stop for different levels of the current account balance variable and the surge dummy. The real exchange rate appreciation variable is evaluated at its mean. The marginal

effect of the surge dummy (which is the difference between the probability of a sudden stop with and without a surge) is also included in the graph. The probability of a sudden stop with a current account deficit of five percent is around five percent, but if the deficit is accompanied by a surge in capital inflows then the probability rises to 26 percent. At the other extreme, if there is a five percent current account surplus, the probability of a sudden stop is close to zero and an accompanying surge increases this probability only to seven percent. Figure 5.3 shows these relationships for the real exchange rate appreciation variable. The results are similar.

There are two conclusions from these results. First the current account deficit and the real exchange rate appreciation by themselves are not good predictors for sudden stops; in fact, it can be argued that the previous prediction success of these variables in the other studies could be due to at least in part to their reflection of surges in capital inflows. Second, the weaker the fundamentals of the emerging markets, the stronger the effect of surges on the probability of sudden stops. If the current account deficit is high or the real exchange rate is appreciated, then the country is in the vulnerable zone and it is likely just a matter of time before the surge will reverse.

5.2.3 Role of Composition

Next, the role of the components of capital inflows is investigated. Tables 5.4 and 5.5 present evidence for Hypotheses 3 and 4: the composition of capital flows matters. Larger inflows of FDI do not have a

significant impact on the probability of a sudden stop and larger inflows of private loans and portfolio flows do increase the probability.

In Table 5.4, two additional variables are added to the model. The coefficient for the FDI/GDP ratio has a negative sign, but is insignificant. On the other hand, the HOT/GDP ratio has a significant positive coefficient.

Table 5.4: Determinants of Sudden Stops – Components of Capital Inflows Included

	(12)	(13)	(14)	(15)	(16)	(17)
Surge Dummy	0.82***	0.70***	0.66***	0.63**	0.77**	0.69**
	(0.23)	(0.21)	(0.25)	(0.26)	(0.31)	(0.32)
Current Account /GDP		-3.87	-6.69**	-5.80*	-5.26	-5.88
		(2.88)	(3.23)	(3.33)	(3.76)	(4.13)
Real Exchange Rate Appreciation			1.74**	1.97***	2.23***	2.01**
			(0.73)	(0.76)	(0.81)	(0.79)
Credit Growth				0.23	0.22	0.21
				(0.28)	(0.29)	(0.29)
Budget Balance / GDP					-2.25	-3.12*
					(2.22)	(1.94)
Short-term Debt / Reserves						-0.12
						(0.16)
FDI / GDP	0.15	-0.51	-4.01	-3.77	-4.21	-5.01
	(2.87)	(3.22)	(4.44)	(4.54)	(4.56)	(5.15)
HOT / GDP	8.38***	8.50***	8.45***	8.37***	9.23***	8.68***
	(3.)	(2.56)	(2.57)	(2.47)	(2.36)	(2.36)
Constant	-1.77***	-1.81***	-1.92***	-1.94***	-2.07***	-1.89***
	(0.16)	(0.18)	(0.19)	(0.18)	(0.18)	(0.25)
# of Observations	398	398	349	326	293	248
Log-Likelihood	-95.3	-94.0	-78.7	-73.2	-67.5	-63.3
Pseudo R^2	0.21	0.22	0.26	0.27	0.29	0.26

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table 5.5 introduces interaction variables. Since we focus on surges of different types of capital flows, we included two interaction variables that

capture the joint effect of a surge and the magnitude of a certain capital flow type. In a non-linear model, the interpretation of the coefficient of the interaction term is not clear (Ai and Norton 2003). Given that one of the interaction terms is a binary variable, the size of the coefficients of HOT/GDP and FDI/GDP ratios should be evaluated and compared at two possible states of the surge dummy. Consider the following probit equation:

$$prob[Stop_t = 1] = \Phi[\beta_0 + \beta_1 Surge_{t-1} + \beta_2 FDI_{t-1} + \beta_3 HOT_{t-1} + \beta_4 (Surge_{t-1} \cdot FDI_{t-1}) + \beta_5 (Surge_{t-1} \cdot HOT_{t-1}) + \beta_6 X_{t-1}]$$

When the surge dummy takes the value of 0, the coefficients, β_2 and β_3 represent the effect of FDI/GDP and HOT/GDP ratios, respectively. Results presented in Table 6 indicate that both of these coefficients are significant. When there is no surge, high levels of FDI decrease the probability of a sudden stop, and high levels of hot money flows increase the probability of a sudden stop.

If the surge dummy takes the value of 1, then the sum of β_2 and β_4 will be the effect of FDI/GDP ratio, and the sum of β_3 and β_5 will be the effect of HOT/GDP ratio. Both of these sums are positive. In the bottom panel of Table 5.5, we present the test results and probability values. HOT/GDP ratio has a significant effect on the probability of sudden stops, yet we cannot reject the hypothesis that FDI/GDP ratio's effect is zero during surges. In the last two tables we also see that the other control variables in the model are robust to the inclusion of these composition effects.

Table 5.5: Determinants of Sudden Stops – Components of the Surge Included

		(18)	(19)	(20)	(21)	(22)	(23)
B_1	***Surge Dummy***	0.02	-0.09	-0.06	-0.25	0.00	-0.26
		(0.42)	(0.44)	(0.48)	(0.52)	(0.54)	(0.57)
B_2	***FDI / GDP***	-7.25	-9.90	-14.50*	-15.20*	-15.09	-17.43*
		(5.52)	(6.39)	(8.96)	(8.67)	(9.93)	(10.46)
B_3	***HOT / GDP***	6.67**	7.35***	7.92***	7.27***	8.76***	8.39***
		(2.79)	(2.27)	(2.58)	(2.39)	(1.99)	(2.11)
B_4	***FDI/GDP x Surge***	14.88*	17.40**	18.17*	19.92**	19.14*	23.36**
		(7.99)	(8.57)	(10.34)	(10.16)	(11.58)	(11.74)
B_5	***HOT/GDP x Surge***	9.00*	7.02	4.74	6.76	5.62	5.88
		(5.54)	(5.2)	(5.7)	(5.79)	(5.59)	(5.7)
B_6	***Current Account /GDP***		-4.16	-7.41**	-6.47*	-5.76	-6.06
			(3.05)	(3.73)	(3.74)	(4.12)	(4.81)
B_7	***Real Exchange Rate Appreciation***			1.83**	2.17***	2.37***	2.20***
				(0.73)	(0.75)	(0.79)	(0.79)
B_8	***Credit Growth***				0.24	0.28	0.29*
					(0.27)	(0.28)	(0.28)
B_9	***Budget Balance / GDP***					-4.01	-4.85*
						(2.97)	(2.92)
B_{10}	***Short-term Debt / Reserves***						-0.07
							(0.1)
B_0	***Constant***	-1.61***	-1.63***	-1.74***	-1.72***	-1.92***	-1.75***
		(0.17)	(0.18)	(0.19)	(0.19)	(0.16)	(0.21)
	# of Observations	398	398	349	326	293	248
	Log-Likelihood	-92.7	-91.5	-76.8	-70.9	-65.5	-60.8
	Pseudo R^2	0.23	0.24	0.28	0.29	0.31	0.29
	Null Hypothesis				**P-Values**		
	Ho: $B_2+B_4=0$	0.10	0.11	0.48	0.37	0.45	0.33
	Ho: $B_3+B_5=0$	0.00	0.01	0.02	0.01	0.01	0.01

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

One hypothesis about FDI is that flows may enter as FDI but may leave under the title of other flows (Sarno and Taylor, 1997, World Bank, 2000, Bird and Rajan, 2002). While I don't test particularly for this hypothesis, results in Table 5.5 suggest that this is not a relevant

contributor to sudden stops. By my statistical definition, the sudden stop dummy measures the sudden stops in total capital flows excluding FDI. The insignificant coefficient of the FDI/GDP variable indicates that FDI is not causing sudden stops in other flows; it is not leaving the emerging market disguised as other flows, or even if it does, the magnitude is not dramatic.

5.3 Robustness Checks

Definition of Sudden Stops and Surges

I have checked to see if the coefficient of the surge dummy in the regressions is sensitive to different sizes of the thresholds (three, four or five percent), different number of year changes (one to five), and inclusion of the FDI flows in sudden stop and surge dummy indicators. I estimate the first regression in Table 5.3 (regression 6) for 270 times with different combinations of definitions. None of the regressions result with an insignificant or an opposite-sign coefficient for the surge dummy. Table D.1 in Appendix D lists the surge coefficients, and their standard deviations that are generated from each regression.

Panel Data Fixed and Random Effects

In order to deal with heteroscedasticity in the estimations, I choose to use a robust covariance matrix and model the heterogeneity by allowing the error term's variance to differ across countries. To check whether the results depend on this specification, I reran the regressions in Table 5.3 (regressions 6 to 11) using both fixed effects and random effects models.

In panel data, regressions fixed effects approach is highly efficient. This approach includes a group specific constant term (dummy variable) in the regression model. Heterogeneity is captured by this term. However, this approach is problematic when applied to the empirical crisis models with binary dependent variables. Since some countries never experience a crisis (or a sudden stop) the dependent variable is always zero. When a country specific dummy variable is added to the regression as an independent variable, this dummy will perfectly estimate the non-crisis country and therefore will cause all the observations for that country to be dropped from the estimation. In this case we will end up with selection bias since only the crisis countries will be used in the estimation.

Table D.2 in appendix D presents the one-way fixed effects model. A country specific dummy variable is included in the estimation. Coefficients of these dummies are not reported in the table. We see an increase in all of the coefficients, but there is no change in the direction or the significance of these coefficients. Table D.3 reports the two-way fixed effects model. In addition to the country dummy, year dummies are included in the regressions. Results are similar.

Another alternative is a random effects model. If the individual effects that cause the heterogeneity are strictly uncorrelated with the regressors, then it might be appropriate to model the individual specific constant terms as randomly distributed across cross-sectional units. However, this view would be appropriate if we believe that the observations are drawn from a large population. Since my sample consists of almost all the emerging

markets, it represents the whole population. Therefore, theoretically the random effects model is not appropriate. Table D.4 presents the results from the random effects model. The model does not have any crucial effects on the significance of the variables.

End of Surges

If a surge is repeated in the following year, this does not mean that it failed to predict a sudden stop. Some countries receive large amounts of capital inflows for an extended period of time. If we aim to test the argument that a surge is highly likely to end up with a sudden stop, we need a different statistical definition for the surge dummy. I modify the surge dummy and add the following condition:

$$\text{Surge}_t = 0 \text{ if } \text{Surge}_{t+1} = 1$$

Table D.5 in appendix D reports the results. The effects of surges on the probability of sudden stops become stronger. The coefficient for the surge dummy increases by nearly 60 percent in all regressions (from 1.22 to 1.84 in the first regression).

Longer Term Effects of Surges

Another possibility that my surge dummy can ignore is the continuation of large inflows without showing up as a surge. In this case a sudden stop may be associated with a surge in the preceding years, but not the previous year necessarily. To capture this effect, I modify the surge dummy as follows:

$$Surge_t = 1 \text{ if } Surge_{t+1} = 0 \text{ and } Stop_{t+1} = 0$$

Table D.6 in Appendix D presents the results. The results are almost the same with the ones in Table 5.3. The link between surges and sudden stops is also robust for this definition.

Share of Components of Capital Flows in Total Flows

As a final robustness test, I check to see whether the share of components of capital flows in total has an effect. In Table D.7 in Appendix D, 'HOT Share' measures the percentage of portfolio flows and private loans in total capital flows. 'FDI Share' does the same for FDI. The results suggest that these variables are clearly not good predictors of sudden stop probability. They are all insignificant, but the direction and relative size of the coefficients are consistent with the earlier findings reported in Table 5.5.

5.4 Summary

I find that surges in capital inflows both directly and indirectly increase the probability of sudden stops. My results indicate that the direct effects are stronger than the indirect effects. In addition, a surge accompanied by weak fundamentals, such as a high current account deficit or an appreciated real exchange rate, is more likely to cause a sudden stop. Finally, I find that a surge that is dominated by private loans and portfolio flows is more likely to cause a sudden stop. FDI is more stable and it does not cause other flows to suddenly stop during a crisis.

CHAPTER 6

Conclusion

6.1. Summary of the Dissertation

In this dissertation, I investigate the behavior of private capital flows to emerging markets. Emerging markets received large amounts of capital flows during the 1990's. They also witnessed large reversals or sudden stops accompanied by currency crisis. In my dissertation I showed that inflow periods and outflow periods are not necessarily independent of each other. While I showed that volatility of capital flows during normal periods is not a good predictor of reversal sizes, information on the type and magnitude of the capital inflows is useful both for assessing the reversibility and predicting the probability of sudden stops.

The results of the empirical analysis do not provide a full explanation of the size of reversals during crises. However, they do provide support for the hypothesis that the composition of capital flows matters for sudden stops and the magnitude of capital outflows during currency crises. The main findings of the dissertation can be listed as follows:

- FDI is stable during currency crisis
- Portfolio flows are not the most reversible type of capital flows;private loans are as reversible as portfolio flows
- Volatility of capital flows during normal periods is not a good predictor of size of reversals during currency crisis

- Surges in capital inflows both directly and indirectly increase the probability of sudden stops; the direct effect seems to be stronger
- A surge accompanied by weak fundamentals such as a high current account deficit and an appreciating real exchange rate, is more likely to turn into a sudden stop
- A surge dominated by private loans and portfolio flows is more likely to cause a sudden stop
- Larger share of FDI during a surge do not contribute to the probability of a sudden stop and it does not cause other flows to have a higher probability of reversals.

6.2 Implications for Policy and Research

The results of my dissertation strongly suggest that while substantial inflows of financial capital generally do signal that a country has been doing many things right, they may also signal that the potential for future currency and financial crises is increasing. Such potential warning signs should be noted by both national governments and private investors. My dissertation also shows that it is important to distinguish between different types of capital flows when designing policy to cope with them. Portfolio and private loan flows are more likely to reverse than FDI and therefore they should require more attention from policymakers.

The evidence presented in this paper does not speak directly to the debate over capital controls, but it does imply that controls can be useful to the extent that they alter the composition of capital inflows.

There are also important implications for the demand for international reserves and international risk management. In general, governments should set aside some of the reserve inflows accompanying large financial capital inflows as a protection against the country's increased vulnerability. Holding sufficient reserves may both reduce the probability of suffering a crisis `a la second-generation crisis models and even if the preventive role fails, they provide financing that can help cushion the effects of private capital outflows. Again, composition plays an important role here. Capital inflows dominated with portfolio flows and private loans require larger accumulation of international reserves.

My dissertation also implies that sterilization policies against large and sudden increases in capital inflows may make the situation worse. Since the interest rates are prevented from falling with sterilization, if capital inflows are in the form of portfolio flows and private loans, they will continue to flow into the emerging market, increasing the probability of a future reversal.

On the research side, my results strongly suggest that surges of financial capital inflows should be included in empirical crises models as primary explanatory variables. The best strategies for dealing with such surges both to make them less likely and to reduce vulnerability to their occurrence will likely depend on developing a better understanding of the causes of these surges. While many ideas have been presented that may help explain such behavior, there is little consensus as yet about their relative importance. This is clearly an important topic for research.

Another important topic for analysis is the incorporation of capital inflows considerations into optimal (or at least reasonable) reserve levels.[33] My results confirm the view that in a world of substantial capital mobility traditional measures of reserve adequacy in terms of month's worth of imports is of limited value. Several governments and central banks already have started to develop reserve accumulation strategies based on international capital flows.

My analysis also shows that reserve coverage ratios based on the past volatility of capital flows are not a good strategy. In Chapters 2 and 3, I showed that volatility during normal times is not a good indicator of sizes of reversals during crisis times. The size of accumulated capital inflows, magnitude and speed of surges and composition of capital flows should be the main determinants of demand for international reserves in a world with high capital mobility.

[33] For initial effort along these lines see Kim et al. (2005).

APPENDIX A

Table A.1
Financial Account of Balance of Payments - Detailed Representation

1. Direct investment
  1.1 Abroad
    1.1.1 Equity capital
      1.1.1.1 Claims on affiliated enterprises
      1.1.1.2 Liabilities to affiliated enterprises
    1.1.2 Reinvested earnings
      1.1.2.1 Claims
      1.1.2.2 Liabilities
    1.1.3 Other capital
      1.1.3.1 Claims on affiliated enterprises
      1.1.3.2 Liabilities to affiliated enterprises
  1.2 In reporting economy
    1.2.1 Equity capital
      1.2.1.1 Claims on direct investors
      1.2.1.2 Liabilities to direct investors
        Exc. Fin.- Investment associated with debt reduction
        Exc. Fin.- Other
      1.2.1.3 Other
    1.2.2 Reinvested earnings
      1.2.2.1 Claims
      1.2.2.2 Liabilities
    1.2.3 Other capital
      1.2.3.1 Claims on direct investors
      1.2.3.2 Liabilities to direct investors
2. Portfolio investment
  2.1 Assets
    2.1.1 Equity securities
      2.1.1.1 Monetary authorities
      2.1.1.2 General government
      2.1.1.3 Banks
      2.1.1.4 Other sectors
    2.1.2 Debt securities
      2.1.2.1 Bonds and notes
        2.1.2.1.1 Monetary authorities
        2.1.2.1.2 General government
        2.1.2.1.3 Banks
        2.1.2.1.4 Other sectors
      2.1.2.2 Money market instruments
        2.1.2.2.1 Monetary authorities
        2.1.2.2.2 General government
        2.1.2.2.3 Banks
        2.1.2.2.4 Other sectors
  2.2 Liabilities
    2.2.1 Equity securities

Table A.1 ***(continued)***
Financial Account of Balance of Payments - Detailed Representation

2.2.1.1 Banks
2.2.1.2 Other sectors
2.2.2 Debt securities
2.2.2.1 Bonds and notes
2.2.2.1.1 Monetary authorities
Exc. Fin.- Issues
Exc. Fin.- Advance repayments
Other
2.2.2.1.2 General government
Exc. Fin.- Issues
Exc. Fin.- Advance repayments
Other
2.2.2.1.3 Banks
Exc. Fin.- Issues
Exc. Fin.- Advance repayments
Other
2.2.2.1.4 Other sectors
Exc. Fin.- Issues
Exc. Fin.- Advance repayments
Other
2.2.2.2 Money market instruments
2.2.2.2.1 Monetary authorities
Exc. Fin.- Issues
Other
2.2.2.2.2 General government
Exc. Fin.- Issues
Other
2.2.2.2.3 Banks
Exc. Fin.- Issues
Other
2.2.2.2.4 Other sectors
Exc. Fin.- Issues
Other
4. Other investment
4.1 Assets
4.1.1 Trade credits
4.1.1.1 General government
4.1.1.1.1 Long-term
4.1.1.1.2 Short-term
4.1.1.2 Other sectors
4.1.1.2.1 Long-term
4.1.1.2.2 Short-term
4.1.2 Loans
4.1.2.1 Monetary authorities

Table A.1 ***(continued)***
Financial Account of Balance of Payments - Detailed Representation

- 4.1.2.1.1 Long-term
- 4.1.2.1.2 Short-term
- 4.1.2.2 General government
- 4.1.2.2.1 Long-term
- 4.1.2.2.2 Short-term
- 4.1.2.3 Banks
- 4.1.2.3.1 Long-term
- 4.1.2.3.2 Short-term
- 4.1.2.4 Other sectors
- 4.1.2.4.1 Long-term
- 4.1.2.4.2 Short-term
- 4.1.3 Currency and deposits
- 4.1.3.1 Monetary authorities
- 4.1.3.2 General government
- 4.1.3.3 Banks
- 4.1.3.4 Other sectors
- 4.1.4 Other assets
- 4.1.4.1 Monetary authorities
- 4.1.4.1.1 Long-term
- 4.1.4.1.2 Short-term
- 4.1.4.2 General government
- 4.1.4.2.1 Long-term
- 4.1.4.2.2 Short-term
- 4.1.4.3 Banks
- 4.1.4.3.1 Long-term
- 4.1.4.3.2 Short-term
- 4.1.4.4 Other sectors
- 4.1.4.4.1 Long-term
- 3.1.4.4.2 Short-term
- 4.2 Liabilities
- 4.2.1 Trade credits
- 4.2.1.1 General government
- 4.2.1.1.1 Long-term
- 4.2.1.1.2 Short-term
- 4.2.1.2 Other sectors
- 4.2.1.2.1 Long-term
- 4.2.1.2.2 Short-term
- 4.2.2 Loans
- 4.2.2.1 Monetary authorities
- 4.2.2.1.1 Use of Fund credit and loans from the Fund
- 4.2.2.1.2 Other long-term

Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf

Exc. Fin.- Rescheduling of existing debt

Table A.1 ***(continued)***
Financial Account of Balance of Payments - Detailed Representation

Exc. Fin.- Advance repayments
Other
4.2.2.1.3 Short-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.2 General government
4.2.2.2.1 Long-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.2.2 Short-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.3 Banks
4.2.2.3.1 Long-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.3.2 Short-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.4 Other sectors
4.2.2.4.1 Long-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf
Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.2.4.2 Short-term
Exc. Fin.- Drawings on new loans by authorities or other sectors on authorities' behalf

Table A.1 ***(continued)***

Financial Account of Balance of Payments - Detailed Representation

Exc. Fin.- Rescheduling of existing debt
Exc. Fin.- Advance repayments
Other
4.2.3 Currency and deposits
4.2.3.1 Monetary authorities
4.2.3.2 General government
4.2.3.3 Banks
4.2.3.4 Other sectors
4.2.4 Other liabilities
4.2.4.1 Monetary authorities
4.2.4.1.1 Long-term
4.2.4.1.2 Short-term
Exc. Fin. - Total arrears
Exc. Fin. - Accumulation of arrears
Exc. Fin. - Principal on short-term debt
Exc. Fin. - Principal on long-term debt
Exc. Fin. - Original interest
Exc. Fin. - Penalty interest
Exc. Fin. - Repayments of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Rescheduling of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Cancellation of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Other
4.2.4.2 General government
4.2.4.2.1 Long-term
4.2.4.2.2 Short-term
Exc. Fin. - Total arrears
Exc. Fin. - Accumulation of arrears
Exc. Fin. - Principal on short-term debt
Exc. Fin. - Principal on long-term debt
Exc. Fin. - Original interest
Exc. Fin. - Penalty interest
Exc. Fin. - Repayments of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Rescheduling of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Cancellation of arrears

Table A.1 ***(continued)***
Financial Account of Balance of Payments - Detailed Representation

Exc. Fin. - Principal
Exc. Fin. - Interest
Other
4.2.4.3 Banks
4.2.4.3.1 Long-term
4.2.4.3.2 Short-term
Exc. Fin. - Total arrears
Exc. Fin. - Accumulation of arrears
Exc. Fin. - Principal on short-term debt
Exc. Fin. - Principal on long-term debt
Exc. Fin. - Original interest
Exc. Fin. - Penalty interest
Exc. Fin. - Repayments of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Rescheduling of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Cancellation of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Other
4.2.4.4 Other sectors
4.2.4.4.1 Long-term
4.2.4.4.2 Short-term
Exc. Fin. - Total arrears
Exc. Fin. - Accumulation of arrears
Exc. Fin. - Principal on short-term debt
Exc. Fin. - Principal on long-term debt
Exc. Fin. - Original interest
Exc. Fin. - Penalty interest
Exc. Fin. - Repayments of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Rescheduling of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Exc. Fin. - Cancellation of arrears
Exc. Fin. - Principal
Exc. Fin. - Interest
Other

Table A.2
Classification of Capital Flows in Some of the Recent Studies

Claessens, Dooley and Warner 95 (IMF)[34]

1) Foreign Direct Investment
    i) Equity Capital
    ii) Reinvested Earnings
2) Portfolio Investment
    i) Equity Securities
3) Short-Term Flows
    i) Short-Term Other Investment
4) Long-Term Flows
    i) Long-term Other Investment
    ii) Debt Securities
    iii) Reserve Components

Also break down by transactors:

1) FDI
2) Government
3) Private Sector
4) Banks

Chuhan, Gabriel and Popper 97 (IMF)

1) Foreign Direct Investment
    i) Equity Capital
    ii) Reinvested Earnings
    iii) Other Capital
        (a) Short-term
        (b) Long-term
2) Portfolio Investment
    i) Equity Securities
    ii) Debt Securities
        (a) Public
        (b) Other
3) Short-term other investments
4) Long-term other investments

[34] Indicates the main data source used.

Table A.2 *(continued)*
Classification of Capital Flows in Some of the Recent Studies

Gabrielle, Boratav and Parikh 2000 (World Bank and IMF)

General breakdown

1) Net Foreign Direct Investment Inflows
2) Total Portfolio Flows
3) Total Capital Inflows excluding Short-term Bank Loans
4) Total Private Capital Inflows excluding Short-term bank flows
5) Total Capital Inflows including Short-term Bank Loans
6) Total Private Capital Inflows including Short-term bank flows
7) Total Bank Loans

Short-Term Flow Breakdown

1) Inflows
    i) Portfolio investment-Equity securities
    ii) Money market instruments
    iii) Short-term other investment
2) Outflows
    i) Portfolio investment-Equity securities
    ii) Money market instruments
    iii) Short-term other investment
    iv) Net Error and omissions
3) Net flows

Budiman 2001 (IMF)

1) Net Direct Investment
2) Net Portfolio Investment
    i) NPI Debt
    ii) NPI Equity
3) Net Other Investment
    i) By maturity
        (a) Short-term
        (b) Long-term
    ii) By Sectoral
        (a) Banks
        (b) Other Sectors
4) Net Financial Account
5) Net Errors and Omissions

Table A.2 *(continued)*
Classification of Capital Flows in Some of the Recent Studies

Ramos 2001 (IMF)

General Breakdown
1) Direct Investment
2) Equity
3) Debt
4) Total Loan
5) Short-term Loan
6) Long-term Loan
7) Total Other Investments
8) Errors and Omissions

Private Flow Breakdown
1) Direct Investment
2) Equity
3) Debt
4) Total Private Loan
5) Short-term Private Loan
6) Long-term Private Loan
7) Total Private Other Investment
8) Short-term Private Other Investment
9) Long-term Private Other Investment

Sarno and Taylor 99 (US Treasury and Department of Commerce)
1) Equity Flows
2) Bond Flows
3) Official Flows
4) Commercial Bank Credit
5) Foreign Direct Investment

IMF Database:
1) Private capital flows
2) Foreign direct investment
3) Portfolio equity
4) Other investment
5) Reserves

Table A.3
Data Description for Reversibility Analysis

Sources: IMF International Financial Statistics (IFS) CD-ROM, September 2004 and World Bank Development Indicators (WDI).

Total Net Capital Inflows: Defined as the sum of financial account of the balance of payments excluding international reserves. IFS line 78BJDZF

FDI: Foreign Direct Investment, defined as direct investment in reporting economy IFS line 78BEDZF

Private Loans: Defined as the sum of other investment assets and liabilities for banks and other sectors. IFS lines 78BQDZF + 78BRDZF + 78BUDZF + 78BVDZF

Portfolio Flows: Defined as the sum of portfolio assets and liabilities IFS lines 78BFDZF + 78BGDZF

GDP: Gross Domestic Product taken from World Development Indicators and IFS. Converted into American Dollars. IFS line 99B..ZF

International Reserves: Reserves excluding gold. Monthly changes are used to calculate the exchange market pressure index. IFS line .1L.DZF

Nominal Exchange Rate: National Currency per US Dollar, Period Average. Monthly changes are used to calculate the exchange market pressure index. IFS line ..RF.ZF

Table A.4
Currency Crises and Speculative Attacks

Argentina				
Bangladesh	1990,	2000		
Botswana	1992,	1998,	2001	
Brazil	1990,	1998		
Bulgaria	1994,			
Chile				
China	1992,	1994		
Colombia	1997,	1999,	2002	
Croatia	1993,			
Czech Republic	1999,			
Egypt	1991,			
Hong Kong				
Hungary	1991,			
India	1991,	1993		
Indonesia	1997,			
Israel				
Korea	1997,			
Malaysia	1997,			
Mexico	1994,			
Morocco	1990,			
Pakistan	1993,	1995,	1997,	1999
Panama				
Peru	1990,			
Philippines	1990,	1997		
Poland				
Romania	1990,			
Russia	1998,			
South Africa	1998,	2001		
Sri Lanka	1993,	1998,	2000	
Syrian Arab Republic				
Thailand	1997,			
Turkey	1994,	2001		
Uruguay	2002,			
Venezuela				
Zimbabwe				

APPENDIX B

Table B.1
Volatility of Capital Flows: Coefficient of Variation* of the Reversal Measure – One Year Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	-3.3	26.0	-76.3	-5.1
Asian Crises Countries	-4.3	-20.5	-1.0	0.2
Indonesia	-1.8	-55.6	-5.3	-1.1
Korea	-2.0	-14.1	-1.6	-7.5
Malaysia	-5.0	-4.6	-5.9	6.5
Philippines	-10.5	-37.4	10.9	-7.5
Thailand	-2.2	9.2	-3.3	10.4
Mexico	-1.5	-9.4	-6.5	-3.8
Russia	-3.0	-1.2	-3.8	-54.7
Turkey	-2.9	6.1	-1.6	-5.8

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	-6.7	-4.0	-10.7	-71.7
Asian Crises	2.8	44.8	3.5	-8.7
Indonesia	-9.0	62.7	-7.0	-5.5
Korea	-6.3	-12.0	-9.3	-8.2
Malaysia	-33.6	-4.7	-39.9	6.8
Philippines	10.8	159.2	12.8	-51.1
Thailand	52.3	19.1	60.7	14.3
Mexico	-4.5	-4.6	-7.8	-9.3
Russia	-5.2	-2.1	-4.3	12.4
Turkey	-8.0	-41.8	-6.7	-55.4

* The reversal measure is the standard deviation of ratio of first difference of net capital inflows to previous years GDP. Coefficients of Variation should be interpreted in absolute values.

Table B.2
Volatility of Capital Flows: Coefficient of Variation of the Reversal Measure – Two Years Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	-7.4	-362.7	-3.7	27.7
Asian Crises Countries	3.7	19.2	2.3	-9.1
Indonesia	-3.4	-5.8	-2.6	-1.2
Korea	-2.1	89.8	-1.9	-2.5
Malaysia	-8.0	-2.6	-4.1	5.2
Philippines	34.4	11.3	22.1	-5.8
Thailand	-2.5	3.2	-2.1	-41.6
Mexico	-2.9	-7.0	-4.8	-2.2
Russia	-3.7	-1.3	-3.7	-7.7
Turkey	-1.8	-3.8	-2.5	-7.9

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	-6.7	-4.0	-10.7	-71.7
Asian Crises	2.8	44.8	3.5	-8.7
Indonesia	-9.0	62.7	-7.0	-5.5
Korea	-6.3	-12.0	-9.3	-8.2
Malaysia	-33.6	-4.7	-39.9	6.8
Philippines	10.8	159.2	12.8	-51.1
Thailand	52.3	19.1	60.7	14.3
Mexico	-4.5	-4.6	-7.8	-9.3
Russia	-5.2	-2.1	-4.3	12.4
Turkey	-8.0	-41.8	-6.7	-55.4

* The reversal measure is the standard deviation of ratio of first difference of net capital inflows to previous years GDP. Coefficients of Variation should be interpreted in absolute values.

Table B.3
Volatility of Capital Flows: Coefficient of Variation of Net Capital Flows as a Percentage of GDP* – One Year Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1.5	1.3	2.1	6.3
Asian Crises Countries	3.6	2.6	30.1	1.6
Indonesia	9.0	10.6	-3.7	4.1
Korea	0.9	1.1	3.6	0.7
Malaysia	2.4	0.5	2.4	-1.0
Philippines	2.6	0.4	-6.4	2.0
Thailand	2.9	0.6	154.7	2.3
Mexico	0.7	0.4	1.9	1.7
Russia	-1.3	0.3	-1.2	-11.2
Turkey	0.8	0.2	0.8	2.9

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.9	1.0	-0.4	4.8
Asian Crises	3.8	1.8	5.0	2.0
Indonesia	9.7	6.2	-3.6	6.0
Korea	1.2	1.0	61.1	0.7
Malaysia	2.4	0.5	2.9	-1.0
Philippines	2.0	0.4	-16.2	2.1
Thailand	3.6	0.6	-19.4	2.0
Mexico	0.7	0.4	2.0	1.7
Russia	-1.3	0.3	-1.1	-37.4
Turkey	2.0	0.4	2.2	4.4

* Coefficients of Variation should be interpreted in absolute values.

Table B.4
Volatility of Capital Flows: Coefficient of Variation of Net Capital Flows as a Percentage of GDP* – Two Years Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	0.8	0.9	-2.5	6.4
Asian Crises Countries	2.6	2.4	0.0	1.4
Indonesia	4.9	9.5	-6.8	3.2
Korea	0.6	1.1	2.0	0.6
Malaysia	2.2	0.4	1.7	-0.9
Philippines	3.0	0.5	-4.5	1.7
Thailand	2.1	0.6	7.8	2.3
Mexico	0.5	0.4	1.5	1.4
Russia	-1.4	0.4	-1.3	-14.2
Turkey	0.8	0.2	0.8	2.6

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.9	1.0	-0.4	4.8
Asian Crises	3.8	1.8	5.0	2.0
Indonesia	9.7	6.2	-3.6	6.0
Korea	1.2	1.0	61.1	0.7
Malaysia	2.4	0.5	2.9	-1.0
Philippines	2.0	0.4	-16.2	2.1
Thailand	3.6	0.6	-19.4	2.0
Mexico	0.7	0.4	2.0	1.7
Russia	-1.3	0.3	-1.1	-37.4
Turkey	2.0	0.4	2.2	4.4

* Coefficients of Variation should be interpreted in absolute values.

Table B.5
Volatility of Capital Flows: Coefficient of Variation of Net Capital Flows* – One Year Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	2.3	1.3	0.5	1.4
Asian Crises Countries	3.5	1.4	-3.4	1.4
Indonesia	6.0	4.5	-3.6	2.9
Korea	1.1	1.0	4.8	0.8
Malaysia	3.4	0.4	3.1	-1.0
Philippines	3.4	0.5	-4.6	2.1
Thailand	3.6	0.6	-17.0	2.2
Mexico	0.6	0.6	1.8	1.7
Russia	-1.2	0.5	-1.2	33.7
Turkey	0.8	0.3	0.8	3.4

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	2.3	1.0	2.2	1.0
Asian Crises	3.8	1.1	-6.0	1.6
Indonesia	6.5	3.2	-3.2	4.4
Korea	1.4	1.0	-14.1	0.8
Malaysia	3.2	0.4	4.2	-1.1
Philippines	2.5	0.5	-9.5	2.2
Thailand	5.5	0.6	-7.3	1.9
Mexico	0.6	0.6	1.9	1.6
Russia	-1.1	0.5	-1.1	9.7
Turkey	2.6	0.7	2.8	6.4

* Coefficients of Variation should be interpreted in absolute values.

Table B.6
Volatility of Capital Flows: Coefficient of Variation of Net Capital Flows* – Two Years Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	1.89	0.82	0.65	-0.18
Asian Crises Countries	2.59	1.32	0.41	1.18
Indonesia	3.08	4.15	-9.69	2.19
Korea	0.74	1.11	2.15	0.67
Malaysia	2.83	0.36	1.73	-0.88
Philippines	3.94	0.45	-3.72	1.70
Thailand	2.38	0.54	11.58	2.21
Mexico	0.39	0.61	1.38	1.24
Russia	-1.34	0.57	-1.36	18.37
Turkey	0.81	0.30	0.78	2.96

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	2.2758547	1.0144879	2.243506	0.96377601
Asian Crises	3.8195694	1.1323776	-5.9791316	1.6277576
Indonesia	6.5214734	3.1935749	-3.2321186	4.4104023
Korea	1.4126009	0.98114866	-14.080294	0.76659411
Malaysia	3.1704934	0.36819881	4.2331138	-1.0685267
Philippines	2.5380926	0.5065335	-9.547986	2.1597731
Thailand	5.4551868	0.61243188	-7.2683735	1.870545
Mexico	0.61534232	0.57166433	1.8842363	1.5767572
Russia	-1.1229619	0.51033419	-1.070923	9.7115688
Turkey	2.6341383	0.6560117	2.7660017	6.4243007

* Coefficients of Variation should be interpreted in absolute values.

Table B.7
Volatility of Capital Flows: Standard Deviation of Net Capital Flows as a Percentage of GDP – One Year Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.4%	1.9%	3.5%	2.6%
Asian Crises Countries	6.7%	1.6%	5.8%	1.8%
Indonesia	5.3%	2.2%	3.4%	1.6%
Korea	1.8%	0.8%	1.5%	1.2%
Malaysia	9.9%	2.8%	6.3%	1.1%
Philippines	7.0%	0.9%	7.5%	3.5%
Thailand	9.7%	1.4%	10.4%	1.8%
Mexico	3.3%	1.0%	1.8%	2.9%
Russia	6.0%	0.3%	3.3%	2.1%
Turkey	2.1%	0.1%	1.7%	1.4%

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.8%	1.8%	3.5%	2.6%
Asian Crises	6.6%	1.6%	5.8%	1.8%
Indonesia	5.1%	2.2%	3.2%	1.6%
Korea	2.0%	0.8%	2.1%	1.2%
Malaysia	9.5%	2.7%	6.2%	1.1%
Philippines	6.6%	0.8%	7.2%	3.3%
Thailand	9.7%	1.3%	10.3%	1.7%
Mexico	3.2%	1.0%	1.8%	2.8%
Russia	5.7%	0.3%	3.1%	2.1%
Turkey	3.2%	0.3%	2.6%	1.5%

Table B.8
Volatility of Capital Flows: Standard Deviation of Net Capital Flows as a Percentage of GDP – Two Years Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.7%	1.8%	3.4%	2.2%
Asian Crises Countries	6.7%	1.6%	5.7%	1.9%
Indonesia	5.2%	2.3%	3.2%	1.6%
Korea	1.4%	0.8%	1.3%	1.1%
Malaysia	10.1%	2.7%	6.0%	1.1%
Philippines	7.6%	0.9%	8.0%	3.7%
Thailand	9.4%	1.3%	9.9%	1.8%
Mexico	2.6%	1.1%	1.8%	2.7%
Russia	6.4%	0.3%	3.5%	2.3%
Turkey	2.2%	0.1%	1.7%	1.6%

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4.8%	1.8%	3.5%	2.6%
Asian Crises	6.6%	1.6%	5.8%	1.8%
Indonesia	5.1%	2.2%	3.2%	1.6%
Korea	2.0%	0.8%	2.1%	1.2%
Malaysia	9.5%	2.7%	6.2%	1.1%
Philippines	6.6%	0.8%	7.2%	3.3%
Thailand	9.7%	1.3%	10.3%	1.7%
Mexico	3.2%	1.0%	1.8%	2.8%
Russia	5.7%	0.3%	3.1%	2.1%
Turkey	3.2%	0.3%	2.6%	1.5%

Table B.9
Volatility of Capital Flows: Standard Deviation of Net Capital Flows (In Millions of $) – One Year Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4757	2579	3924	3572
Asian Crises Countries	7807	2035	6738	2623
Indonesia	7334	3101	4576	2408
Korea	8333	3197	6777	5298
Malaysia	6389	1379	4294	810
Philippines	4735	627	4909	2406
Thailand	12243	1871	13131	2195
Mexico	11673	6505	6078	10063
Russia	13969	1720	9899	8265
Turkey	3527	242	2933	2729

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4700	2571	3956	3563
Asian Crises	7893	2008	7340	2671
Indonesia	7040	3169	4389	2498
Korea	9278	3062	10070	5514
Malaysia	6117	1384	4214	789
Philippines	4564	608	4822	2241
Thailand	12466	1817	13205	2312
Mexico	11238	6249	5919	9675
Russia	13170	1629	9550	8004
Turkey	6307	682	5252	2890

Table B.10
Volatility of Capital Flows: Standard Deviation of Net Capital Flows (In Millions of $) – Two Years Crisis Period

Crises Years Excluded	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4573	2499	3881	3483
Asian Crises Countries	7397	1958	6001	2572
Indonesia	6805	3234	3377	2361
Korea	6895	3268	5623	4920
Malaysia	6537	1361	3771	773
Philippines	5200	552	5320	2521
Thailand	11549	1376	11916	2285
Mexico	8134	6779	5710	9162
Russia	14759	1839	10367	8803
Turkey	3753	263	3036	2968

Total Sample	Total Flows	FDI	Private Loans	Portfolio
All Emerging markets	4700	2571	3956	3563
Asian Crises	7893	2008	7340	2671
Indonesia	7040	3169	4389	2498
Korea	9278	3062	10070	5514
Malaysia	6117	1384	4214	789
Philippines	4564	608	4822	2241
Thailand	12466	1817	13205	2312
Mexico	11238	6249	5919	9675
Russia	13170	1629	9550	8004
Turkey	6307	682	5252	2890

Table B.11.a
Correlations of Reversal Size (Annual Change in Capital Flows) and Volatility (Coefficient of Variation) – One Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	0.07	0.28
FDI	0.07	0.01
Private Loans	0.38	-0.06
Portfolio Flows	0.02	0.05

Table B.11.b
Correlations of Reversal Size (Annual Change in Capital Flows) and Volatility (Coefficient of Variation) – Two Years Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.07	0.28
FDI	0.03	0.01
Private Loans	0.21	-0.06
Portfolio Flows	-0.09	0.05

Table B.12.a
Correlations of Reversal Size (Net Capital Flows as a Percentage of GDP) and Volatility (Coefficient of Variation) – One Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.20	-0.15
FDI	-0.08	-0.10
Private Loans	-0.38	-0.10
Portfolio Flows	-0.03	-0.08

Table B.12.b
Correlations of Reversal Size (Net Capital Flows as a Percentage of GDP) and Volatility (Coefficient of Variation) – Two Years Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.08	-0.15
FDI	-0.01	-0.10
Private Loans	-0.09	-0.10
Portfolio Flows	-0.03	-0.08

Table B.13.a
Correlations of Reversal Size (Net Capital Flows) and Volatility (Coefficient of Variation) – One Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.02	-0.14
FDI	-0.02	-0.13
Private Loans	0.19	0.23
Portfolio Flows	0.18	0.00

Table B.13.b
Correlations of Reversal Size (Net Capital Flows) and Volatility (Coefficient of Variation) – Two Years Crisis Period

	Crises years Excluded	Total Sample
Total Flows	0.06	-0.14
FDI	0.00	-0.13
Private Loans	-0.18	0.23
Portfolio Flows	0.18	0.00

Table B.14.a
Correlations of Reversal Size (Net Capital Flows as a Percentage of GDP) and Volatility (Standard Deviation) – One Year Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.11	-0.16
FDI	0.63	0.69
Private Loans	-0.19	-0.30
Portfolio Flows	0.14	0.03

Table B.14.b
Correlations of Reversal Size (Net Capital Flows as a Percentage of GDP) and Volatility (Standard Deviation) – Two Years Crisis Period

	Crises years Excluded	Total Sample
Total Flows	-0.09	-0.16
FDI	0.71	0.69
Private Loans	-0.14	-0.30
Portfolio Flows	0.14	0.03

Table B.15.a
Correlations of Reversal Size (Net Capital Flows) and Volatility (Standard Deviation) – One Year Crisis Period

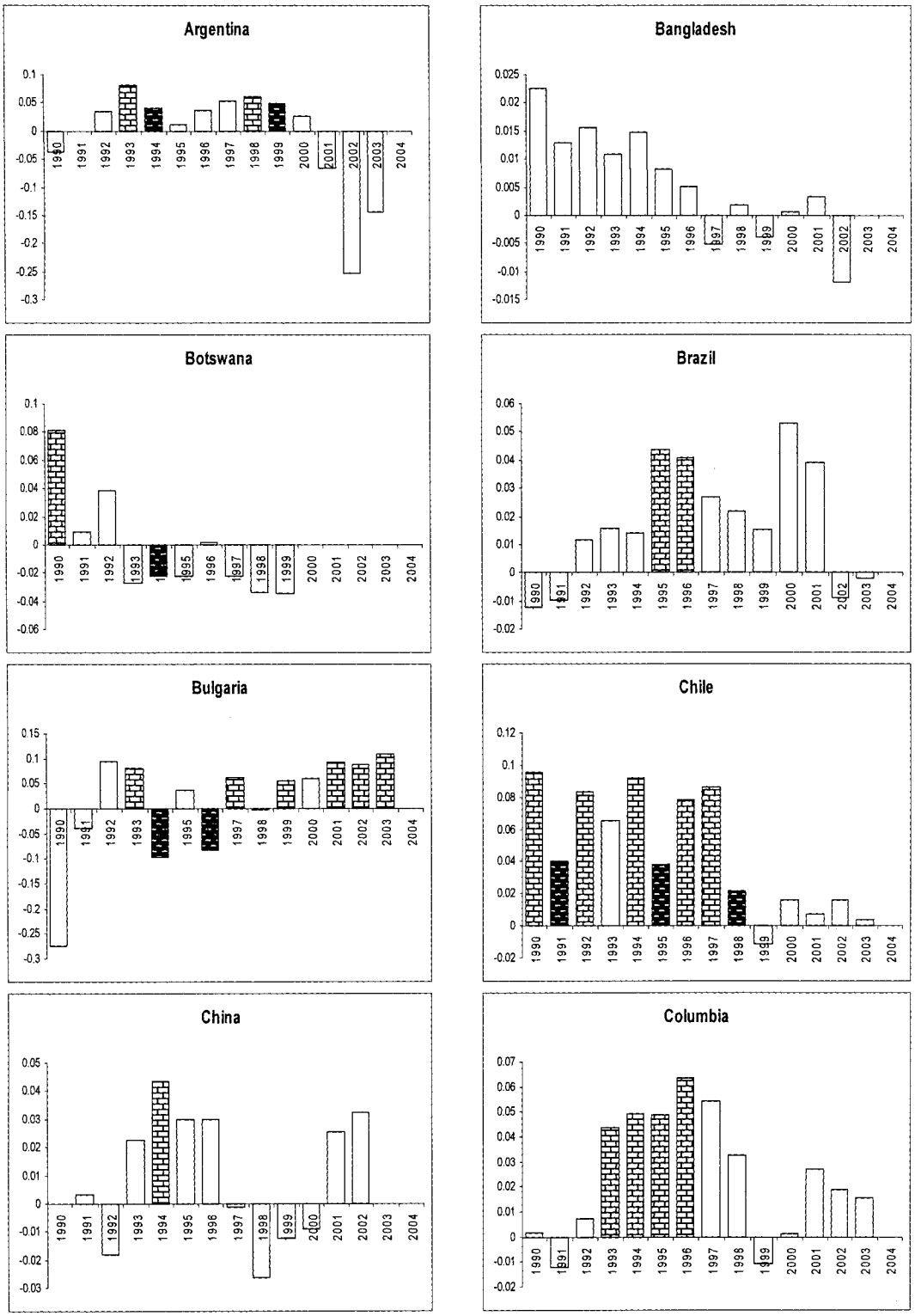
	Crises years Excluded	Total Sample
Total Flows	0.15	0.11
FDI	0.97	0.98
Private Loans	-0.63	-0.76
Portfolio Flows	0.70	0.69

Table B.15.b
Correlations of Reversal Size (Net Capital Flows) and Volatility (Standard Deviation) – Two Years Crisis Period

	Crises years Excluded	Total Sample
Total Flows	0.12	0.11
FDI	0.98	0.98
Private Loans	-0.56	-0.76
Portfolio Flows	0.68	0.69

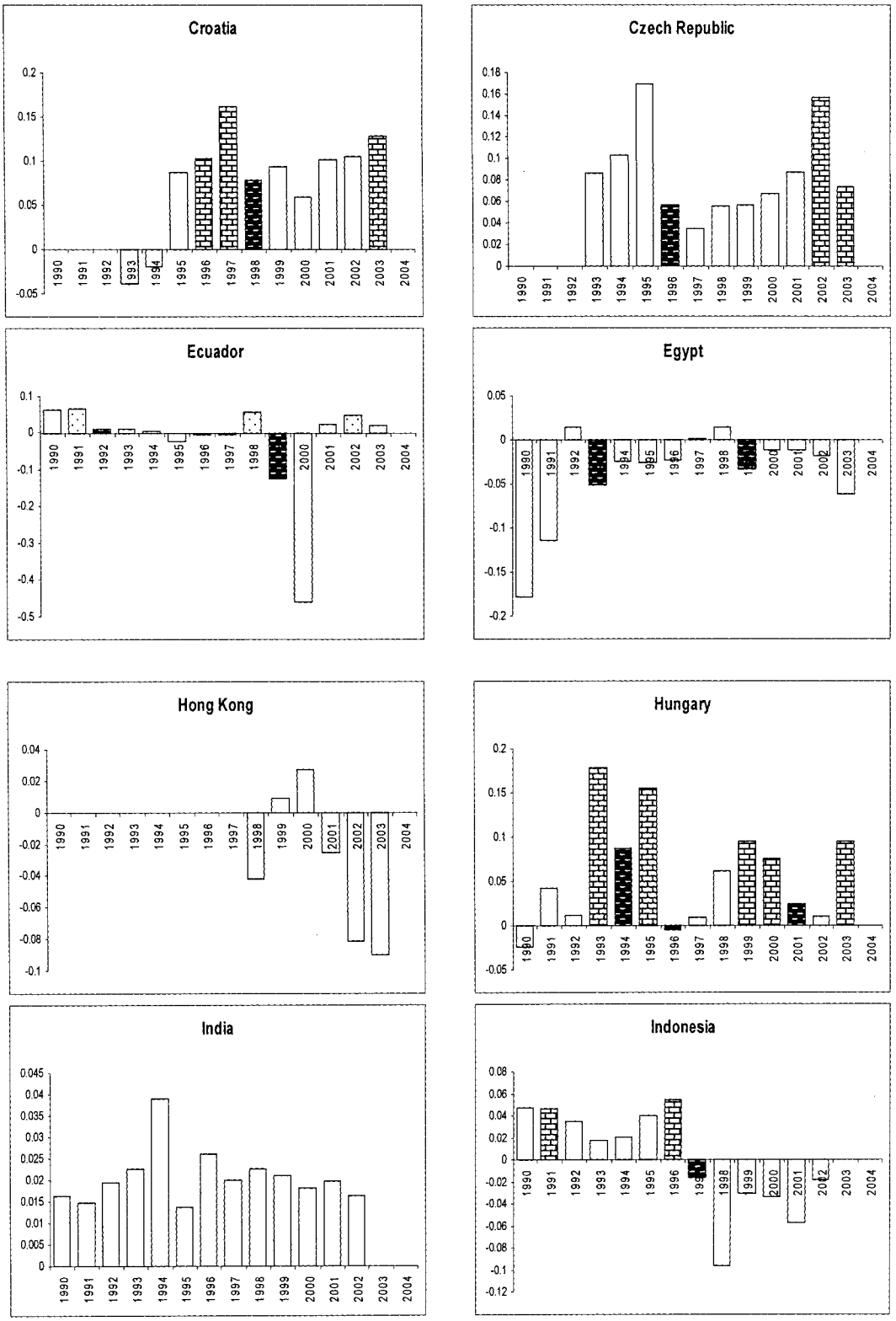
APPENDIX C

Figure C.1
Total Capital Flows, Surges and Sudden Stops



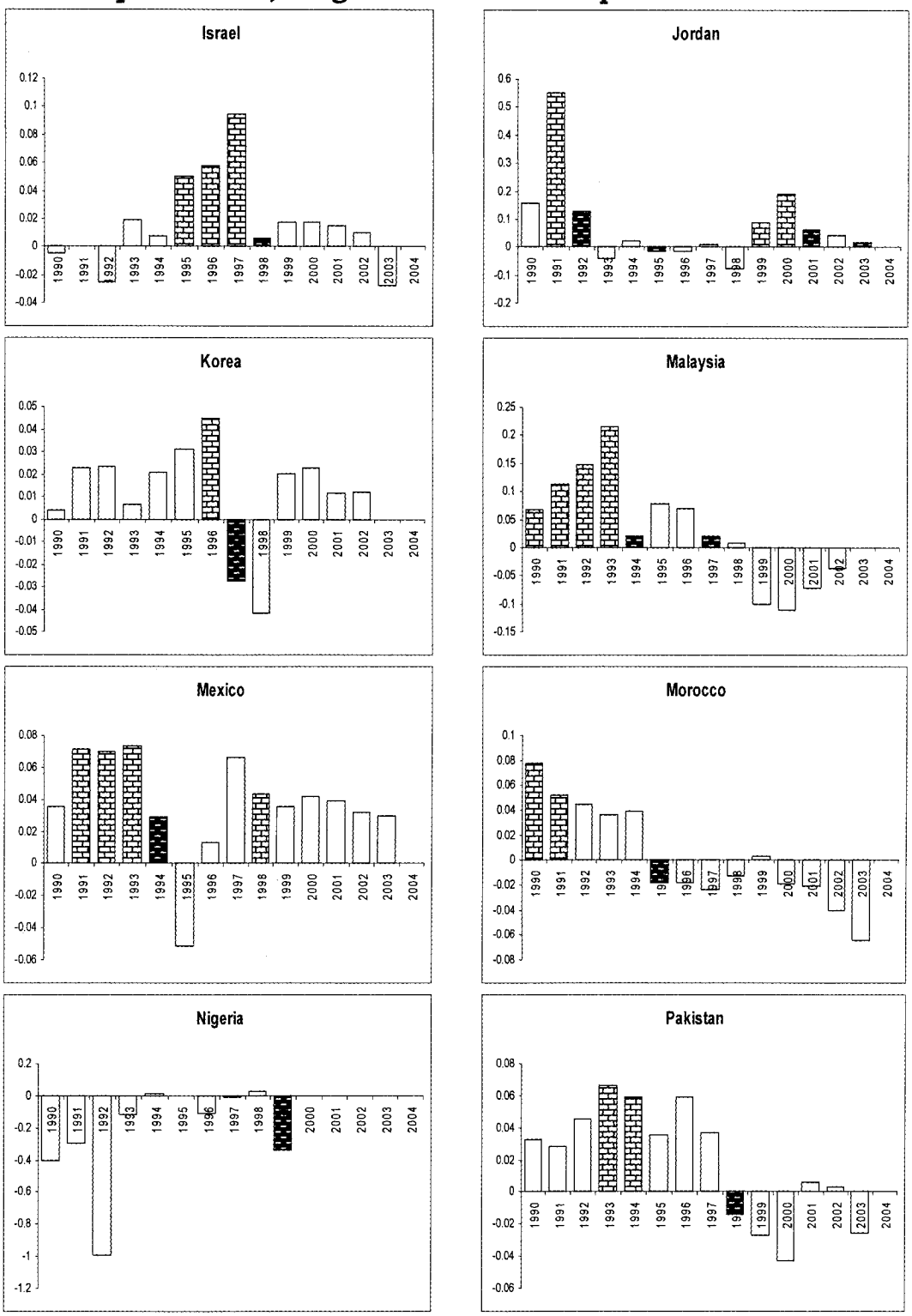
Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Figure C.1 *(continued)*
Total Capital Flows, Surges and Sudden Stops



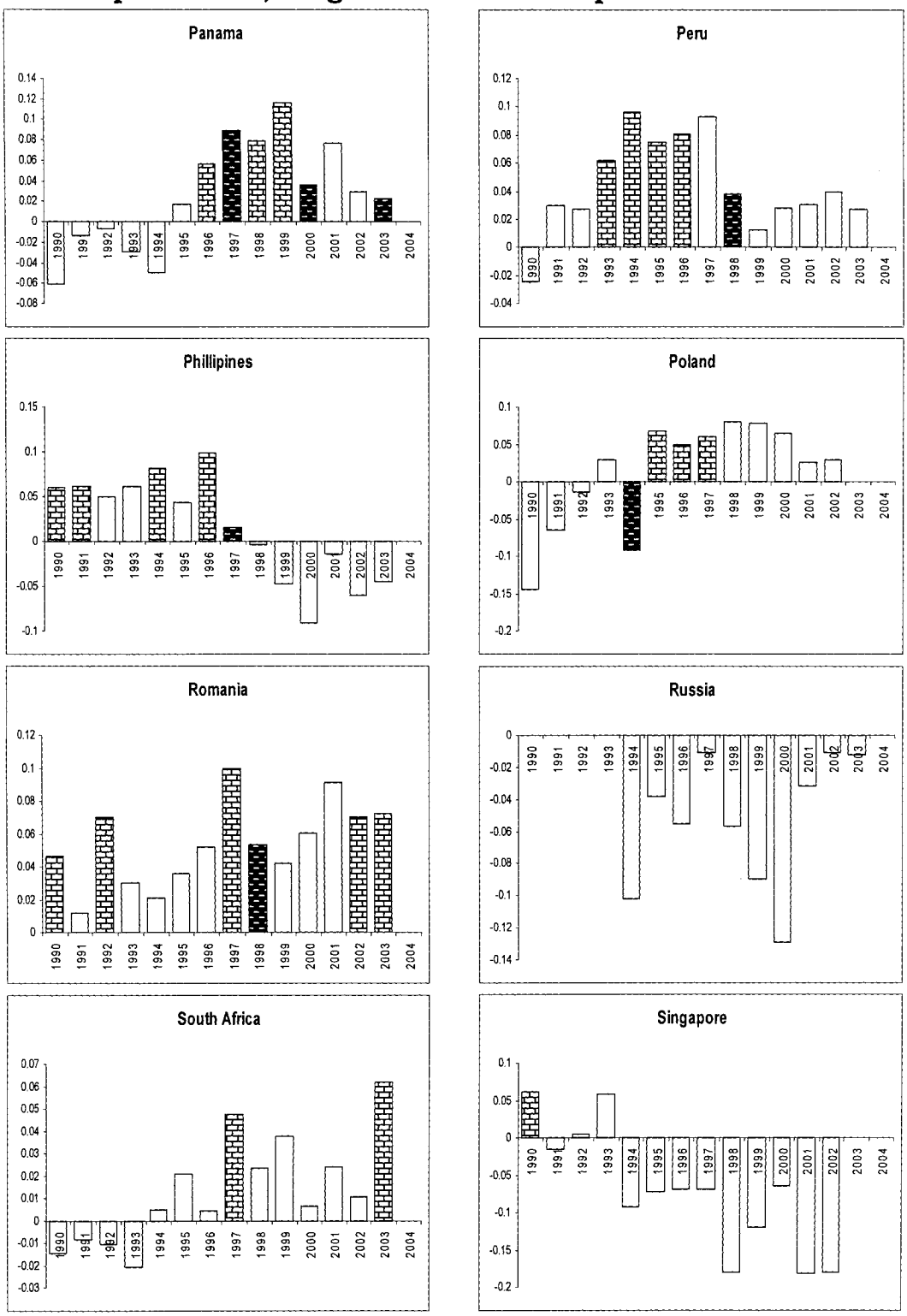
Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Figure C.1 *(continued)*
Total Capital Flows, Surges and Sudden Stops



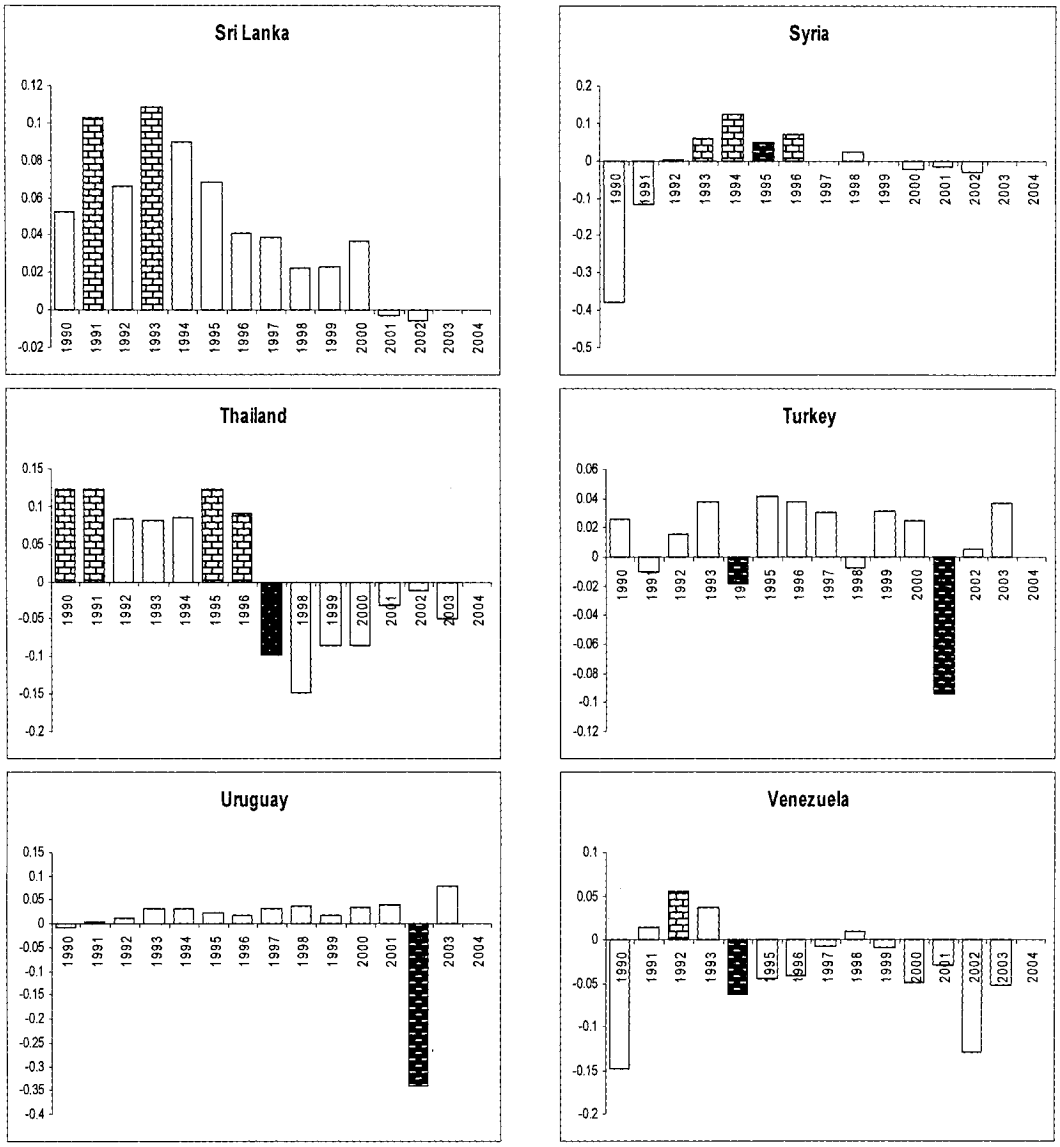
Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Figure C.1 *(continued)*
Total Capital Flows, Surges and Sudden Stops



Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Figure C.1 *(continued)*
Total Capital Flows, Surges and Sudden Stops



Note: White bars indicate total capital flows as a percentage of GDP, white brick bars indicate surges and black brick bars indicate sudden stop episodes.

Table C.1
Data Description for Surge and Sudden Stop Analysis

Sources: *International Financial Statistics (IFS),* International Monetary Fund; *World Development Indicators (WDI),* The World Bank; JP Morgan Real Exchange Rate Indices. Unless otherwise noted, the frequency of the data is annual.

Net Capital Flows: The sum of the financial account of balance of payments excluding reserves (IFS line 78BJDZF) and net errors and omissions balance (IFS line 78CADZF).

FDI: Foreign Direct Investment, defined as direct investment in reporting economy IFS line 78BEDZF

Private Loans: Defined as the sum of other investment assets and liabilities for banks and other sectors. IFS lines 78BQDZF + 78BRDZF + 78BUDZF + 78BVDZF

Portfolio Flows: Defined as the sum of portfolio assets and liabilities IFS lines 78BFDZF + 78BGDZF

Hot Flows: Private loans + Portfolio Flows

GDP: Main series is from WDI. Missing data is filled with data from IFS (line 99B..ZF). GDP from IFS is converted into dollars whenever necessary using nominal exchange rate (divided by IFS line ..AE.ZF)

Current Account Balance: IFS line 78ALDZF

Budget Balance: IFS line 80...ZF

Credit Growth: Defined as the three year change in the banking sector credit to non-government sector divided by the GDP. IFS line 32D..ZF divided by the Dollar GDP

Short-term Debt: Short-term debt is taken from Global Development Finance database and it is defined as external debt that has an original maturity of one year or less.

Reserves: Reserves excluding gold: IFS line .1..SZF

Real Exchange Rate Appreciation: Defined as the three year percentage change in the real exchange rate. Main real exchange rate series is from IFS. Missing data is filled with data from JP Morgan Real Exchange Rate index.

APPENDIX D

Table D.1
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
3%	No	-3%	3%	1	0.97	0.17
3%	No	-3%	3%	2	0.89	0.15
3%	No	-3%	3%	3	1.13	0.17
3%	No	-3%	3%	4	1.19	0.17
3%	No	-3%	3%	5	0.93	0.15
3%	No	-3%	4%	1	0.96	0.17
3%	No	-3%	4%	2	0.93	0.16
3%	No	-3%	4%	3	1.10	0.18
3%	No	-3%	4%	4	1.12	0.20
3%	No	-3%	4%	5	0.93	0.17
3%	No	-3%	5%	1	1.08	0.18
3%	No	-3%	5%	2	1.06	0.17
3%	No	-3%	5%	3	1.25	0.19
3%	No	-3%	5%	4	1.21	0.20
3%	No	-3%	5%	5	1.01	0.17
3%	No	-4%	3%	1	0.94	0.16
3%	No	-4%	3%	2	0.86	0.15
3%	No	-4%	3%	3	1.25	0.17
3%	No	-4%	3%	4	1.23	0.18
3%	No	-4%	3%	5	0.94	0.15
3%	No	-4%	4%	1	0.90	0.16
3%	No	-4%	4%	2	0.84	0.15
3%	No	-4%	4%	3	1.20	0.18
3%	No	-4%	4%	4	1.15	0.20
3%	No	-4%	4%	5	0.94	0.17
3%	No	-4%	5%	1	1.02	0.17
3%	No	-4%	5%	2	1.02	0.17
3%	No	-4%	5%	3	1.36	0.19
3%	No	-4%	5%	4	1.23	0.19
3%	No	-4%	5%	5	1.01	0.17
3%	No	-5%	3%	1	0.91	0.15
3%	No	-5%	3%	2	0.92	0.15
3%	No	-5%	3%	3	1.26	0.16
3%	No	-5%	3%	4	1.16	0.17
3%	No	-5%	3%	5	0.88	0.15
3%	No	-5%	4%	1	0.86	0.16
3%	No	-5%	4%	2	0.88	0.15
3%	No	-5%	4%	3	1.21	0.18
3%	No	-5%	4%	4	1.08	0.19
3%	No	-5%	4%	5	0.88	0.17
3%	No	-5%	5%	1	0.93	0.16
3%	No	-5%	5%	2	1.01	0.18
3%	No	-5%	5%	3	1.37	0.19
3%	No	-5%	5%	4	1.20	0.19

Table D.1 *(continued)*
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
3%	No	-5%	5%	5	0.97	0.17
3%	Yes	-3%	3%	1	0.93	0.19
3%	Yes	-3%	3%	2	0.69	0.16
3%	Yes	-3%	3%	3	0.86	0.17
3%	Yes	-3%	3%	4	0.83	0.17
3%	Yes	-3%	3%	5	0.81	0.18
3%	Yes	-3%	4%	1	0.88	0.18
3%	Yes	-3%	4%	2	0.72	0.17
3%	Yes	-3%	4%	3	0.80	0.16
3%	Yes	-3%	4%	4	0.79	0.19
3%	Yes	-3%	4%	5	0.75	0.19
3%	Yes	-3%	5%	1	0.96	0.19
3%	Yes	-3%	5%	2	0.81	0.17
3%	Yes	-3%	5%	3	0.90	0.18
3%	Yes	-3%	5%	4	0.89	0.19
3%	Yes	-3%	5%	5	0.85	0.19
3%	Yes	-4%	3%	1	0.93	0.19
3%	Yes	-4%	3%	2	0.73	0.17
3%	Yes	-4%	3%	3	0.94	0.16
3%	Yes	-4%	3%	4	0.93	0.18
3%	Yes	-4%	3%	5	0.79	0.19
3%	Yes	-4%	4%	1	0.91	0.20
3%	Yes	-4%	4%	2	0.71	0.17
3%	Yes	-4%	4%	3	0.89	0.17
3%	Yes	-4%	4%	4	0.86	0.20
3%	Yes	-4%	4%	5	0.76	0.20
3%	Yes	-4%	5%	1	0.99	0.19
3%	Yes	-4%	5%	2	0.85	0.19
3%	Yes	-4%	5%	3	1.01	0.17
3%	Yes	-4%	5%	4	0.96	0.19
3%	Yes	-4%	5%	5	0.85	0.20
3%	Yes	-5%	3%	1	0.96	0.19
3%	Yes	-5%	3%	2	0.79	0.19
3%	Yes	-5%	3%	3	0.92	0.16
3%	Yes	-5%	3%	4	0.85	0.17
3%	Yes	-5%	3%	5	0.78	0.19
3%	Yes	-5%	4%	1	0.91	0.19
3%	Yes	-5%	4%	2	0.76	0.19
3%	Yes	-5%	4%	3	0.87	0.17
3%	Yes	-5%	4%	4	0.77	0.19
3%	Yes	-5%	4%	5	0.75	0.20
3%	Yes	-5%	5%	1	0.95	0.20
3%	Yes	-5%	5%	2	0.86	0.21
3%	Yes	-5%	5%	3	1.02	0.18

Table D.1 *(continued)*
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
3%	Yes	-5%	5%	4	0.94	0.19
3%	Yes	-5%	5%	5	0.81	0.20
4%	No	-3%	3%	1	0.94	0.15
4%	No	-3%	3%	2	0.91	0.16
4%	No	-3%	3%	3	1.09	0.19
4%	No	-3%	3%	4	1.20	0.19
4%	No	-3%	3%	5	0.94	0.16
4%	No	-3%	4%	1	0.91	0.15
4%	No	-3%	4%	2	0.91	0.16
4%	No	-3%	4%	3	1.09	0.19
4%	No	-3%	4%	4	1.09	0.21
4%	No	-3%	4%	5	0.91	0.18
4%	No	-3%	5%	1	1.02	0.15
4%	No	-3%	5%	2	1.02	0.17
4%	No	-3%	5%	3	1.21	0.20
4%	No	-3%	5%	4	1.15	0.21
4%	No	-3%	5%	5	0.96	0.19
4%	No	-4%	3%	1	1.00	0.16
4%	No	-4%	3%	2	0.90	0.16
4%	No	-4%	3%	3	1.20	0.19
4%	No	-4%	3%	4	1.23	0.19
4%	No	-4%	3%	5	0.93	0.17
4%	No	-4%	4%	1	0.95	0.16
4%	No	-4%	4%	2	0.86	0.16
4%	No	-4%	4%	3	1.22	0.18
4%	No	-4%	4%	4	1.11	0.20
4%	No	-4%	4%	5	0.91	0.19
4%	No	-4%	5%	1	1.06	0.17
4%	No	-4%	5%	2	1.03	0.18
4%	No	-4%	5%	3	1.30	0.20
4%	No	-4%	5%	4	1.15	0.20
4%	No	-4%	5%	5	0.94	0.19
4%	No	-5%	3%	1	0.91	0.16
4%	No	-5%	3%	2	0.98	0.16
4%	No	-5%	3%	3	1.24	0.19
4%	No	-5%	3%	4	1.19	0.17
4%	No	-5%	3%	5	0.90	0.18
4%	No	-5%	4%	1	0.85	0.16
4%	No	-5%	4%	2	0.93	0.17
4%	No	-5%	4%	3	1.22	0.19
4%	No	-5%	4%	4	1.07	0.19
4%	No	-5%	4%	5	0.87	0.20
4%	No	-5%	5%	1	0.92	0.17
4%	No	-5%	5%	2	1.05	0.19

Table D.1 ***(continued)***
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
4%	No	-5%	5%	3	1.35	0.20
4%	No	-5%	5%	4	1.16	0.20
4%	No	-5%	5%	5	0.94	0.21
4%	Yes	-3%	3%	1	0.97	0.19
4%	Yes	-3%	3%	2	0.76	0.18
4%	Yes	-3%	3%	3	0.93	0.19
4%	Yes	-3%	3%	4	0.97	0.19
4%	Yes	-3%	3%	5	0.90	0.19
4%	Yes	-3%	4%	1	0.89	0.18
4%	Yes	-3%	4%	2	0.77	0.18
4%	Yes	-3%	4%	3	0.88	0.18
4%	Yes	-3%	4%	4	0.88	0.20
4%	Yes	-3%	4%	5	0.83	0.19
4%	Yes	-3%	5%	1	1.02	0.19
4%	Yes	-3%	5%	2	0.89	0.19
4%	Yes	-3%	5%	3	1.01	0.19
4%	Yes	-3%	5%	4	1.01	0.21
4%	Yes	-3%	5%	5	0.95	0.20
4%	Yes	-4%	3%	1	0.99	0.19
4%	Yes	-4%	3%	2	0.77	0.19
4%	Yes	-4%	3%	3	0.99	0.18
4%	Yes	-4%	3%	4	1.06	0.19
4%	Yes	-4%	3%	5	0.91	0.20
4%	Yes	-4%	4%	1	0.95	0.19
4%	Yes	-4%	4%	2	0.73	0.18
4%	Yes	-4%	4%	3	0.97	0.18
4%	Yes	-4%	4%	4	0.95	0.21
4%	Yes	-4%	4%	5	0.83	0.20
4%	Yes	-4%	5%	1	1.08	0.20
4%	Yes	-4%	5%	2	0.90	0.20
4%	Yes	-4%	5%	3	1.11	0.19
4%	Yes	-4%	5%	4	1.08	0.21
4%	Yes	-4%	5%	5	0.94	0.20
4%	Yes	-5%	3%	1	1.10	0.19
4%	Yes	-5%	3%	2	0.84	0.20
4%	Yes	-5%	3%	3	0.99	0.18
4%	Yes	-5%	3%	4	1.00	0.18
4%	Yes	-5%	3%	5	0.88	0.20
4%	Yes	-5%	4%	1	1.05	0.20
4%	Yes	-5%	4%	2	0.79	0.20
4%	Yes	-5%	4%	3	0.97	0.18
4%	Yes	-5%	4%	4	0.88	0.20
4%	Yes	-5%	4%	5	0.80	0.21
4%	Yes	-5%	5%	1	1.16	0.21

Table D.1 ***(continued)***
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
4%	Yes	-5%	5%	2	0.94	0.22
4%	Yes	-5%	5%	3	1.10	0.18
4%	Yes	-5%	5%	4	1.03	0.20
4%	Yes	-5%	5%	5	0.89	0.21
5%	No	-3%	3%	1	0.98	0.16
5%	No	-3%	3%	2	0.92	0.16
5%	No	-3%	3%	3	1.21	0.20
5%	No	-3%	3%	4	1.29	0.21
5%	No	-3%	3%	5	0.94	0.18
5%	No	-3%	4%	1	0.93	0.15
5%	No	-3%	4%	2	0.91	0.16
5%	No	-3%	4%	3	1.19	0.19
5%	No	-3%	4%	4	1.13	0.23
5%	No	-3%	4%	5	0.88	0.20
5%	No	-3%	5%	1	1.03	0.16
5%	No	-3%	5%	2	1.00	0.16
5%	No	-3%	5%	3	1.29	0.20
5%	No	-3%	5%	4	1.17	0.23
5%	No	-3%	5%	5	0.91	0.21
5%	No	-4%	3%	1	1.02	0.17
5%	No	-4%	3%	2	0.89	0.17
5%	No	-4%	3%	3	1.32	0.20
5%	No	-4%	3%	4	1.31	0.21
5%	No	-4%	3%	5	0.99	0.19
5%	No	-4%	4%	1	0.95	0.16
5%	No	-4%	4%	2	0.83	0.16
5%	No	-4%	4%	3	1.27	0.18
5%	No	-4%	4%	4	1.14	0.23
5%	No	-4%	4%	5	0.93	0.21
5%	No	-4%	5%	1	1.05	0.17
5%	No	-4%	5%	2	0.98	0.19
5%	No	-4%	5%	3	1.38	0.19
5%	No	-4%	5%	4	1.16	0.22
5%	No	-4%	5%	5	0.94	0.21
5%	No	-5%	3%	1	0.96	0.16
5%	No	-5%	3%	2	0.93	0.17
5%	No	-5%	3%	3	1.34	0.20
5%	No	-5%	3%	4	1.24	0.20
5%	No	-5%	3%	5	0.94	0.19
5%	No	-5%	4%	1	0.89	0.16
5%	No	-5%	4%	2	0.85	0.17
5%	No	-5%	4%	3	1.30	0.18
5%	No	-5%	4%	4	1.08	0.21
5%	No	-5%	4%	5	0.88	0.22

Table D.1 *(continued)*
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
5%	No	-5%	5%	1	0.96	0.17
5%	No	-5%	5%	2	0.97	0.19
5%	No	-5%	5%	3	1.41	0.19
5%	No	-5%	5%	4	1.15	0.22
5%	No	-5%	5%	5	0.93	0.23
5%	Yes	-3%	3%	1	0.96	0.20
5%	Yes	-3%	3%	2	0.83	0.18
5%	Yes	-3%	3%	3	0.92	0.20
5%	Yes	-3%	3%	4	0.92	0.20
5%	Yes	-3%	3%	5	0.81	0.20
5%	Yes	-3%	4%	1	0.86	0.20
5%	Yes	-3%	4%	2	0.82	0.18
5%	Yes	-3%	4%	3	0.85	0.17
5%	Yes	-3%	4%	4	0.80	0.21
5%	Yes	-3%	4%	5	0.70	0.20
5%	Yes	-3%	5%	1	0.98	0.20
5%	Yes	-3%	5%	2	0.93	0.19
5%	Yes	-3%	5%	3	0.96	0.18
5%	Yes	-3%	5%	4	0.91	0.21
5%	Yes	-3%	5%	5	0.80	0.21
5%	Yes	-4%	3%	1	1.01	0.19
5%	Yes	-4%	3%	2	0.82	0.20
5%	Yes	-4%	3%	3	0.97	0.19
5%	Yes	-4%	3%	4	1.01	0.20
5%	Yes	-4%	3%	5	0.86	0.20
5%	Yes	-4%	4%	1	0.96	0.20
5%	Yes	-4%	4%	2	0.76	0.19
5%	Yes	-4%	4%	3	0.93	0.17
5%	Yes	-4%	4%	4	0.87	0.21
5%	Yes	-4%	4%	5	0.75	0.21
5%	Yes	-4%	5%	1	1.08	0.21
5%	Yes	-4%	5%	2	0.93	0.21
5%	Yes	-4%	5%	3	1.05	0.18
5%	Yes	-4%	5%	4	0.97	0.21
5%	Yes	-4%	5%	5	0.84	0.21
5%	Yes	-5%	3%	1	1.16	0.20
5%	Yes	-5%	3%	2	0.86	0.21
5%	Yes	-5%	3%	3	0.95	0.20
5%	Yes	-5%	3%	4	0.91	0.19
5%	Yes	-5%	3%	5	0.87	0.21
5%	Yes	-5%	4%	1	1.11	0.22
5%	Yes	-5%	4%	2	0.80	0.21
5%	Yes	-5%	4%	3	0.91	0.19
5%	Yes	-5%	4%	4	0.77	0.21

Table D.1 ***(continued)***
Sensitivity to the Definition of the Sudden Stop and Surge Dummies

τ	FDI included	$-\eta$	μ	k	Coef.	Std.
5%	Yes	-5%	4%	5	0.77	0.22
5%	Yes	-5%	5%	1	1.21	0.22
5%	Yes	-5%	5%	2	0.93	0.23
5%	Yes	-5%	5%	3	1.02	0.20
5%	Yes	-5%	5%	4	0.90	0.21
5%	Yes	-5%	5%	5	0.83	0.23

Table D.2
Determinants of Sudden Stops – One-way Fixed Effects Model

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.37***	1.18***	1.01***	1.02***	1.29***	1.10**
	(0.26)	(0.27)	(0.31)	(0.35)	(0.45)	(0.46)
Current Account /GDP		-6.11**	-10.77*	-9.52*	-8.81	-9.72
		(2.66)	(6.13)	(5.62)	(7.44)	(8.40)
Real Exchange Rate Appreciation			2.81***	3.08**	2.67**	2.39*
			(1.07)	(1.29)	(1.23)	(1.25)
Credit Growth				0.01	0.60	0.51
				(0.11)	(0.39)	(0.44)
Budget Balance / GDP					-1.85	-3.04
					(3.23)	(2.92)
Short-term Debt / Reserves						-0.20
						(0.26)
Constant	-1.44***	-1.48***	-1.72***	-1.71***	-1.80***	-1.45***
	(0.09)	(0.09)	(0.21)	(0.20)	(0.20)	(0.39)
# of Observations	316	316	270	246	209	184
Log-Likelihood	-100	-97	-73	-68	-61	-57
Pseudo R^2	0.22	0.24	0.28	0.28	0.29	0.27

Country dummy variables are included but are not reported. Standard errors are in parenthesis.
All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table D.3
Determinants of Sudden Stops – Two-way Fixed Effects Model

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.50***	1.34***	1.18**	1.18**	1.74***	1.57***
	(0.35)	(0.36)	(0.43)	(0.47)	(0.53)	(0.56)
Current Account /GDP		-4.77	-9.20*	-7.68	-9.46	-9.78
		(3.22)	(5.35)	(5.35)	(7.93)	(8.95)
Real Exchange Rate Appreciation			3.05**	2.68*	2.98	2.58
			(1.37)	(1.52)	(1.97)	(1.97)
Credit Growth				0.24	0.61	0.56
				(0.28)	(0.54)	(0.54)
Budget Balance / GDP					-3.76	-3.71
					(4.59)	(4.35)
Short-term Debt / Reserves						-0.07
						(0.32)
Constant	-1.35***	-1.47***	-1.92**	-1.85**	-2.03**	-2.55**
	(0.38)	(0.43)	(0.78)	(0.76)	(0.93)	(1.09)
# of Observations	288	288	226	206	166	150
Log-Likelihood	-83	-82	-59	-56	-47	-45
Pseudo R^2	0.32	0.33	0.38	0.37	0.40	0.37

Country and year dummy variables are included but are not reported. Standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table D.4
Determinants of Sudden Stops – Random Effects Model

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.22***	1.02***	0.84***	0.83***	0.97***	0.87***
	(0.18)	(0.20)	(0.23)	(0.24)	(0.27)	(0.27)
Current Account /GDP		-4.87**	-9.13***	-8.49**	-7.16**	-7.21*
		(2.14)	(3.26)	(3.26)	(3.49)	(3.69)
Real Exchange Rate Appreciation			1.70**	1.88**	1.81**	1.67*
			(0.75)	(0.80)	(0.89)	(0.91)
Credit Growth				-0.02	0.25	0.23
				(0.13)	(0.29)	(0.29)
Budget Balance / GDP					-1.25	-1.74
					(2.74)	(2.75)
Short-term Debt / Reserves						-0.08
						(0.13)
Constant	-1.67***	-1.70***	-1.94***	-1.92***	-1.99***	-1.86***
	(0.11)	(0.12)	(0.17)	(0.18)	(0.21)	(0.25)
# of Observations	443	443	369	341	300	255
Log-Likelihood	-121	-118	-87	-82	-75	-70
Pseudo R^2						

Random effects are based on countries. Standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table D.5
Determinants of Sudden Stops – End of the Surges

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.84***	1.69***	1.60***	1.60***	1.80***	1.69***
	(0.20)	(0.20)	(0.23)	(0.24)	(0.28)	(0.29)
Current Account /GDP		-4.51**	-9.37***	-8.67***	-7.40***	-7.03**
		(2.05)	(2.61)	(2.52)	(2.76)	(3.07)
Real Exchange Rate Appreciation			1.54***	1.62***	1.47**	1.37**
			(0.49)	(0.62)	(0.68)	(0.64)
Credit Growth				0.02	0.52*	0.47
				(0.09)	(0.29)	(0.30)
Budget Balance / GDP					-2.30	-2.58*
					(1.71)	(1.40)
Short-term Debt / Reserves						-0.09
						(0.13)
Constant	-1.72***	-1.76***	-2.03***	-2.02***	-2.16***	-2.01***
	(0.11)	(0.13)	(0.16)	(0.15)	(0.16)	(0.18)
# of Observations	443	443	369	341	300	255
Log-Likelihood	-104	-101	-73	-68	-60	-57
Pseudo R^2	0.28	0.29	0.35	0.36	0.38	0.35

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table D.6
Determinants of Sudden Stops – Longer Term Effects of Surges

	(6)	(7)	(8)	(9)	(10)	(11)
Surge Dummy	1.22***	1.02***	0.84***	0.83	0.97	0.87
	(0.18)	(0.19)	(0.24)	(0.24)	(0.29)	(0.30)
Current Account /GDP		-4.87**	-9.13***	-8.49***	-7.16**	-7.21**
		(1.99)	(2.89)	(2.78)	(3.08)	(3.43)
Real Exchange Rate Appreciation			1.70***	1.88***	1.81***	1.67***
			(0.53)	(0.58)	(0.66)	(0.63)
Credit Growth				-0.02	0.25	0.23
				(0.08)	(0.25)	(0.27)
Budget Balance / GDP					-1.25	-1.74
					(1.98)	(1.78)
Short-term Debt / Reserves						-0.08
						(0.11)
Constant	-1.67***	-1.70***	-1.94***	-1.92***	-1.99***	-1.86***
	(0.11)	(0.12)	(0.15)	(0.14)	(0.16)	(0.19)
# of Observations	443	443	369	341	300	255
Log-Likelihood	-127	-123	-90	-84	-78	-73
Pseudo R^2	0.11	0.14	0.21	0.21	0.20	0.18

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Table D.7
Determinants of Sudden Stops – Shares of the Components of the Surge Included

		(18)	(19)	(20)	(21)	(22)	(23)
B_1	*Surge Dummy*	0.68	0.44	0.68	0.42	0.49	0.29
		(0.48)	(0.54)	(0.76)	(0.74)	(0.77)	(0.88)
B_2	*FDI / GDP*	0.00	0.00	-0.01	-0.01	-0.01	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
B_3	*HOT / GDP*	0.01	0.00	0.00	-0.01	-0.01	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
B_4	*FDI/GDP x Surge*	0.06	0.16	-0.33	-0.10	-0.10	0.08
		(0.40)	(0.41)	(0.72)	(0.66)	(0.68)	(0.83)
B_5	*HOT/GDP x Surge*	0.82	0.80	0.51	0.73	0.84	0.88
		(0.51)	(0.55)	(0.72)	(0.72)	(0.73)	(0.81)
B_6	*Current Account /GDP*		-5.26**	-8.37***	-7.47**	-6.74*	-6.89*
			(2.50)	(3.19)	(3.15)	(3.57)	(3.83)
B_7	*Real Exchange Rate Appreciation*			1.59***	1.79**	1.95**	1.73**
				(0.68)	(0.70)	(0.76)	(0.74)
B_8	*Credit Growth*				0.27	0.23	0.23
					(0.27)	(0.28)	(0.28)
B_9	*Budget Balance / GDP*					-1.58	-2.24
						(2.12)	(1.82)
B_{10}	*Short-term Debt / Reserves*						-0.11
							(0.14)
B_0	*Constant*	-1.72***	-1.75***	-1.90***	-1.92***	-1.98***	-1.83***
		(0.12)	(0.14)	(0.15)	(0.14)	(0.16)	(0.19)
	# of Observations	398	398	349	326	293	248
	Log-Likelihood	-101	-99	-82	-76	-71	-66
	Pseudo R^2	0.16	0.18	0.23	0.24	0.25	0.22
	Null Hypothesis				**P-Values**		
	Ho: $B_2+B_4=0$	0.88	0.70	0.64	0.88	0.88	0.93
	Ho: $B_3+B_5=0$	0.10	0.15	0.49	0.32	0.26	0.28

Robust and clustered (on country) standard errors are in parenthesis. All independent variables are lagged one year unless specified otherwise.
* Significant at 10%; ** significant at 5%; ***significant at 1%

Bibliography

Abiad, A., 2003. Early-Warning Systems: A Survey and and a Regime-Switching Approach. IMF Working Paper No.03/32. International Monetary Fund.

Ai, C., Norton, E.C., 2003. Interaction Terms in Logit and Probit Models. Economics Letters 80, (1), 123--129.

Aziz, J., Caramazza, F., Salgado, R., 2000. Currency Crises: In Search of Common Elements. IMF Working Paper No.00/67. International Monetary Fund.

Bacchetta, P., Vincoop, E.V., 1998. Capital Flows to Emerging Markets: Liberalization, Overshooting, and Volatility. CEPR Discussion Paper No.1889.

Bailey, M.N., Farrell, D., Lund, S., 2000. The Color of Hot Money. Foreign Affairs (March/April), 99--109.

Bikhchandani, S., Sharma, S., 2000. Herd Behavior in Financial Markets-A Review. IMF Working Paper No.00/48.

Bird, G., Rajan, R.S., 2002. Does FDI Guarantee the Stability of International Capital Flows? Evidence from Malaysia. Development Policy Review 20, 191--202.

Calvo, G., 1998. Capital Flows and Capital-Market Crises: The Simple Economics of Sudden Stops. Journal of Applied Economics 1, (November), 35--54.

Calvo, G., 2000. Balance-of-Payments Crises in Emerging Markets: Large Capital Inflows and Sovereign Governments, in: Krugman, P. (Ed.), Currency Crises, University of Chicago Press, Chicago, Illinois,

Calvo, G., Izquierdo, A., Mejia, L.-F. , 2004. On the Empirics of Sudden Stops: The Relevance of Balance-sheet Effects. NBER Working Paper No.10520.

Calvo, G., Leiderman, L., Reinhart C.M. , 1996. Inflows of Capital to Developing Countries in the 1990's. Journal of Economic Perspectives 10, (Spring), 123-129

Calvo, G., Mendoza, E.G., 2000. Rational Contagion and the Globalization of Securities Markets. Journal of International Economics 51, 79--113.

Cavallo, E.A., Frankel, J.A., 2004. Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, Or Less? Using Gravity to Establish Causality. NBER Working Paper No.10957.

Chuhan, P., Perez-Quiros, G., Popper, H., 1996. International Capital Flows: Do Short-term Investment and Direct Investment Differ? Policy Research Working Paper No.1507. The World Bank.

Claessens, S., Dooley, M.P., Warner, A., 1995. Portfolio Capital Flows: Hot or Cold? The World Economic Review 9, 153--174.

Corsetti, G., Pesenti, P., Roubini, N., 1999. Paper tigers? A Model of the Asian crisis. European Economic Review 43, (7), 1211--1236.

Edwards, S., 1998. Capital Flows, Real Exchange Rates, and Capital Controls: Some Latin American Experiences. NBER Working Paper No.6800.

Edwards, S., 2005. Capital Controls, Sudden Stops and Current Account Reversals. NBER Working Paper No.11170.

Fischer, S., 2001. Exchange Rate Regimes: Is the Bipolar View Correct? Journal of Economic Perspectives 15, (2), 3--24.

Frankel, J.A., Rose, A.K., 1996. Currency Crashes in Emerging Markets: An Empirical Treatment. Journal of International Economics 41, (3-4), 351--366.

Gabriele, A., K., B., A., P., 2000. Instability and Volatility of Capital Flows to Developing Countries. World Economy 23, 1031--1056.

Guttentag, J., Herring, R., 1984. Credit Rationing and Financial Disorder. Journal of Finance 39, (5), 1359--1382.

Haley, Mary-Ann (2001) 'Emerging Market Makers: The Power of Institutional Investors' in L.E. Armijo (ed) *Financial Globalization and Democracy in Emerging Markets.* London: Macmillan, pp. 74-90.

Hutchison, M., Noy, I., 2002. Sudden Stops and the Mexican Wave: Currency Crises, Capital Flow Reversals and Output Loss in Emerging Markets. Pacific Basin Working Paper Series No.02-03. Federal Reserve Bank of San Francisco.

Kamin, S.B., Schindler, J.W., Samuel, S.L., 2001. The Contributions of Domestic and External Factors to Emerging Market Devaluation Crises: An Early Warning Systems Approach. International Finance Discussion Paper No.711. Board of Governers of the Federal Reseve System.

Kaminsky, G.L., 2004. Volatile International Capital Flows: A Blessing or a Curse? Devue d'Economie du Développement 34, (December), 83--119.

Kaminsky, G.L., Lizondo, S., Reinhart, C., 1998. Leading Indicators of Currency Crises. IMF Staff Papers 45, No.1.

Kaminsky, G.L., Reinhart, C., Vegh, C.A., 2003. The Unholy Trinity of Financial Contagion. Journal of Economic Perspectives 17, (4), 51--74.

Keynes, J.M., 1936 The General Theory of Employment, Interest, and Money, London, Macmillan, London.

Krugman, P., 1998. What Happened to Asia? Vol. Mimeo. MIT,

Kumar, M., Moorthy, U., Perraudin, W., 2002. Predicting Emerging Market Currency Crashes. IMF Working Paper No.02/07. International Monetary Fund.

Obstfeld, M., 1984. The Logic of Currency Crises. Cahiers Economiques et Monetaires 43, 311--325.

Osband, K., Van Rijckeghem, C., 1998. Vulnerability to Currency Crises. IMF Staff Papers 47, No.2. 238--258.

Radelet, S., Sachs, J., 1998. The East Asian Financial Crisis: Diagnosis, Remedies, Prospects. Brookings Paper of Economic Activity 1, 1--90.

Rodrik, D., Velasco, A., 1999. Short-Term Capital Flows. NBER Working Paper No.7364.

Sachs, J., Tornell, A., Velasco, A., 1996. Financial Crises in Emerging Markets: The Lessons from 1995. Brookings Paper of Economic Activity 1, 147--212.

Sarno, L., Taylor, M.P., 1999. Hot Money, Accounting Labels and the Permanence of Capital Flows to Developing Countries: An Empirical Investigation. Journal of Development Economics 59, (2), 337--364.

Sula, O., Willett, T.D., 2005. Measuring The Reversibility of Different Types of Capital Flows. Working Paper Claremont Graduate University.

Willett, T.D., 2000. International Financial Markets as Sources of Crises or Discipline: The Too Much, Too Late Hypothesis. Princeton Essays in International Finance 218,

Willett, T.D., Denzau, A., Ramos, C., Thomas, J., Jo, G.-J. , 2004. The Falsification of Four Popular Hypothesis about International Financial Behavior during Asian Crises. The World Economy 27, 25--44.

Willett, Thomas D., J. Sik Kim, J. Li, R.S. Rajan, and O. Sula, (2004), "Reserve Adequacy in Asia Revisited: New Benchmarks Based on the Size and Composition of Capital Flows" *Claremont Institute of Economic Studies Working Paper*, 07.

Williamson, J., 2001. Issues Regarding the Composition of Capital Flows. Development Policy Review 19, (1), 11--29.