FINANCIAL GLOBALIZATION, SEQUENCING OF REFORMS, AND MACROECONOMIC VULNERABILITY: A LATIN AMERICAN VIEW*

By

Sebastian Edwards

Draft: August, 2007

Abstract

In this paper I use a large cross country data set and panel probit analysis to investigate whether an increase in the degree of openness – both financial openness and trade openness – affects the probability of external crises. Although the analysis is motivated by Latin America's experiences, the data set covers countries from every region in the world. I am particularly interested in investigating the way in which the interaction between trade and financial openness affect these probabilities. I also focus on current account and fiscal imbalances, contagion, international reserves holdings, and the exchange rate regime as possible determinants of external crises. The results indicate that relaxing capital controls increases the likelihood of a country experiencing a sudden stop. Moreover, the results suggest that "financial liberalization first" strategies increase the degree of vulnerability to external crises. This is particularly the case if this strategy is pursued with pegged exchange rates and if it results in large current account imbalances.

***JEL Classification No*:** F30, F32

Keywords: Financial openness, capital mobility, contagion, external imbalances, current account deficits, sudden stops, sequencing of reform.

* This paper has been prepared for presentation at the TRIO Conference, Tokyo, September, 4-5, 2007. I thank Alberto Naudon for his assistance. I have benefited from conversations with Anella Munro.

1. Introduction

For decades Latin America has been called the "land of the future." Some day, it has been said, its countries will achieve their economic potential: growth will accelerate and poverty and inequality will decline. Hopes of improved economic conditions were never higher than during the first half of the 1990s, when country after country embarked on market-oriented reforms that were supposed to modernize the region, increase its people's productivity, and take them out of poverty. These reform programs, known as the "Washington Consensus," were based on efforts to open up the Latin American economies, reduce fiscal imbalances and inflation, deregulate investment, develop domestic capital markets, and privatize public enterprises. In addition, there was an effort to reallocate public expenditures towards the poorest segments of society. [1]

During the early 1990s the Washington Consensus reforms bore fruit on the macroeconomic front: inflation declined substantially and growth accelerated. In some countries – Argentina, Chile and Peru – the pace of economic expansion was nothing short of spectacular. Throughout most of the region the eraly 1990s was a period of hope and high expectations.[2]

In the second half of the 1990s and early 2000s hope was replaced by a succession of deep and traumatic crises. In December 1994, the Mexican Peso collapsed and was devalued by more than 50%. In 1997, when the region was beginning to recover from Mexico's "Tequila" crisis, Latin America was impacted by the East Asian crises, and in 1998 by the Russian devaluation and the failure of the investment firm *Long Term Capital Management*. The drastic worsening of international financial conditions resulted in sudden stops of capital flows into the region and forced many Latin American nations to devalue their currencies and to implement severe current account adjustments. Output declined and unemployment increased significantly.

During the early 2000s an increasing number of analysts began to criticize the Washington Consensus and the market oriented reforms. Nobel laureate Joseph E. Stiglitz was, perhaps, the most forceful of the critics. In his 2002 book *Globalization and its Discontent*, Stiglitz argues that globalization policies and market reforms have the

---

[1] See, Williamson (1990).

[2] For an analysis of the early reforms see Edwards (1995). For a technical analysis of Latin America's growth see Loayza et al (2005).

potential of doing a lot of good, if undertaken properly and if they incorporate the characteristics of each individual country. The problem, according to Stiglitz, is that globalization was not pushed carefully or fairly. On the contrary, according to him, during the 1990s and early 2000s liberalization policies were implemented too fast, in the wrong sequence, and often using inadequate – or plainly wrong – economic analysis. Three interrelated policy issues were at the center of Stiglitz's and other criticisms of globalization and the Washington Consensus: (1) in designing reform packages during the 1990s, crucial aspects of the sequencing and pace of reform were ignored. As a result, in many countries reform was implemented too fast – Stiglitz prefers gradualism --, and in the wrong order.[3] (2) Advocating (and imposing) financial liberalization was a huge mistake. According to Stiglitz freer capital mobility encourages speculation and increases the probability of external crises, including sudden stops of capital inflows. And (3), the IMF involvement in the East Asian and Argentinean crises was a disaster that made things worse rather than better.[4]

As a result of the economic setbacks of the late 1990s and early 2000s, frustration erupted across most of Latin America, and the public grew increasingly skeptical about the merits of globalization. In some countries -- Bolivia, Ecuador and Venezuela – newly elected political leaders announced policies that would undo the reforms of the 1990s. These policies included the nationalization of industries and increased government controls.

In this paper I use a large cross country data set to investigate whether, as posited by some authors, an increase in the degree of financial openness affects the likelihood that a country experiences an external crisis. In particular, I analyze if a liberalization process undertaken in the "wrong order" – that is, one characterized by an early relaxation of capital controls – increases a country's vulnerability to a crisis. Although the analysis is motivated by Latin America's experiences, the data set is broader and covers countries from every region in the world. I use variance component probit analysis to investigate how different variables affect the probability of countries being

[3] Questions related to the sequencing of reform were first addressed by McKinnon (1973). The subject was revived in the early 1980s by Edwards (1984). Both of these authors argued that the most adequate sequencing implied postponing the opening of the financial account.

[4] Criticism of the Washington Consensus can also be found in Rodrik (2006).

subject to sudden stops of capital inflows. I also analyze the role played by current account and fiscal imbalances, contagion, international reserves holdings, and the exchange rate regime on the probability of an external crisis. Throughout the paper I define "crisis" as a major and abrupt decline in (net) capital inflows, or "sudden stop.".

The rest of the paper is organized as follows: In Section II I discuss Latin America's protectionist history until the early 1990s. I then analyze the evolution of trade and capital account restrictions during the last two decades, and I discuss some policy issues related to the sequencing of economic reform. In Section III I develop an empirical model for analyzing the extent to which financial globalization and trade openness, among other variables, have affected the probability of an external crisis. More specifically, I investigate the way in which different combinations of trade and financial openness affect the probability of a sudden stop of capital inflows. In Section IV I provide some concluding remarks. There is also a Data Appendix. The paper differs from previous work on the subject, including from some of my own past efforts, in several respects: first, I use a new measure of the degree of financial openness constructed from data collected by the Fraser Institute since 1975. Second, I use a data set that includes a larger number of countries and years than those used in previous works. And third, and perhaps more important, I address questions related to the effects of alternative sequencings of economic reform on macroeconomic vulnerability.

2. **Financial and Trade Liberalization in the 1990s and 2000s: How Much? How Fast? In which Sequence?**

2.1 Latin America's Protectionist History

Starting in the 1940s most Latin American nations followed an economic strategy based on protectionism and government-led industrialization. For some time this approach seemed to work: growth picked up in many countries, and industrialization proceeded at a brisk pace. During the 1950s many observers were optimistic and thought that economic development and prosperity were around the corner. But underneath this veneer of success, deep inefficiencies and social tensions were simmering. The newly developed industrial sector was highly inefficient, and in order to survive it required higher and higher import barriers. As a result of protectionism the region's currencies became artificially strong, discouraging exports and hurting competitiveness in the agricultural sector in many countries.

The oil price shocks of 1973 and 1979 shaped in a fundamental way the path followed by the Latin American countries during the last quarter of the 20th century. As expected, the large increase oil prices affected oil exporters and importers in very different ways. The former – and, in particular Mexico and Venezuela – embarked in ambitious government-led development plans aimed at rapid industrialization. Oil importing countries, on the other hand, tried to cushion the sudden worsening in their terms of trade by borrowing liberally from abroad. As their oil-exporting neighbors, they accumulated foreign debt at an unsustainable pace.

These strategies, however, didn't work, and by early 1983 the region was facing a major foreign debt crisis. Country after country experienced what later became to be known as a "sudden stop" of capital inflows. Although no one knew it then, by the end of 1982 Latin America had entered one of the darkest periods in its history, the so-called "lost decade." This traumatic period came to an end in 1989 when the "Brady Plan" was announced. This initiative relied on voluntary debt reduction, and consisted on exchanging old non performing bank debt for new long-term bonds with a lower face value. This exchange represented true debt relief for the countries involved in it. In order to be eligible to participate in the Brady debt exchanges the Latin American countries had to show a commitment to implement some economic reforms, including trade liberalization.

2.2 Trade and Financial Liberalization in the 1990s

During the 1990s and early 2000s there was an unprecedented move towards trade and financial liberalization throughout the world, including in Latin America. Country after country reduced import tariffs and quantitative trade restrictions, and lifted controls on capital mobility. Table 1 presents data on average import tariffs and an index of capital mobility for 6 regions for 1985-2004, computed by the Fraser Institute. This index goes from 1 to 10, with larger numbers denoting a greater degree of financial openness. The data in this table are eloquent, and show that both trade and capital controls have declined significantly in every region in the world. Average import tariffs have declined by 49% between 1985 and 2004. Tariff rates have been reduced by 68% in the advanced countries, 56% in Latin America and the Caribbean, 64% in Asia, 33% in Africa, and only 4% in the Middle East.[5] The final three columns in this Table also confirm that the degree of financial openness was much higher in 2004 than in 1985. The pattern of financial liberalization, however, has differed across regions. In Africa, the Middle East and Eastern Europe financial liberalization proceeded through 2004. In the Industrial nations, Latin America and Asia financial openness “peaked” in 1995; between 1995 and 2004 the index of financial openness declined slightly, indicating a small readjustment of norms and regulations.

2.3 The Sequencing of Liberalization

For a long time economists have argued about the appropriate sequencing of economic reform. During most of the 1980s the generally agreed view on sequencing was: (1) Trade liberalization should be gradual and buttressed with substantial foreign aid. (2) An effort should be made to minimize the unemployment consequences of reform. (3) In countries with very high inflation, fiscal imbalances should be dealt with very early on in the reform process. (4) Financial reform requires the creation of modern supervisory and regulatory agencies. And (5), the capital account should be liberalized at the very end of the process, and only once the economy has been able to expand successfully its export sector.[6]

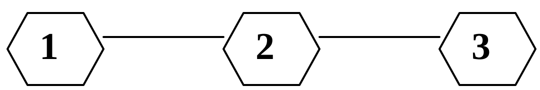
Sometime during the early 1990’s this received wisdom on sequencing and speed began to be challenged. Increasingly, the IMF and U.S. Treasury began to call for a very early opening of the financial account. Many argued that politically this was the only way to move forward. Otherwise, the argument went, reform opponents would successfully block liberalization efforts. It was around this time that the U.S. government began pressuring the East Asian nations to liberalize their financial account restrictions and to allow capital to move more freely. Policy makers and academics in most of the Asia became extremely worried about these recommendations. They had two main concerns. On the one hand, they argued that – as had been the case in a number of Latin American countries during the early 1980s – liberalizing the financial account would

[5] Ideally one would also want information on non-tariff restrictions. These data, however, are difficult to find for a large number of countries and years. The Fraser Institute, for instance, has only data for a few years since 1995.

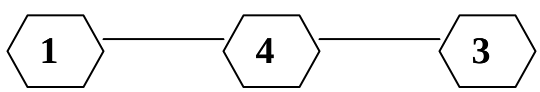
[6] See Edwards (1984) for an early discussion on these issues.

result in massive real exchange rate appreciation. This was against the decades-old policy of maintaining a highly competitive real exchange rate as a way of encouraging exports. The second concern was based on a vulnerability argument: an open financial account could make the East Asian nations more vulnerable to abrupt declines in capital inflows. If this were to happen the countries in the region would incur in severe adjustment costs and could even end up with a smaller export sector.

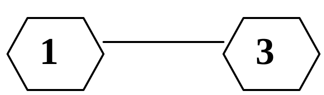
The sequencing of reform discussion may be illustrated with the assistance of Table 2, where there are four combinations of financial and trade integration with the rest of the world. The conventional “trade liberalization first” sequencing is given by a (gradual) move from box 1, to box 2, and eventually to box 3:



The “early financial integration” sequence, which has been criticized by Stiglitz and others, has two variants. The “financial liberalization” first mode:



The second variant corresponds to a faster and simultaneous trade and financial opening:



During the last two decades the following countries have had, during one point or another, a relatively closed trade account (average tariffs in excess of 25%) and a relatively open financial account (Fraser index of capital mobility higher than 6): China, Costa Rica, Egypt, Guatemala, Jordan, Kenya, Mauritius, Panama, Paraguay, Philippines, Slovak Republic, Uruguay, and Venezuela.[7] As may be seen, one half of these countries belong to the Latin American region. When alternative measures of financial integration are used – such as an index based on the sum of external assets and liabilities --, similar results are obtained. In terms of the typology in Table 2, these countries are in box 4, a box that belongs to the criticized "early financial reform" sequencing.

Many of the Latin American countries that suffered major external crises during the 1990s and 2000s – including Argentina, Mexico, and Uruguay – had opened their financial accounts early and rapidly. This contrasted with the case of Chile and Colombia, two countries that maintained some controls on capital flows – and in particular on capital inflows -- and did not default on their debts during the 1980s. An interesting question, and one that I address in Section III of this paper, is whether countries whose policies are characterized by Box 4 in Table 2 have faced a higher probability of experiencing a sudden stop of capital inflows than countries in other boxes in this Table.

3. Globalization and Crises: An Empirical Investigation

In this Section I investigate whether the degree of globalization affects the probability of a country experiencing a sudden stop of capital inflows. I am particularly interested in analyzing the way in which alternative combinations of financial and trade openness affect the likelihood of a sudden-stops crisis. This analysis will shed some light on the sequencing of reform debate, as well as on the validity of some of the criticisms of the so-called Washington Consensus. I am also interested in investigating the way in which capital mobility affects the role played by other variables – including external imbalances and the degree of flexibility of the nominal exchange rate – in determining the probability of a sudden stop.

3.1 The Empirical Model

The point of departure of the analysis is a variance component probit model given by equations (1) and (2):

[7] In order to be in this list a country has to have had, at least for one year, trade and financial indicators in excess of the thresholds presented above.

$$(1) \qquad y_{tj} = \begin{cases} 1, & \text{if } \; y^*_{tj} > 0, \\ 0, & \text{otherwise.} \end{cases}$$

$$(2) \qquad y^*_{tj} = a w_{tj} + e_{tj}.$$

Variable y_{tj} is a dummy variable that takes a value of one if country j in period t experienced a sudden stop (as defined below), and zero if the country in question did not experience a sudden stop.[8] According to equation (1), whether the country experiences a sudden stop is the result of an unobserved latent variable y^*_{tj}, assumed to depend linearly on vector w_{tj}, which includes a number of economic, structural and policy characteristics of each economy, such as the degree of openness, external and domestic imbalances and others. The error term e_{tj} is given by a variance component model: $e_{tj} = n_j + m_{tj}$. n_j is iid with zero mean and variance s^2_n; m_{tj} is normally distributed with zero mean and variance $s^2_m = 1$. In addition to the random effects model, I also estimated fixed effects and basic probit versions of the probit model in equations (1) and (2).[9]

3.2 Specification and Variable Definition

I define a "*sudden stop*" episode as an abrupt and major reduction in net capital inflows to a country that, up to that time, had been receiving large volumes of foreign capital. More specifically, I imposed the following requirements for an episode to qualify as a "sudden stop": (1) the country must have received an inflow of capital (relative to GDP) larger than its region's third quartile during the two years prior to the "sudden stop." And (2), net capital inflows must have declined by at least 3% of GDP in one year. Table 3 contains data on the incidence of sudden stops for the period 1970-

[8] Glick and Hutchinson (2005) investigated whether capital controls have isolated countries from currency crises. There measure of controls is a basic zero-one indicator, however.

[9] In the "basic probit" estimation, the error term is assumed to have the standard characteristics.

2004 for six regions as well as for the world as a whole. In the econometric analysis I use a one year window, where data for the year following a sudden stop episode are set as "missing." The main purpose of this window is to avoid double counting sudden stop episodes. However, when the analysis was performed on the raw data, without a window, the results were similar to those reported here (See Section 3.6).

In specifying the model I (mostly) follow the literature on external crises, devaluations, sudden stops, and current account reversals.[10] In the base-case specification I included the following covariates, all of which are available for a large number of countries and years:

- The ratio of the current account deficit to GDP, lagged one period.
- The lagged ratio of the country's fiscal deficit relative to GDP.
- The lagged value of an index that measures "contagion." This index is defined as the relative occurrence of a contraction in capital flows in each country's "reference group." The reference group, in turn, is defined for most countries as their region. As in Table 3 there are five geographical regions: Latin America, Asia, North Africa and the Middle East, Africa and Eastern and Central Europe. The advanced countries belong to a group of their own. In this calculation data for the country in question are excluded. The coefficient of this "contagion" variable in the probit equation is expected to be positive, reflecting the fact that when a similar country experiences a capital flow contraction, capital flows to the country in question will tend to decline, increasing the likelihood of a sudden stop.
- Percentage change in the terms of trade (defined as the ratio of export prices to import prices), with a one year lag. Improved terms of trade are expected to lower the probability of a crisis; its coefficient should be negative.
- Lagged international real interest rates, proxied by real U.S. 10 year Treasuries. As Eichengreen (2001) has argued, a decline in world liquidity – captured by higher international real interest rates – will tend to increase the

[10] See, for example, Calvo et al (2004), Glick and Hutchison (2005), Edwards (2004a, 2004b), and Frankel and Cavallo (2004). See also Eichengreen et al (2006), Frankel and Rose (1996), Milesi-Ferreti and Razin (2000) and Edwards (2002).

probability of an external crisis. If this is indeed the case, the coefficient of this variable will be positive.

- A dummy variable for each region. In some of the regressions I included dummy variables for advanced countries.
- A dummy variable that takes the value of one if that particular country has a de facto flexible exchange rate regime, and zero otherwise. The classification of exchange rate regimes is taken from the updated data set developed by Levy-Yeyati and Sturzenegger (2003).
- International reserves as a proportion of the country's total external liabilities. This indicator was constructed from data provided by Lane and Milesi-Ferreti (2006). To the extent that a high level of international reserves held by the central bank is seen as an insurance policy, the coefficient of this variable is expected to be negative in the estimation of the probit equations.

As a way of capturing alternative openness scenarios, I included the following variables into the probit analysis:[11]

- A variable that measures whether the financial account is open. This variable, which I call *Cap_Open*, takes the value of one if in any given year a financial openness index constructed on the bases of the Fraser Institute indicator takes a value equal or higher than 6, in a scale from 1 to 10. This value of 6 corresponds to the 25th percentile of the financial openness index.
- A variable that measures whether the trade account is open in any given year. This variable, which I call *Trade_Open*, takes the value of one if the average tariff in that year and country is equal or lower than 10%. This value corresponds to the 25th percentile of the average tariff calculated by the Fraser Institute for 1985-2004; that is, only 25% of the country-year observations have values lower than 10% (See the data appendix). Notice that a country

[11] I am not aware of any study that has attempted to deal with sequencing issues with a methodology similar to the one used in this paper.

may have "closed" trade – that is, import tariffs in excess of 10% -- and still develop (very) large current account deficits.

3.3 Basic Results

The basic results are presented in Tables 4, where as customary, I report the marginal effects of each independent variable on the probability of a sudden stop, evaluated at the mean values of the covariates (for presentation purposes I don't present the marginal effects of the regional dummies). At the bottom of each column I also present the estimated probability of a sudden stop, also evaluated at the mean values of the covariates. As may be seen, most estimated coefficients have the expected signs and the majority of them are significant at conventional levels. The following aspects of the results are worth discussing: (a) countries with large (lagged) current account deficits face a higher probability of a crisis. The marginal effect of the (lagged) current account deficit is rather small, however-- about one half of one percent. (b) There is evidence of contagion. A higher incidence of capital flows contractions in the region increases the probability of a sudden stop. (c) Higher world interest rates – that is lower global liquidity – increases the probability of a sudden stop crisis. (d) With other things given, having a flexible exchange rate reduces the probability of a financial crunch. Moreover, the marginal effect of the flexible exchange rate regime is rather large, at approximately (minus) 2 percentage points. (e) Equation (4.1) suggests that after controlling for the current account deficit, the public sector deficit plays no role in determining the likelihood of a crisis. However, as may be seen in equation (4.2), once the current account variable is excluded, the public sector deficits have a positive effect on the probability. That is, a marginal increase in the government deficit that is not reflected in an external (current account) imbalance has no effect on the probability of a crisis. (f) Interestingly, and perhaps surprisingly, with other things given, neither changes in the terms of trade nor the stock of international reserves appear to affect the likelihood of a sudden stop.

From this paper's perspective the most important results are related to the coefficients of the two openness variables. As may be seen, the coefficient of the financial openness dummy is significantly positive in the three regressions; moreover, the marginal effects are rather large, suggesting that with other variables given (and at their mean values), moving from having a "closed" to having an "open" financial account increases the probability of a sudden stop by approximately 4 percentage points. The results in Table 4 also show that the coefficient of the trade openness variable is always positive, suggesting that countries with more open to trade face a higher probability of experiencing a sudden stop. The values of the z-statistics, however, are low; only in one of the three regressions they exceed one, and in none of them they are significant at the 10% level. Aizenman and Noy (2004) have argued that financial and trade openness are highly correlated across countries and time. This correlation may explain the low degree of significance of the trade openness variable.

The results reported at the bottom of Table 4 show that, when all the covariates are at their mean values, the estimated probabilities of a sudden stop are on the low side, ranging from 3.2% to 4.2%. In the Sub-Sections that follow I investigate how these estimated probabilities – and the marginal effects – change when the probability functions are evaluated at alternative values of the covariates.

3.4 Probabilities of Sudden Stops under Alternative Configurations of Trade and Financial Openness: A Preliminary Exercise

An important property of probit models is that marginal effects and estimated probabilities are conditional on the values of *all* covariates. This means that if the value of one of the independent variables changes, the marginal effect of all of them – and of the overall estimated probability, for that matter -- will also change. Denoting the (normal) cumulative probability distribution by Φ, then the probit model is defined by:

(3) $$\Pr(y_{jt} \neq 0 \mid w_{jt}) = \Phi(a w_{jt})$$

The marginal effect of covariate z_1 is calculated as the slope of the probability function, evaluated at a specific set of values of the covariates $w_{jt}s$. If the estimated probit coefficient of z_1 is a_1, and we want to evaluate the marginal effect of z_1 at a point where covariates have values captured by vector $\tilde{w}$, the marginal effect of z_1 (evaluated at $\tilde{w}$) is given by:

(4) $$\frac{\partial \Phi}{\partial z_1} = \Phi'(a\tilde{w})a_1.$$

In order to provide some insights into the sequencing issue, I use the estimates from equation (4.3) in Table 4 to compute the probabilities of experiencing a sudden stop for the four configurations of financial and trade openness that appear in Table 2 (in performing this exercise the values of the other covariates have been maintained at their means).

The results obtained are presented in Table 5. A first reaction to these computations is that in all four possible combinations of trade and financial openness the estimated probabilities are on the low side. Even in the highest case the estimated probability is lower than 0.10. Second, and as expected from the estimates reported above, these results show that the highest probability is obtained when the trade and financial accounts are open. This result, however, has to be interpreted with caution, for at least two reasons: (a) the coefficients of the trade openness indicator in the probit equations were estimated in a very imprecise way (see the z-statistics in Table 4). (b) The probability estimates in Table 5 were obtained by evaluating the probability function *at the mean values* of all other covariates. This, however, is an artificial exercise, as it is highly unlikely that countries that have very different configurations of trade and financial openness, will face the same values of other covariates. In the Sub-Section that follows I address this issue by evaluating the probability function under two broad alternative scenarios.

3.5 The Role of Current Account Imbalances and the Exchange Rate Regime

Authors that favor a gradual liberalization course, where the financial account is opened towards the end of the process, have argued that that particular sequence avoids very large current account deficits, and reduce the probability of a crisis.[12] Moreover, critics of early financial liberalization have been particularly concerned about the rigidities imposed by fixed exchange rates. Indeed, many of the major crises of the 1990s took place in countries that had built very large current account deficits – in the order of

[12] Stiglitz (2002).

6% to 8% of GDP – and had pegged exchange rates. In order to analyze the roles played by both of these variables, in this Section I report results for estimated probabilities of sudden stops under two alternative scenarios. The two cases under consideration are:

- ***Scenario A***: A country with a fixed exchange rate regime moves from a "closed-closed" situation to an "open financial-closed trade" configuration. In addition, I assume that in the process of opening up financially the country develops a large current account deficit (8% of GDP).
- ***Scenario B***: Gradual transition from a "closed-closed" configuration to an "open-open" one. I further assume that during the liberalization process the country adopts a flexible exchange rate regime and that, due to the gradualism of the process, it is able to maintain the current account deficit at reasonable levels (3.5% of GDP).

I use the estimates from equation (4.3) for evaluating the probabilities under these two scenarios. In order to provide some structure to the model I undertake these exercises for the case of a Latin American country.[13] Under both scenarios the initial conditions are characterized by closed trade and financial accounts. As may be seen from Table 5, in this case the estimated probability of a sudden stop crisis is 0.022. The estimated probabilities of experiencing a sudden stop crisis under the two alternative scenarios described above are:

- ***Scenario A*** (abrupt "financial account first" strategy): Estimated probability of experiencing a sudden stop: 0.133.
- ***Scenario B*** (gradual "financial account last" strategy): Estimated probability of a sudden stop: 0.062.

---

[13] That is, I evaluate the marginal effects and the probabilities of a sudden stop for values of the regional dummies corresponding to Latin American countries.

These results suggest, quite strongly, that both the exchange rate regime and the evolution of the current account deficit are key variables for determining the likelihood of a capital inflows crunch. In particular, maintaining the current account deficit within limits during a reform process reduces a country's vulnerability significantly. Likewise, adopting a flexible rates regime appears to reduce the risks of a crisis in an important way.

Another important results is that according to this exercise, under Scenario A the country in question is more vulnerable to external shocks than under Scenario B. For example, the marginal effect of world real interest rates shocks is twice as large under Scenario A as under Scenario B: 0.014 vs 0.007. Notice, however, that under both scenarios these probabilities are still low in absolute terms.

3.6 Extensions, Instrumental Variables, and Future Work

In this section I investigate the robustness of the results and I discuss directions for future research. I also present results obtained using instrumental variables probit estimates. In dealing with robustness I focus on the definition of both the sudden stop indicator and of the openness indexes.

Extensions and Robustness: The results reported above were obtained when the sudden stops indicator was defined using a one year window. This means that the observation corresponding to the year immediately following a sudden stop episode was set as missing. However, one could alternatively define the episodes without using a window. The results obtained when this is done are presented in column 1 of Table 6, where as before I report the marginal effects (as in previous TAbles, and due to space considerations, I don't show those for the regional dummies). As may be seen, the estimated marginal effects are not very different from those discussed above and presented in Table 5.

An important question is whether the results discussed here are driven by the way in which the two openness indicators were defined. In order to investigate this possibility I estimated the variance component probit model using two alternative set of indicators for openness: (a) I excluded (that is, I set to "missing") observations where either the Fraser Institute financial openness index or average tariff variable took intermediate values. That is, the capital open indicator now has a value of one if the index is greater than 6 and zero if its value is smaller than 3; all observations with an index value in between these two values were set to "missing." Likewise, for the trade openness index, I set to "missing" all observations with import tariffs in between 11 and 20. The results obtained when these alternative indexes of openness were used are reported in column 2 of Table 6. (b) As additional measures of integration to the world economy I used continuous indexes of financial openness and tariff averages computed on the bases of the Fraser Institute data (remember that the indexes used in the regressions discussed above where 0-1). I called theses variable *Tariff* and *Financial Op*; a higher value of *Tariff* indicates a lower degree of trade openness, while a higher value of *Financial Op* captures a higher degree of financial openness. These results tend to support those reported above. The coefficient of trade openness is negative, but not significant; that of financial openness is significantly positive. It is important to notice, however, that in this case the marginal effect – computed at mean values of all covariates – is very small: a unitary increase in the financial openness index raises the probability of a sudden stop by less than one tenth of one percent.

<u>*Instrumental Variables*</u>: It is possible, although in my view unlikely, that the analysis presented in the preceding sections is subject to endogeneity. In particular, under certain circumstances capital restrictions (and maybe, even trade restrictions) may be increased as a result of the perception that a sudden stop will occur in the future. In order to address this potential endogeneity issue I estimated the probit model using maximum likelihood instrumental variables procedure suggested by Amemiya (1978).[14] In this estimation I used the two continuous indexes of openness (*Tariff* and *Financial Op*) used in the estimation of equation (6.3) in Table 6.[15]

In determining the instruments I relied on several findings from the empirical literature on capital controls: (1) Political considerations also play an important role in determining the extent of capital restrictions. (2) More advanced countries tend to rely less on capital controls. (3) Distance and geographical location are exogenous determinants of trade flows and openness. Based on these considerations, in the

[14] The identifying restrictions is that the number of instruments excluded from the main equation is equal or greater than the number of endogenous variables.
[15] The estimation of IV probits when the endogenous variables are binary is extremely complex. For this reason in this paper I used the continuous indicators discussed above.

instrumental variables estimation the following instruments were used: a measure of civil liberties, as a proxy for political instability; an index of ethnic fractionalization; lagged change in the terms of trade; the lagged contagion indicator in other regions; lagged current account balance; lagged (real) world interest rates; the log of GDP per capita in 1970; regional dummies; latitude; and an index of predicted trade flows over GDP, calculated using a gravity model.[16] The results obtained from the instrumental variables probit estimates are reported in Table 7, where I report the IV estimates. The results obtained from these instrumental variables analysis generally support the findings on the effects of financial openness on the probability of a sudden stop. The covariates have the expected signs and most are significant. The most important result from this paper's perspective is that the coefficient of financial openness is significantly positive; moreover, its point estimate is very similar to that obtained when no correction for potential endogeneity was made. On the other hand, the coefficient of *Tariff* is not significant at conventional levels.

Future Work: The analysis presented above has relied on the nonlinear properties of probits to investigate the way in which different variables – including the degree of trade and financial openness, the exchange rate regime and current account imbalances – interact to determine the probability of a country experiencing a sudden and abrupt decline in capital inflows. An alternative way to deal with this issue – and one that is beyond the scope of this paper – is to introduce in the estimation terms that interact two or more covariates. This specification would provide information on the *cross effect* of one of the covariates on the probability of a *sudden stop*. It is important to notice, however, that in this case the interpretation of the coefficients and marginal effects is not completely trivial.[17] Future work on the subject could indeed investigate the nature of these interactive terms and cross effects. Additionally, future work should focus on trying to determine whether different forms of financial restrictions affect the probability of a crisis in different ways. A particularly interesting question is whether controls on

[16] As Aizenman and Noy (2004) have shown, there is a strong empirical connection between trade openness and the degree of capital mobility. The use of gravity trade equations to generate instruments in panel estimation has been pioneered by Jeff Frankel. See, for example, Frankel and Cavallo (2004).
[17] See Edwards (2007) for an application to external crises.

capital inflows and controls on outflows have the same effect on the probability of a crisis.

4. Concluding Remarks

In this paper I have used panel probit analysis and a large cross country data set to investigate whether an increase in the degree of openness – both trade and financial – affects the probability of external crises. Although the analysis was motivated by Latin America's experiences, the data set is broader and covers countries from every region in the world. I was particularly interested in investigating the way in which the interaction between the degree of openness in the trade and capital accounts affect these probabilities. I also focused on potential roles of current account and fiscal imbalances, contagion, international reserves holdings, and the exchange rate regime as possible determinants of external crises. In the analysis I use new measures of capital account and trade restrictions developed by the Fraser Institute.

A main objective of this work is trying to determine whether abrupt reforms that open the financial account on increase a country's degree of vulnerability to external shocks and crises. The results reported in the preceding pages provide some (preliminary) evidence suggesting that "financial liberalization first" strategies increase the degree of vulnerability to external crises. This is particularly the case if these strategies are pursued with pegged exchange rates and if they result in large current account imbalances.

Although these results should be interpreted with caution – in particular due to the imperfect nature of the index of capital mobility --, they do support the view that "sequencing matters," a view expressed early on by McKinnon (1973) and Edwards (1984), and more recently espoused by Stiglitz (2002). The analysis presented here also provide some light on why so many Latin American countries faced significant vulnerabilities and faced major crises during the 1990s.

Finally, it is important to emphasize that this paper has dealt with only one aspect of policies aimed at opening an economy. Indeed, I have not addressed issues related to the effects of financial and/or trade liberalization on TFP growth, aggregate growth and/or welfare. At this time, however, there is a considerable body of empirical evidence suggesting that countries that are more open to international trade experience faster total factor productivity growth than countries that restrict trade.[18] Whether this is a long term effect, or one that eventually dies off is still subject to some discussion. There is also evidence that more open economies are able to adjust more rapidly – and less costly – to external shocks.[19] The evidence on the effects of financial openness on growth and overall economic performance, however, is not that clear cut. A challenge for future research is to develop a unified empirical framework that considers the simultaneous effects of financial and trade openness, including the effects on growth, welfare and vulnerability to crises.

[18] Edwards (1998).
[19] Calvo et al (2004), Edwards (2004).

Table 1
Average Import Tariffs and Index of Capital Mobility

		Mean Tariff				Financial Openness Index			
		All Years	1985	1995	2004	All Years	1985	1995	2004
Industrial	Mean	5.686	7.886	6.639	2.633	6.773	5.542	8.246	7.517
	St. Dev.	3.4	2.6	1.3	1.7	2.6	3.0	1.6	1.0
	Obs.	231.0	22.0	23.0	24.0	240.0	24.0	24.0	24.0
Latin American and Caribbean	Mean	17.895	34.248	12.695	10.716	4.533	2.360	5.940	5.720
	St. Dev	13.5	17.4	3.5	6.1	3.1	2.8	2.9	2.2
	Obs.	200.0	21.0	21.0	25.0	249.0	25.0	25.0	25.0
Asia	Mean	20.591	33.907	29.423	10.153	2.975	2.500	3.638	3.447
	St. Dev.	21.8	31.5	24.3	6.9	2.8	3.4	3.2	2.3
	Obs.	140.0	14.0	13.0	17.0	162.0	16.0	16.0	17.0
Africa	Mean	19.470	27.540	24.336	14.932	1.885	0.567	1.468	3.494
	St. Dev.	9.5	11.3	7.6	5.9	2.4	1.2	2.3	2.4
	Obs.	233.0	25.0	25.0	31.0	307.0	30.0	31.0	32.0
Middle East	Mean	13.539	15.433	15.300	11.311	3.413	1.500	2.770	5.190
	St. Dev.	10.1	13.3	8.3	6.3	3.0	1.6	2.5	2.7
	Obs.	64.0	9.0	6.0	9.0	100.0	10.0	10.0	10.0
Eastern Europe	Mean	9.359	20.100	10.330	7.372	3.625	0.000	4.950	5.595
	St. Dev.	6.7	9.2	6.3	5.1	3.0	0.0	2.3	1.8
	Obs.	90.0	2.0	10.0	18.0	134.0	10.0	14.0	19.0
World	Mean	14.628	24.015	16.381	9.668	3.870	2.293	4.517	5.102
	St. Dev.	13.3	19.1	12.9	6.8	3.2	3.0	3.4	2.5
	Obs.	968.0	94.0	98.0	126.0	1209.0	116.0	122.0	129.0

Source: Fraser Institute

Table 2
Configurations of Trade and Financial Openness and Alternative Sequencings of Reform

	Closed Trade Account	**Open Trade Account**
Closed Financial Account	1	2
Open Financial Account	4	3

Note: See texts for details.

Table 3
Incidence of Sudden Stops, 1970-2004

	No Sudden Stop	Sudden Stop
Industrial	94.07	5.93
Latin American and Caribbean	93.02	6.98
Asia	94.36	5.64
Africa	93.91	6.09
Middle East	85.53	14.47
Eastern Europe	91.82	8.18
World	93.24	6.76
Number of observations	1627	
Pearson:		
Uncorrected chi2(5)	8.6919	
Design-based F(5, 8130)	1.7373	
P - value	0.1224	

Table 4
Marginal Effects and Predicted Probabilities of Sudden Stops

	(4.1)	(4.2)	(4.3)
Financial Openness	0.0382	0.0421	0.0460
	(2.36) **	(2.21) **	(2.75) ***
Trade Openness	0.0070	0.0100	0.0199
	(0.48)	(0.55)	(1.25)
Contagion	0.0010	0.0009	0.0010
	(2.01) **	(1.53)	(2.03) **
Terms of Trade Change	0.0004	0.0000	-0.0001
	(1.05)	(0.09)	(0.16)
World Interest Rate	0.0068	0.0080	0.0051
	(2.46) **	(2.36) **	(1.94) *
Flexible	-0.0153	-0.0216	-0.0207
	(1.56)	(1.81) *	(2.06) **
Public Sector Deficit	0.0007	0.0026	--
	(0.68)	(2.05) **	
International Reserves (% Total External Liabilities)	0.0004	-0.0001	--
	(1.38)	(0.32)	
Current Account Deficit (% of GDP)	0.0065	--	0.0072
	(5.90) ***		(6.97) ***
Predicted Probability	0.0317	0.0433	0.0384
Number of Observations	1295	1295	1627
Number of Countries	93	93	113

Note: Absolute value of z statistics are reported in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%.. Regional dummies included, but not reported.

Table 5
Estimated Probabilities of a Sudden Stops under Alternative Configurations of Financial and Trade Openness
(Computations Based on Equation 4.3)

	Closed Trade Account	**Open Trade Account**
Closed Financial Account	0.022	0.037
Open Financial Account	0.068	0.094

Note: In computing these probabilities (most) other covariates were set at their mean values. The computation was done for a typical Latin American country. See the text for details.

Table 6
Marginal Effects and Predicted Probabilities of Sudden Stops: Alternative Indicators and Samples

	(6.1)	(6.2)	(6.3)
Current Account Deficit (% of GDP)	0.0070	0.0069	0.0073
	(7.30) ***	(4.36) ***	(7.27) ***
Contagion	0.0011	0.0012	0.0012
	(2.22) **	(2.31) **	(2.29) **
Terms of Trade Change	-0.0002	-0.0003	-0.0001
	(0.72)	(0.79)	(0.38)
World Interest Rate	0.0045	0.0057	0.0055
	(1.76) *	(2.18) **	(2.04) **
Flexible	-0.0188	-0.0240	-0.0218
	(1.90) *	(2.36) **	(2.17) **
Financial Openness	0.0434	--	--
	(2.76) ***		
Trade Openness	0.0188	--	--
	(1.21)		
Financial Openness (Index w/missing)	--	0.0379	--
		(1.95) *	
Trade Openness (Index w/missing)	--	0.0210	--
		(1.11)	
Financial Openness (Continuous Index)	--	--	0.0067
			(2.97) ***
Trade Openness (Continuous Index)	--	--	-0.0006
			(1.07)
Predicted Probability	0.0393	0.0218	0.0395
Number of Observations	1745	955	1627
Number of Countries	113	95	113

Note: Absolute value of z statistics are reported in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. Regional dummies included, but not reported.

Table 7
Marginal Effects and Predicted Probabilities of Sudden Stops: IV estimation

	(7.1)
Financial Openness (Instrumented)	0.2132
	(2.84) ***
Mean Tariff (Instrumented)	0.0257
	(1.46)
Current Account Deficit (% of GDP)	0.0730
	(6.44) ***
Contagion	0.0104
	(1.92) *
World Interest Rate	0.0389
	(1.35)
Terms of Trade Change	-0.0011
	(-0.31)
Flexible	-0.3534
	(-3.06) ***
Predicted Probability	0.0384
Number of Observations	1627
Number of Countries	113

Note: Absolute value of z statistics is reported in parentheses. *** significant at 1%; ** significant at 5%; * significant at 10%. For the list of instruments, see the text. Regional dummies included, but not reported.

Data Appendix

Variable	Description	Source
Consumer Price Index (CPI)	Consumer Price Index	World Development Indicators
Civil Liberties	Index Civil Liberties	Freedom House
Contagion	Relative occurrence of capital flow contractions in each country's "reference group."	Author's construction based on data of financial account (World Development Indicators)
Contagion other Regions	Relative occurrence of capital flow contractions in all regions different from each country's "reference group."	Author's construction based on data of financial account (World Development Indicators)
Current Account	Current Account	World Development Indicators
External Liabilities	External Liabilities	Lane and Milesi-Ferreti (2006)
Financial Openness	Variable 4E "International Capital Market Controls". The Dummy takes a value 1 if in any given year a financial openness index takes a value in excess of 6, in a scale from 1 to 10. The continuous index is the actual data for each country. Missing data was filled using Stata impute procedure.	"The Economic Freedom of the World Project", The Fraser Institute
Fiscal Deficit	Fiscal Deficit	World Development Indicators
Flexible	Dummy with value 1 if exchange rate regime is flexible and 0 otherwise. Classification based in Levy Yeyati and Sturzenegger de facto exchange rate regimes classification.	Levy Yeyati and Sturzenegger (2003)
GDP per capita in 1970	GDP per capita in 1970	World Development Indicators
Gross Domestic Product (GDP)	Gross Domestic Product (GDP)	World Development Indicators
Inflation	Annual change in CPI	Author's construction.
International Reserves	International Reserves	Lane and Milesi-Ferreti (2006)
Mean Tariff (Openness Index)	Variable 4 Aii "Mean tariff rate" (the data, not the index). The Dummy takes a value 1 if the average tariff in that year and country is equal or lower than 10%. The continuous index is the actual data for each country. Missing data was filled using Stata impute procedure.	"The Economic Freedom of the World Project", The Fraser Institute
Measure of Trade Openness	Fitted value from a gravity model of bilateral trade	Author's construction.
Net Capital Inflow	Net Capital Inflow	World Development Indicators
No tariff Trade Barriers	Variable 4Bi "No tariff trade barriers"	"The Economic Freedom of the World Project", The Fraser Institute
Sudden Stop	Reduction of net capital inflows of at least 5% of GDP in one year. The country in question must have received an inflow of capital larger to its region's third quartile during the previous two years prior to the "sudden stop."	Author's construction based on data of financial account (World Development Indicators)
Terms of Trade	Trade-exports as capacity to import (constant local currency units)	World Development Indicators
World Interest Rate	Real U.S. 10 year Treasuries (Nominal interest rate minus corresponding inflation)	Author's construction.

Ethnic Fractionalization	Probability that two randomly selected people in a country will not belong to the same ethnic group.	Weil (2005)
Latitude	Latitude	Weil (2005)

References

Aizenman, J., Noy, I., 2004. On the Two Way Feedback Between Financial and Trade Openness. NBER Working Paper no. 10496.

Amemiya, T., 1978. The Estimation of a Simultaneous Equation Generalized Probit Model. *Econometrica* 46 (5), 1193-1205.

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

Edwards, S., 1984.The Order of Liberalization of the External Sector in Developing Countries, Princeton Essays in International Finance No. 156, New Jersey, International Finance Section, Princeton University, December.

Edwards, S., 1995. Crisis and Reform in Latin America: From Despair to Hope. *Oxford University Press.*

Edwards, S., 1998. Openness, Productivity and Growth: What Do We Really Know?. *Economic Journal* 108 (447), pp.383-98.

Edwards, S., 2002. Does the Current Account Matter?. In: Edwards. S., Frankel, J. A. (Eds.), Preventing Currency Crises in Emerging Markets. The University of Chicago Press, pp. 21-69.

Edwards, S., 2004a. Thirty Years of Current Account Imbalances, Current Account Reversals and Sudden Stops. *IMF Staff Papers* 61 (Special Issue), 1-49.

Edwards, S., 2004b. Financial Openness, Sudden Stops and Current Account Reversals. *American Economic Review* 94 (2), 59-64.

Edwards, S., 2007. Capital controls, capital flow contractions, and macroeconomic vulnerability, *Journal of International Money and Finance* 26 (5), pp. 814-840.

Eichengreen, B., 2001. Capital account liberalization: what do cross country studies tell us?, *The World Bank Economic Review* 15 (3), pp. 341–365.

Eichengreen, B., Gupta, P., Mody. A., 2006. Sudden stops and IMF-supported programs. NBER Working Papers No. 12235.

Frankel, J.A., Cavallo, E.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.

Frankel, J.A., Rose, A.K., 1996. Currency crashes in emerging markets: an empirical treatment. *Journal of International Economics* 41 (3 & 4), 351e366.

Glick, R., Hutchison, M., 2005. Capital controls and the exchange rate instability in developing Countries. *Journal of International Money and Finance* 24 (3), 387 - 412.

Lane, P.R., Milesi-Ferretti, G.M., 2006. The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970e2004. CEPR Discussion Papers No. 5644.

Levy Yeyati, E., Sturzenegger, F., 2003. A de facto classification of exchange rate regimes. *American Economic Review* 93 (4), pp. 1623 - 1645.

Loayza, N., P. Fajnzylberg, C. Calderon. 2005. Economic Growth in Latin America and the Caribbean: Stylized Facts, Explanations and Forecasts, The World Bank.

Mckinnon, R.I. 1973. Money and Capital in Economic Development. Washington, D.C.: The Brookings Institution, 1973.

Milesi-Ferretti, G.M., Razin, A., 2000. Current account reversals and currency crises: empirical regularities. In Krugman, P. (Ed.), Currency Crises. *The University of Chicago Press,* pp. 285 - 323.

Rodrik, D. 2006. Goodbye Washington Consensus, Hello Washington Confusion? A Review of the World Bank's Economic Growth in the 1990s: Learning from a Decade of Reform. *Journal of Economic Literature* Vol. XLIV, pp. 973–987.

Stiglitz, J.E., 2002. Globalization and Its Discontents. W.W. Norton, New York.

Weil, D., 2005. Economic Growth. Addison-Wesley, Boston.

Williamson, J. (Ed) 1990. Latin American Adjustment: How Much has Happened?, Washington DC; *Institute for International Economics*.