CAPITAL CONTROLS, EXTERNAL IMBALANCES, SUDDEN STOPS AND CONTAGION

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ABSTRACT

In this paper I analyze whether restrictions to capital mobility reduce countries' vulnerability to major external shocks. More specifically, I ask if countries that restrict the free flow of international capital have a lower probability of experiencing a sudden stop and being subject to contagion than countries that have a freer degree of capital mobility. I use three new indexes on the degree of international financial integration and a large multi-country data set for 1970-2004 to estimate a series of random-effect *probit* equations. I use these estimates to compute marginal effects of different indicators on the likelihood of a country facing a major external crisis. I also analyze the role played by other variables in determining the probability of experiencing a sudden stop, including large current account deficits; the exchange rate regime – fixed or flexible; holdings of international reserves; fiscal imbalances; world interest rates; and the degree of dollarization, among others.

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I. Introduction

The East Asian currency crises of 1997-1998 were extremely traumatic. Countries that for years had been praised as examples of how to conduct economic policy were subject to sudden stops of capital inflows and had to devalue their currencies. As the crisis deepened, contagion spread to other emerging nations, affecting countries as far as Latin America. In many ways, the East Asian crises marked the end of an era; in the years that followed, macroeconomic policies in most emerging countries went through profound changes. Perhaps the most important one was that most countries gave up pegged exchange rate regimes and adopted some form of flexible exchange rates.[1] Indeed, at the time of this writing, very few countries have rigid exchange rates – China being the most important cases of exchange rate inflexibility.

It is not an exaggeration to say that the East Asian and subsequent crises -- Brazil, Turkey, Argentina, Uruguay, the Dominican Republic – resulted in the emergence of a new (and more prudent) approach towards macroeconomic policy in emerging and transition nations. The overall objective of this new approach is to reduce vulnerability to external shocks and to lower the likelihood of external crises, including sudden stops and major devaluations. This new view on macro policy has also recognized the need of maintaining the public and external debts at prudent levels. In addition, the accumulation of international reserves has been used as a self insurance system, and current account deficits have generally been kept in check.[2]

In spite of the emergence of a new view on macroeconomic policy, there are still some areas of disagreement. The most important one refers to the appropriate degree of capital mobility in emerging and transition countries. Some authors argue that limiting the extent of international financial integration reduces speculation and helps countries withstand external shocks without suffering massive crises. According to this view, countries that control and limit capital mobility are less likely to suffer contagion from abroad. In his criticism of the International Monetary Fund (IMF), Stiglitz (2002) argues that the fundamental reason why India and China were spared from substantial currency

[1] To be sure, the profound Argentine crisis of 2001-2002 also influenced the switch away from fixed exchange rates.

crises -- and were not subject to contagion from the East Asian or other crises of the 1990s and early 2000s -- is that they did not allow free capital mobility. Stiglitz goes as far as arguing that the easing of controls on capital mobility was at the center of most modern currency crises in the emerging markets -- Mexico 1994, East Asia 1997, Russia 1998, Brazil 1999, Turkey 2001, and Argentina 2002. According to other authors, however, restrictions to capital mobility are ineffective -- the private sector always finds way of circumventing them --, introduce costly microeconomic distortions and encourage corruption.[3] What makes the debate on capital controls particularly interesting is that some of the critics of free capital mobility in the emerging countries are authors that have been staunch supporters free trade in goods: according to them there are fundamental differences between markets for goods and markets for securities (Bhagwati, 1998, 1999).

The purpose of this paper is to analyze whether restrictions on capital mobility reduce countries' vulnerability to major external shocks. More specifically, I ask if countries that restrict the free flow of international capital have a lower probability of experiencing a sudden stop and being subject to contagion than countries that have a freer degree of capital mobility.[4] I use three new indexes on the degree of international financial integration and a large multi-country data set for 1970-2004 to estimate a series of random-effect *probit* equations. I use these estimates to compute marginal effects of different indicators on the likelihood of a country facing a major external crisis. I also analyze the role played by other variables in determining the probability of experiencing a sudden stop of capital inflows. In particular, I focus on: (a) large current account deficits; (b) the exchange rate regime – fixed or flexible; (c) holdings of international reserves; (d) fiscal imbalances; (e) world interest rates; and (f) the degree of dollarization, among others. Throughout the analysis I focus on nonlinearities, and on the interaction between the degree of financial integration and other determinants of macroeconomic crises and instability. One of the important innovations of this paper is the use of a new

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[2] The evolution of this new approach to macro policy in emerging nations may be traced through the writings of a number of authors. See, for example, Summers (2000), Fischer (2003), Dornbusch (2002), Aizenman and Lee (2005), and Rogoff, Reinhart and Savastanno (2003). See also Rogoff (2006).

[3] Forbes (2006 a,b).

data set that covers a large number of countries, and a longer period. More important, perhaps, this data set includes three new indexes of capital mobility. The use of these new data will help improve our understanding of the interaction between financial integration and external crises, and will provide insights on the way in which the degree of capital mobility interacts with other variables that affect the likelihood of a sudden stop. Before proceeding, it is important to emphasize that the analysis presented in this apper deals only with one aspect of the effects of capital controls: their impact on the probability of experiencing a crises. A complete policy evaluation of the effects of capital controls would also analyze their *costs* in the form of distortions, misallocated investment and others. However, dealing with the (potential) costs of capital account restrictions, is beyond the scope of this paper.[5]

The rest of the paper is organized as follows: In section II I describe the three indexes on capital account restrictions used in this paper, and I compare them to alternative measures used in the literature. In Section III I define sudden stops as abrupt and large declines net capital flows, and I discuss briefly their incidence across different regions during the 1970-2004 period. In Section IV I report econometric results on the determinants of the probability of experiencing a sudden stop. The analysis concentrates on nonlinearities, and investigates the way in which capital interacts with other determinants of sudden stops. In Section V I concentrate on the relationship between capital mobility, contagion and large current account imbalances. More specifically, I investigate whether restrictions on capital mobility reduce a country's vulnerability to "contagion" from abroad. In this Section I also deal with extensions and robustness. In Section VI I deal with the potential endogeneity of the capital mobility indexes, and I present results obtained when an instrumental variables version of probit regressions was used. Finally, in Section VII I provide some concluding remarks. The paper also has a data appendix.

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[4] On sudden stops, see Calvo 92003), Calvo et al (2004), Caballero And Krishnamurthy (2002, 2003), Frankel and Cavallo (2004), Edwards (2004a,b), Hutchinson and Noy (2005). See also the discussion in Rothenberg and Warnock (2006).

[5] See the papers by Forbes mentioned above. See also Desai et al (2004).

II. Measuring Capital Mobility

Literature Review: Most early attempts to measure the extent of international financial integration used information provided by the International Monetary Fund. The standard approach has been to use line E.2 of the annual summary published in the *Annual Report on Exchange Arrangements and Exchange Restrictions*. Alesina, Grilli and Milesi-Ferreti (1994) and Rodrik (1998) constructed a dummy variable index of capital controls, which took a value of one when capital controls were in place and zero otherwise. Klein and Olivei (1999) used the IMF's data to construct an index as the number of years in the period 1986 and 1995 during which each country had an open capital account.[6] Leblang (1997), Razin and Rose (1994), Chinn and Ito (2002), Glick and Hutchinson (2005), and Glick, Guo and Hutchinson (2005) also used indicators based on the IMF to construct *zero-one* classifications of openness.

An important limitation of these IMF-based binary indexes, however, is that they do not distinguish between de jure and de facto controls, and do not differentiate according to different intensities of capital restrictions, or type of flow being restricted. Montiel and Reinhart (1999) and Chinn and Ito (2002) addressed this issue by combining IMF and country-specific information to construct indexes on the intensity of capital controls in a number of countries.

In an effort to deal with some of these measurement problems, Quinn (1997) constructed a comprehensive set of cross country indicators on the degree of capital mobility that ranged from 0 through 4. These indexes covered several years, allowing researchers to investigate how changes in capital controls affected key macroeconomic variables. Edwards (1999, 2002) used Quinn's index to analyze whether restricted capital controls affected growth. He found that there was a threshold effect: higher capital mobility benefit countries that have reached a certain level of economic development. Edison et al (2004) compared Quinn's (1997) index with an index based on the number of years that, according to the *Exchange Arrangements and Exchange Restrictions*, a country has had a closed capital account, and found out that for most (but not all) countries and periods there was a correspondence between the two indicators. More

[6] A limitation with this indicator is that it dos not say if the index's number (i.e. the percentage of years with restrictions) refers to most recent or most distant years in the time window being considered.

recently Quinn et al (2003) and Quinn (2003) developed a new index that provides greater detail on the intensity of controls. Mody and Murshid (2002) also used IMF data as the bases for an index of financial integration that covers 150 countries for 1966-2000, and is tabulated from a value of zero to four.

A number of authors have used stock market data to construct indexes on international financial integration. Early attempts were made by Bekaert (1995), Bekaert and Harvey (1995, 2000), and Bekaert et al (2005). According to these authors it is important to distinguish between "official" or "legislative" dates of stock market liberalization. Edison and Warnock (2003) used data on stock markets compiled by the *International Finance Corporation* to construct a new index of restrictions on ownership of stock by foreigners. This index – which is available for 29 countries – has a high degree of correlation with the index by Bekaert et al (2005).[7] Shatz (2000) built an index on capital account restrictions based on restrictions on foreign direct investment in 57 countries. Desai et al (2004) used this index in a study on the way in which multinational firms deal with capital controls.

These difficulties in measuring capital mobility and financial integration accurately have resulted in empirical results that have often been tentative, and not very robust. It is not an exaggeration to say that for some time now macroeconomists have tried to obtain better and more detailed indexes of capital account restrictions and financial integration.

Three New Indexes: In this paper I use three new indexes on the degree of international financial integration.

- I constructed the first index – which I call *Capital Mobility* or *CM* -- by combining information from Quinn (2003) and Mody and Murshid (2002), with information from country-specific sources. In creating this new index I followed a three steps procedure: First, the scales of the Quinn and Mody and Murshid indexes were made compatible. The new index has a scale from 0 to 100, *where higher numbers denote a higher degree of capital mobility*; a score of 100 denotes absolutely free capital mobility.

[7] See Edison et. al (2004) for a survey of studies on the effect of capital account restrictions on stock markets.

Second, I use *Stata's* "*impute*" procedure to deal with missing observations in the new index. In order to impute *preliminary* values to the missing observations I use data on the two original indexes (Quinn and Mody and Murshid), their lagged values, openness as measured by import tariffs collections over imports, the extent of trade openness measured as imports plus exports over GDP, a measure of openness obtained from the fitted values of a gravity model of trade and GDP per capita.[8] In the third step, I use country-specific data to revise and refine the preliminary data created using the "*impute*" procedure discussed above. The new index covers the period 1970-2004, and has data for 163 countries (although not every country has data for every year).[9]

- The second index is constructed from data on international assets positions compiled by Lane and Milesi Ferreti (2006) for 147 countries for 1970 to 2004. This index is computed as the sum of total external assets *plus* total external liabilities as a proportion of GDP. A higher value of this index – which I call *LMF* – denotes that the country is more integrated to world financial markets. In some ways this index is a financial or capital markets counterpart of the traditional index on trade openness calculated as the ratio of imports plus exports to GDP.
- The third index was constructed by Miniane (2004) for 34 countries. It is based on detailed country-specific data compiled by the IMF since 1996, and considers 13 types of capital controls and restrictions, including restrictions on that affect inflows and outflows of stocks, money market instruments, mutual funds, derivatives, commercial credits, warrants, letters of credit, direct investment, profit repatriation, and real estate transactions. Miniane (2004) used country-specific primary data to recalculate this index all the way back to 1983. This index – which I call

[8] See Aizenman and Noy (2004) on the relationship between trade account openness and capital account openness.

[9] It is important to note that although this new index represents an improvement over alternative indexes, it still has some shortcomings, including the fact that it does not distinguish very sharply between restrictions on capital inflows and restrictions on capital outflows. See the discussion in the preceding section for an analysis of the shortcomings of different indexes. See also Eichengreen (2001) and Edwards (1999).

Miniane or simply *MI* – ranges from zero to one, and is calculated at the three-decimal level. A higher value of this index denotes a higher level of capital account restrictions.

There are some differences across these indexes. First, while the *Capital Mobility* and *Miniane* indexes are based on an analysis of de-jure restrictions, the *LMF* index relies on de facto capital mobility. A second difference refers to coverage. The *Capital Mobility* and *LMF* indexes cover a longer period of time and larger number of countries than the *Miniane* index; in that regard the *CM* and *LMF* indexes are preferred to the *MI* index. A third difference is that while in the *Capital Controls* and *LMF* indexes a higher value denotes a higher degree of capital mobility, in *Miniane* a higher value of the index refers to stricter capital controls. An important question is whether, in overall terms, these three indexes tell a similar story. I address this issue by computing Spearman rank coefficients of correlation. The null hypotheses that the indexes are independent were rejected at conventional levels. The Spearman coefficient between *Capital Mobility* and *Miniane* it is -0.880 ; between *LMF* and *MI* it is -0.660; and between the *CM* and *LMF* indexes is 0.430.

III. Sudden Stops: Definition and Incidence

In this paper I have defined a "*sudden stop*" episode as an abrupt reduction in net capital flows to a particular country in a given year. More specifically, in order for an episode to classify as a sudden stop, net capital flows have to decline in a year by at least 3% of GDP. In the extensions reported in Section IV I consider alternative definitions of sudden stops, including definitions that consider more severe reductions in flows, definitions that spread the decline in capital flows over two years, as well as a definition that focuses on the behavior of *gross* capital flows. Generally speaking, the results obtained are similar to those reported in the body of this paper. Table 1 provides summary data on the incidence of sudden stops for six groups of countries. The χ^2 test in this table is for the null hypothesis that the distribution of "sudden stops" and "no sudden stops" is independent across group of countries. As may be seen from Table this null hypothesis is rejected at conventional levels.

IV. An Empirical Analysis of Capital Mobility, Sudden Stops and Contagion

In this Section I investigate whether the degree of international financial integration affects the probability of experiencing a sudden stop of capital inflows. I am particularly interested in analyzing how the extent of capital mobility affects the role played by other variables – and in particular contagion – in determining the probability of facing a sudden stop.

IV.1 The Empirical Model

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

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

$$(2) \qquad y^*_{tj} = \alpha\omega_{tj} + \varepsilon_{tj}.$$

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 above), and zero if the country in question did not experience a sudden stop.[10] According to equation (1), whether the country experiences a current account reversal is assumed to be the result of an unobserved latent variable y^*_{tj}. y^*_{tj}, in turn, is assumed to depend linearly on vector ω_{tj}. The error term ε_{tj} is given by a variance component model: $\varepsilon_{tj} = \nu_j + \mu_{tj}$. ν_j is iid with zero mean and variance σ^2_ν; μ_{tj} is normally distributed with zero mean and variance $\sigma^2_\mu = 1$. In addition to the

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

random effects model, I also estimated fixed effects and basic probit versions of the probit model in equations (1) and (2).[11]

One of the advantages of probit models, such as the one described above, is that they are highly non-linear; the marginal effect of any independent variable on the probability is 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 on the probability of the outcome variable will also change. Denoting the (normal) cumulative probability distribution by Φ, then the probit model is defined by:

$$\Pr(y_{jt} \neq 0 \mid \omega_{jt}) = \Phi(\alpha\omega_{jt}) \tag{3}$$

The marginal effect of a particular variable z_1 on the probability may be calculated as the slope of the probability function, evaluated at a specific set of values of the covariates $\omega_{jt}s$. Assume that the estimated probit coefficient of z_1 is α_1, and that we want to evaluate the marginal effect of z_1 at a point where covariates have values captured by vector $\tilde{\omega}$. In this case, the marginal effect of z_1 (evaluated at $\tilde{\omega}$) is given by:[12]

$$\frac{\partial\Phi}{\partial z_1} = \phi(\alpha\tilde{\omega})\alpha_1. \tag{4}$$

Equation (4) may be used to evaluate how a change in certain variable – a "large" current account deficit, say – affects the probability of a sudden stop, under alternative degrees of capital mobility (captured by different values of $\tilde{\omega}$). This is precisely what I do in this paper: I calculate the marginal effects of the different covariates for three alternative degrees of capital mobility: *high*, *intermediate* and *low*.

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

IV.2 Specification

In determining the specification of this probit model I followed the literature on external crises, devaluations, sudden stops and reversals.[13] In the basic specification I included the following covariates, all of which have data for a large number of countries and years:[14]

- The capital mobility index(es) described above, lagged one period. As pointed out, the sign (and magnitude) of this coefficient is at the center of current policy debates on the effects of capital mobility. If, as some authors such as Stiglitz (2002) have argued, restricting capital mobility reduces the likelihood of suffering a crisis, the sign of the capital mobility index would be positive.[15].
- 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 the (potential) effect of "contagion." This contagion index is defined as the relative occurrence of sudden stops in each particular country's "reference group." The reference group, in turn, is defined for most countries as their region. 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. The contagion variable is calculated, for each year, as the proportion of countries, in the relevant group, that experienced a sudden stop. In this calculation data for the country in question are excluded. The coefficient of this "contagion" variable is expected to be positive, reflecting the fact that when a similar country experiences a "sudden stop," capital flows to the country in question will tend to decline, increasing the likelihood of a

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[12] In rigor, however, this is a (very good) approximation.
[13] 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).
[14] See, for example, Frankel and Rose (1996), Milesi-Ferreti and Razin (2000) and Edwards (2002).
[15] Remember that *Miniane's MI* index measures capital *restrictions*. Thus, for that index the coefficient would be negative.

sudden stop.[16] A particularly interesting question – and one that I address in some detail in this paper – is how different degrees of capital mobility affect a country's vulnerability to contagion.

- Change in the logarithm of the terms of trade (defined as the ratio of export prices to import prices), with a one year lag. Improved terms of trade will 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 probability of an external crisis. If this is indeed the case, the coefficient of this variable will be positive.
- A dummy variable that takes the value of one if the country is an "advanced country," and zero otherwise. If more advanced countries are less likely to experience a sudden stop, its coefficient would be negative. (In some of the regressions I included dummy variables for each region; the results, however, did not change from those obtained when a only a dummy for advanced nations was included).
- A dummy variable that takes the value of one if that particular country had a flexible exchange rate regime, and zero otherwise.

In addition to the base estimates with the covariates discussed above, I also estimated a number of regressions that in addition include (some combination) of the following covariates:[17]

- The ratio of net international reserves to the country's total external liabilities. This is a measure of the country's "war chest" in case a major external shock hits it.

[16] There are six groups. Five of them are strictly regional – Latin America, Asia, Middle East and North Africa, Eastern and Central Europe, and Africa --, while the sixth refers to "advanced" nations and, thus, covers more than a region.

[17] Most of these variables have a lower number of observations than those in (a)-(e) above.

- An index that measures the extent to which the country is dollarized. If countries subject to "original sin" – that is, countries that are unable to borrow in their own currency are more prone to experience sudden stops, its coefficient should be positive. The data for this index were taken from Reinhart, Rogoff and Savastano (2003).

Previous work that has analyzed the effects of openness – both financial and trade -- on sudden stops has found inconclusive results. Edwards (2004, 2005), for instance, found a negative but insignificant coefficient in the estimation of the probit component of treatment regressions; Frankel and Cavallo (2004) also found a negative relationship between openness and the probability of a sudden stop. Calvo et al (2004), on the other hand, report a positive effect. These studies, however, used more limited data sets and definitions of capital mobility.

IV.3 Basic Results

I present the basic results in Tables 2-4; each table contains the results for a different index on capital mobility. As may be seen the most estimated coefficients are significant at conventional levels. The most interesting result from the perspective of this paper is that the coefficients of the capital mobility indexes are statistically significant in all the equations. Moreover, the signs of these coefficients indicate that, with other things given, an increase in the degree of international financial integration increases the probability of a country experiencing a sudden stop. These results are important and should not be underestimated. The fact that they hold for three very different indexes of capital mobility – indexes that are available for very different samples of countries –, indicate an important degree of robustness. However, as is discussed in great detail in Sub-Section IV.4 of this paper, the effects of changes in capital mobility on the estimated probabilities are quantitatively quite small. An important question, and one that is discussed in great detail below, is the way in which different degrees of capital mobility affect the way in which other covariates affect the probability of a sudden stop.

The results in Tables 2-4 indicate that a higher current account deficit increases the probability of a sudden stop. This is also the case with a deterioration in the terms of trade. The results confirm the presence of a "contagion" effect, and indicate that an

improvement in the terms of trade reduces the probability of a sudden stop.[18] These results also indicate that counties with a flexible exchange rate regime have a lower probability of experiencing a sudden stop, as do advanced nations. More stringent global liquidity – captured by higher international real interest rates – increase the probability of a sudden stop.

In equations (2.4), (3.4), (4.4) the coefficient of the fiscal deficit is significantly positive, indicating that a higher fiscal imbalance increases the likelihood of a sudden stop. However, when the fiscal variable is introduced jointly with the current account deficit – equation (2.3), (3.3) and (4.3) --, its coefficient is not significant any longer. As may be seen, in this case the coefficient of the (lagged) current account deficit continues to be positive and significant. This result is rather intuitive: higher fiscal imbalances that are *not* associated with a deterioration of the external accounts, do not affect in a significant way the probability of an abrupt and sudden stop in capital inflows. Finally, when other covariates, such as international reserves holdings or degree of dollarization were introduced in the probit regression, their coefficients were not significant.[19]

Since the coverage of the *Miniane* index is narrower – both in terms of countries and time period – than the two other measures of mobility, in the rest of the paper I will concentrate on the *CM* and *LMF* indexes.

IV.4 Evaluating the Marginal Effect of Capital Mobility on the Probability of Sudden Stops

The estimated probit coefficients reported in Tables 2-4 are difficult to interpret. In order to gain further insights into the way in which the different covariates affect the probability of a sudden stop, in this Sub-Section I report *marginal effects* computed using the procedure sketched in equations (3) and (4). In order to organize the discussion, I discuss the marginal effects for only one of the six equations reported above -- equation 2.2 in Table 2.[20]

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[18] The contagion results contrasts with the findings from Glick and Hutchinson (2005) for currency crises. Notice, however, that their measure of contagion differs from the one used in this paper. In their case the contagion indicator is binary.

[19] Detailed results are not reported here due to space considerations. However, they are available on request.

[20] When alternative equations were used, the results on the marginal effects were similar. This equation was chosen for calculating the marginal effects because it has the preferred specification and covers a large number of countries. When the probit regressions with the *LMF* index were used to evaluate the marginal

I evaluated the marginal effects for three different degrees of capital mobility: low, intermediate, and high. The marginal effects for "low capital mobility" were evaluated at a value of the *Capital Mobility* index corresponding to the 5th percentile of its distribution; all other independent variables were taken at their mean values. The results for "intermediate capital mobility" were calculated when all covariates, including the *CM* index, were at their mean values; and the marginal effects for "high capital mobility" were calculated at a value of the *CM* index corresponding to the 95th percentile of its distribution; as before, all other independent variables were maintained at their mean values.

These three sets of marginal effects are reported in Table 5; the bottom row includes the estimated probability of experiencing a sudden stop. Several results stand out from this Table:

- A "typical" country – that is a country with covariate values equal to the sample mean – has an estimated probability of experiencing a sudden stop of 16.5%. This estimated probability increases to 21.6% in a country with a "high" degree of capital mobility, and declines to 13.5% for a country with a "low" degree of capital mobility. Notice that, although moving from the 5th to the 95th percentile in the *CM* distribution is a huge increase in financial integration, the resulting increase in the estimated probability of experiencing a sudden stop is not very large.
- The point estimates of the *Capital Mobility* indexes are very low: according to Column (5.1), when the initial condition is a low degree of financial integration, a marginal increase in the *CM* index increases the probability of a sudden stop by a mere 0.1%. The marginal effect of the CM index barely changes when it is evaluated at higher levels of capital mobility.
- "Contagion" has, by far, the highest marginal effect on the probability of a country experiencing a sudden stop; the point estimates are highly significant and in all cases exceed 20%. This means that a (new) crisis in the country's "neighborhood" will result in a very large increase in the probability that the

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effects, the results were also similar. The marginal effects obtained from the probits with the *MI* index were somewhat different. This is not surprising, as the *MI* index is available for a shorter period and a

country itself will experience a sudden stop. What is particularly interesting is that the marginal effect of "contagion" increases significantly as the degree of financial integration goes up: it is 24.3% for low capital mobility, 27.9% for intermediate mobility, and 32.9% for high mobility. Figure 1 presents the point estimates, as well as 95% confidence interval, for the "contagion" marginal effect coefficient corresponding to different values of the *Capital Mobility* index. This figure shows very clearly the positive relationship between the degree of financial integration – measured in a scale from 0 to 100 on the horizontal axis – and the marginal effect of contagion on the probability of a sudden stop.

- The effect of moving from a pegged to a flexible exchange rate regime is negative, statistically significant, and large. Countries that adopt a flexible exchange rate regime reduce the probability of experiencing a sudden stop between 6.1% and 8.4%.
- The marginal effects of current account deficits are significantly positive, but small. Moreover, they don't experience a significant change when the degree of capital mobility increases. The marginal effect is 0.9% for low capital mobility countries, and 1.2% for high capital mobility countries.
- Improvements in the terms of trade reduce the probability of a sudden stop. At the margin, however, the effects are not very large; more important from the perspective of this paper, the marginal effects are very similar across different degrees of capital mobility.
- A marginal decline in world liquidity – captured by an increase in real world interest rates – has a small positive effect on the probability of a sudden stop. The marginal effect is never higher than 1%.
- Being an advanced nation reduces the probability of a sudden stop between 2.5% and 3.5%.

To summarize, the results in Table 5 indicate that the most important effect of changes in the degree of capital mobility is on a country's vulnerability to contagion. With everything else constant, an increase in the *Capital Mobility* index from 25 to 75,

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limited sample of countries.

results in an increase in the marginal effect of contagion from 24.0% to 31.6%. To put things in perspective, during most of the 1980s India's *CM* index was 25; on the other hand, during most of that period, Australia's *CM* index was 75

V. Capital Controls, Vulnerability and Contagion

The results discussed in the previous Section refer to a "typical" country, and were obtained by evaluating the marginal effects at the mean values of all covariates, except the *Capital Mobility* index. From a policy perspective, however, a more relevant question is whether controls on capital mobility reduce the probability of a sudden stop in vulnerable countries. In this Section I expand the analysis in order to address this issue. In Sub-Section V.1 I analyze the relationship between the degree of capital mobility and crises in countries with large current account deficits and fixed exchange rates. In V.2 I analyze in greater detail the role of contagion, and I ask whether the relevant concept of contagion is "regional" or "global." Finally, in Sub-Section V.3 I discuss some extensions and I analyze the robustness of the results. Issues related to the possible endogeneity of the capital mobility indexes are taken up in Section VI.

V.1 Large Current Account Deficits, Capital Mobility, Sudden Stops and Contagion

Most emerging countries that suffered major crises during the 1990s and 2000s had run large current account imbalances. Consider the following cases: In Mexico, the current account deficit averaged 7% of GDP during 1992-1994; deficits averaged 8.5% in Thailand in 1995-1996; and in Malaysia they averaged 7% in 1995-1996. The recent surge in current account deficits in some advanced countries, such as the U.S. and New Zealand, has generated an interest in analyzing the role of large external imbalances in sudden stops episodes. In order to address this issue I follow a two-part strategy: First, I evaluate both the estimated probability functions reported in Tables 2-4 under two cases of current account imbalances: "*Moderate Deficits*" (2.0% of GDP) and "*Large Deficits*" (9.0% of GDP). This allows me to investigate the way – and channels – through which large deficits affect the probability of a sudden stop. In the second stage I

analyze whether these estimates for "*Moderate*" and "*Large*" current account deficits change for two alternative degrees of capital mobility: *Low*, and *High*.[21]

Table 6 presents the marginal effects and estimated probabilities of a sudden stop for a "typical" country with *Moderate* and *Large* current account deficits.[22] As may be seen, the estimated probability of a sudden stop increases from 14.3% in the *Moderate Deficit* case to 21.9% under *Large Deficits*. Interestingly, the benefits of a flexible exchange rate regime – captured by a negative marginal effect – are higher in countries with large current account deficits. The marginal contribution of the current account deficit itself continues to be rather small, and it barely increases when moving from the *Moderate* to the *Large* deficits cases (1.0% to 1.2%).

The results on the role of contagion are particularly interesting: the marginal effect of contagion increases quite drastically from 25.3% in the moderate deficits case, to 33.1% in the large deficits case. This indicates that the most important consequence of running a large current account deficit is that it increases the degree of vulnerability of the country in question to contagion from abroad.

The results reported in Table 6 are for a "typical" country with an average degree of capital mobility – the *CM* index is 56.7. From the perspective of this paper, a particularly important question is whether the effects of large current account deficits are different under different degrees of capital mobility. I address this issue by evaluating the probability function for four cases that combine the level of the current account deficit (*Moderate* and *Large*) with the degree of capital mobility (*Low* and *High*).[23] The results obtained are reported in Table 7. As before, the largest marginal effects correspond to the contagion variable. Its point estimate reaches the highest value (37.6%) for the combination "large deficit-high capital mobility." Its lowest estimate (21.7%) is for "moderate deficit-low capital mobility." These results also indicate that a country that develops a (very) large current account deficit would be able to reduce

[21] I define *Low* and *High* mobility as above. I don't report the results for intermediate mobility in order not to clutter the analysis with an excessive number of combinations of deficits and capital mobility. On the effects of large deficits see, for example, Freund and Warnock (2005).

[22] As before these marginal effects were computed using the estimated coefficients from equation (2.2) in Table 2. "Typical" in this context means that these marginal effects and estimated probabilities have been evaluated at the mean values of all other covariates.

[23] As before low capital mobility is defined as a value of the *CM* index at the 5th percentile; High capital mobility corresponds to a value of the *CM* index at the 95th percentile.

somewhat its vulnerability to contagion by reducing its degree of financial integration to the rest of the world. These estimates, however, indicates that even after hiking up controls significantly and reducing the *CM* index from the 75th to the 25th percentile, a large deficit country will continue to have a very high marginal effect for contagion (29.5%). This suggests that restricting capital mobility may not be the most effective way of reducing external vulnerability.

V.2 Contagion: Regional or Global?

In the results discussed above, "contagion" has been defined as a change in the probability of experiencing a sudden stop that stems from financial instability generated in the country's neighborhood or region. Indeed, the regressions and marginal effects in Tables 2 through 7 indicate that contagion is the most important channel through which changes in other variables affect the probability of a sudden stop. Moreover, these results show that the vulnerability to contagion – measured through its marginal effect --, is positively related to the degree of capital mobility. An important question, however, is whether crises stemming from more distant regions also affect the probability of a sudden stop. In order to address this issue I defined a second contagion variable as the incidence in sudden stops (in that particular year) in other regions. I call this variable "*Contagion Other*." The results obtained when this variable is added to the analysis are reported in Table 8, and indicate that once the incidence of regional crises are taken into account, other crises – or non-regional contagion -- play no role in determining the probability of sudden stops; contagion is a regional phenomenon.

V.3 Robustness and Extensions

Standard robustness tests were performed, including estimating the equations for alternative time periods, alternative data sets smaller number of countries. I also re-estimated the model excluding outlier observations. Generally speaking, the results obtained suggest that the results reported in Tables 2 through 5 are robust to specification, time period, country coverage, and the exclusion of "extreme values" of the different variables. I also considered alternative specifications, and included additional variables that (potentially) capture the extent of external imbalances. (Instrumental variables estimates are discussed in Section VI). As an illustration of the degree of

robustness of these results, in Table 9 I report variance component probit estimates for two sub-samples: emerging countries and "large" countries.[24]

The results discussed above consider the current account deficit as the measure of external imbalances, and don't control by the country's initial net international investment position (NIIP). That is, the specification reported above makes no distinction between countries with a large deficit and a very negative initial NIIP, and one with a very large deficit and a low initial GDP. When the value of the initial NIIP to GDP ratio was included as an additional regressor its coefficient was negative, as expected, indicating that a more positive NIIP would tend to reduce the probability of a sudden stop. However, the coefficient for this variable was statistically insignificant. Moreover, its inclusion did not affect in any way the analysis on marginal effects on probabilities.

As an additional robustness test I also considered alternative definitions of sudden stops. In particular, I re-estimated the probits when a sudden stop was defined as being a 4% or 5% reduction in capital inflows in one year. The results obtained – available on request – are very similar to those reported here. I also used an alternative definition based on abrupt changes (3% of GDP decline in one year) in *gross* capital flows.[25] The results obtained confirm the key role played by contagion in determining the probability of sudden stops. The coefficient of the *LMF* index of financial integration is positive and significant as before; on the other hand, the coefficient of the *CM* index of capital mobility is still positive but insignificant.

VI. On the Potential Endogeneity of Capital Mobility: Instrumental Variable Estimates

As a number of authors have documented, international financial integration has increased significantly during the last decade and a half. These changes in the extent of capital mobility have not been linear, however. Indeed, there is evidence that, beyond the general trend towards liberalization, countries tend to alter the severity of capital controls

[24] Large countries are defined as those countries that in 1995 had a GDP in the top 25 percent of the global GDP distribution.

[25] Gross flows were, in turn, defined as changes in the country's total liabilities. The raw data were taken from Lane and Ferreti-Milesi (2006). Rothenberg and Warnock (2006) have argued that it is useful to distinguish between sudden stops in gross flows and those in net flows.

for a number of political and economic reasons.[26] More specifically, countries that face external payments difficulties have tended to introduce restrictions on capital mobility. This means that it is possible that the capital mobility indexes used in this paper are endogenous, and jointly determined (future) sudden stops.[27] In order to address this potential endogeneity issue I estimated the probit equation in equation (2) using maximum likelihood instrumental variables procedure suggested by Amemiya (1978).[28]

In determining the instruments I relied on several important findings from the empirical literature on capital controls: (1) Capital mobility and trade openness are highly correlated. This suggests that an exogenous measure of trade openness is a good instrument for capital mobility.[29] (2) Political considerations also play an important role in determining the extent of capital restrictions. (3) More advanced countries tend to rely less on capital controls. (4) Some countries respond to exogenous external shocks – such as changes in the terms of trade or in world (real) interest rates – by adjusting the degree of capital mobility. Based on these considerations, in the instrumental variables estimation the following instruments were used: a measure of trade openness, obtained as the fitted value from a gravity model of bilateral trade; the lagged contagion indicator in other regions; a measure of civil liberties, as a proxy for political instability; lagged change in the terms of trade; twice lagged current account balance; lagged (real) world interest rates; the log of GDP per capita in 1970; and regional dummies. The results obtained from the instrumental variables probit estimates are reported in Table 10. The estimations reported are both for the complete sample as well as for an emerging countries only sample (where the z-tests were computed with robust standard errors).

As may be seen from Table 10, the results obtained are very similar from those reported in Tables 2 and 3 for the random effect probit estimates. All coefficients continue to have the same signs and are statistically significant at conventional levels. Moreover, the estimated marginal effects support the conclusions reached above:

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[26] See, for example, the discussion in Alessina and Milesi-Ferreti (1994) for an early discussion on this subject.

[27] Although lagged capital mobility is a pre-determined variable, it may still be jointly determined with sudden stops if the error term ε in equation (2) is autoregressive.

[28] The identifying restrictions is that the number of instruments excluded from the main equation is equal or greater than the number of endogenous variables.

increased capital results in a very small (although statistically significant) increase in the probability of a sudden stop. Countries that adopt a flexible exchange rate see a significant reduction in their probability of experiencing a sudden stop. Contagion is the moist important (marginal) determinant of the probability of sudden stops. The most important effect of changes in the extent of capital mobility is that they affect a country's vulnerability to contagion.

VII. Concluding Remarks

The consequences of globalization continue to be a subject of intense debate. The role of capital mobility and international financial integration is, perhaps, the most controversial aspect of globalization. Most of these debates, however, have been affected by the poor quality of indexes on capital account mobility. In this paper I use a new and large data set that includes three new indexes on capital mobility. Two of these are available for over 130 countries and more than 30 years. In this paper I have used this data set to investigate whether a greater degree of international financial integration affects the probability of a sudden stop. The analysis focused on both direct and indirect effects of capital mobility on an abrupt halt in net capital flows. In particular, I analyzed whether different degrees of capital mobility affected countries vulnerability to contagion and to large current account deficits. An advantage of using this One of the important innovations of this paper is the use of a new data set that covers a large number of countries, a longer period of time (1970-2004). More important, this new data set includes three alternative new indexes of capital mobility. The results obtained indicate that a higher degree of capital mobility tends to increase the probability of a sudden stop. Quantitatively, however, the magnitude of the effect is very small. The results also indicate that contagion is the most important determinant of sudden stops. Moreover, according to the results reported here, the vulnerability to contagion increases significantly as the degree of capital mobility increases. Although the new data set used in this paper represents an improvement over previous data, there still is significant room for improving our measures of financial integration. In particular, emphasis should be

[29] 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).

given to constructing indexes that distinguish between different types of controls, and between mobility to capital inflows and outflows. The index proposed by Miniane (2004) and used in the regressions in Table 4 of this paper is a step in the right direction. Gaining further insights on the role of financial integration would require expanding its coverage, both in terms of years and countries.

Finally, it is important to reiterate, once again, that the results reported here only cover one aspect of the debate on capital mobility and financial integration – whether controls affect the probability of facing a crisis, and the channels through which these effects take place. A complete analysis of the welfare implications of restricting capital mobility would also focus on other consequences and costs of these policies, including its effect on investment, productivity growth, governance, transparency and microeconomic distortions. Such a study is beyond the scope of this paper.

FIGURE 1: CONTAGION MARGINAL EFFECT COEFFICIENT FOR DIFFERENT VALUES OF THE CAPITAL MOBILITY INDEX

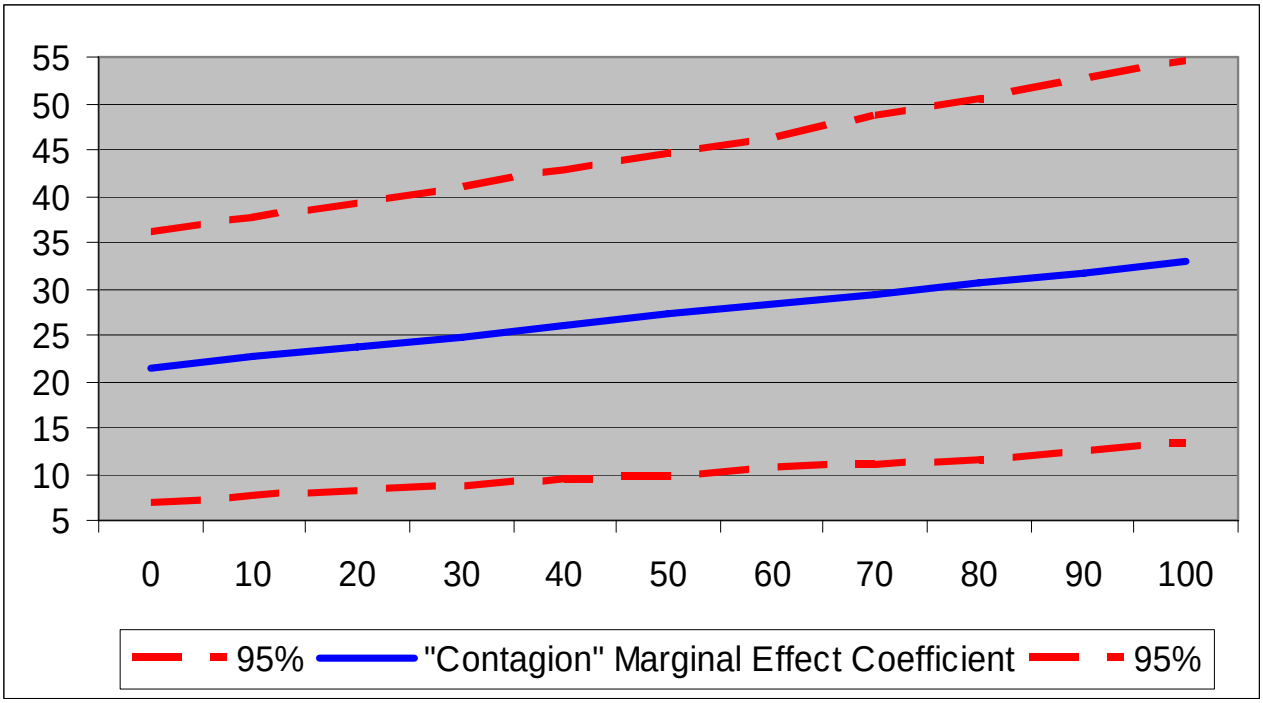

Table 1
Title: Incidence of Sudden Stops, 1970-2004

	No Sudden Stop	Sudden Stop
Industrial Countries	0.8852	0.1148
Latin American and Caribbean	0.7801	0.2199
Asia	0.8634	0.1366
Africa	0.8003	0.1997
Middle East	0.7426	0.2574
Eastern Europe	0.7561	0.2439
Total	0.8118	0.1882
Observations	2030	
Pearson		
Uncorrected $\chi^2(5)$	27.9304	
Design-based F(5,18210)	5.5833	
p-value	0.0000	

Table 2
Random Effect Probit Estimates for Sudden Stops, 1970-2004:
Capital Mobility (*CM*) Index of International Financial Integration

	Eq.(2.1)	Eq.(2.2)	Eq.(2.3)	Eq.(2.4)
CAD to GDP	0.036	0.042	0.043	--
	(9.4) ***	(9.12) ***	(7.23) ***	
Contagion	0.754	1.121	1.055	0.936
	(2.53) **	(3.04) ***	(2.61) ***	(2.37) **
Terms of Trade Change	-0.003	-0.003	-0.003	-0.005
	(-1.69) *	(-1.58)	(-1.06)	(-2.16) **
Advanced	-0.225	-0.122	-0.126	-0.318
	(-1.94) *	(-0.95)	(-0.9)	(-2.27) **
Capital Mobility	0.005	0.004	0.004	0.004
	(3.07) ***	(2.41) **	(2.24) **	(2.05) **
World Interest Rate	0.033	0.035	0.040	0.032
	(2.29) **	(1.89) *	(1.98) **	(1.61)
Flexible	--	-0.304	-0.283	-0.301
		(-3.37) ***	(-2.95) ***	(-3.17) ***
Fiscal Deficit to GDP	--	--	0.008	0.021
			(1.03)	(2.86) ***
Pseudo - R^2				
Log – Likelihood	-1389.3043	-895.82153	-726.59869	-754.69818
σ_v	0.315	0.225	0.262	0.279
ρ	0.090	0.048	0.064	0.072
Likelihood-ratio test of ρ =0 (p - value)	0.000	0.008	0.003	0.001
Number of Observations	3009	2030	1671	1671
Number of Countries	150	136	121	121

Absolute value of z statistics is reported in parentheses. All regressors are one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%. ρ is σ^2_v / σ^2_v + 1.

Table 3
Random Effect Probit Estimates for Sudden Stops, 1970-2004:
***LMF* Index of International Financial Integration**

	Eq.(3.1)	Eq.(3.2)	Eq.(3.3)	Eq.(3.4)
CAD to GDP	0.033	0.041	0.046	--
	(6.82) ***	(7.05) ***	(6.2) ***	
Contagion	0.886	1.336	1.268	1.194
	(2.72) ***	(3.3) ***	(2.97) ***	(2.87) ***
Terms of Trade Change	-0.002	-0.003	-0.001	-0.003
	(-0.89)	(-1.23)	(-0.37)	(-1.19)
Advanced	-0.126	0.035	0.052	-0.125
	(-1.07)	(0.27)	(0.38)	(-0.95)
LMF	0.061	0.043	0.047	0.041
	(3.42) ***	(2.12) **	(2.23) **	(2.05) **
World Interest Rate	0.028	0.018	0.028	0.021
	(1.8) *	(0.9)	(1.28)	(1.00)
Flexible	--	-0.332	-0.311	-0.313
		(-3.44) ***	(-3.07) ***	(-3.14) ***
Fiscal Deficit to GDP	--	--	0.005	0.019
			(0.54)	(2.09) **
Pseudo - R^2				
Log – Likelihood	-1155.8353	-745.9215	-640.0216	-661.2303
σ_v	0.343	0.267	0.297	0.286
ρ	0.105	0.066	0.081	0.076
Likelihood-ratio test of ρ =0 (p - value)	0.000	0.002	0.001	0.001
Number of Observations	2620	1769	1528	1528
Number of Countries	126	115	105	105

Absolute value of z statistics is reported in parentheses. All regressors are one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%. ρ is σ^2_v / σ^2_v + 1.

Table 4
Random Effect Probit Estimates for Sudden Stops, 1970-2004:
***MI* Index of International Financial Integration**

	Eq.(4.1)	Eq.(4.2)	Eq.(4.3)	Eq.(4.4)
CAD to GDP	0.043	0.051	0.050	--
	(1.94) *	(2.00) **	(1.95) *	
Contagion	1.102	1.649	1.605	1.364
	(1.2)	(1.64)	(1.59)	(1.36)
Terms of Trade Change	0.017	0.009	0.008	0.005
	(1.77) *	(0.79)	(0.72)	(0.45)
Advanced	-0.650	-0.592	-0.596	-0.674
	(-1.84) *	(-1.65) *	(-1.63)	(-1.86) *
Miniane	-0.922	-0.961	-0.988	-0.886
	(-1.98) **	(-1.89) *	(-1.9) *	(-1.72) *
World Interest Rate	-0.020	-0.017	-0.015	-0.014
	(-0.3)	(-0.24)	(-0.22)	(-0.2)
Flexible	--	-0.590	-0.584	-0.515
		(-2.74) ***	(-2.7) ***	(-2.43) **
Fiscal Deficit to GDP	--	--	0.0001	-0.003
			(0.01)	(-0.14)
Pseudo - R^2				
Log – Likelihood	-181.1533	-147.9502	-146.3515	-148.3096
σ_v	0.557	0.471	0.454	0.455
ρ	0.237	0.182	0.171	0.172
Likelihood-ratio test of ρ =0 (p - value)	0.000	0.002	0.006	0.005
Number of Observations	516	448	423	423
Number of Countries	30	30	28	28

Absolute value of z statistics is reported in parentheses. All regressorsare one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%. ρ is σ^2_v / σ^2_v + 1.

Table 5
Marginal Effects and Predicted Probabilities of Sudden Stops
Under Alternative Degrees of Capital Mobility

	Low Capital Mobility	Intermediate Capital Mobility	High Capital Mobility
	Eq.(5.1)	Eq.(5.2)	Eq.(5.3)
CAD to GDP	0.009	0.01	0.012
	(7.90) ***	(9.03) ***	(7.88) ***
Contagion	0.243	0.279	0.329
	(3.01) ***	(3.04) ***	(2.97) ***
Terms of Trade Change	-0.001	-0.001	-0.001
	(-1.58)	(-1.58)	(-1.56)
Advanced	-0.025	-0.029	-0.035
	(-1.02)	(-0.99)	(-0.96)
Capital Mobility	0.001	0.001	0.001
	(2.83) ***	(2.42) **	(2.11) **
World Interest Rate	0.007	0.009	0.01
	(1.88) *	(1.89) *	(1.88) *
Flexible	-0.061	-0.07	-0.084
	(-3.51) ***	(-3.63) ***	(-3.54) ***
Predicted Probability	0.135	0.165	0.216

For details on the computations in each column, see the text. Absolute value of z statistics are reported in parentheses. Sample means are: 4.3 for current account deficit to GDP, 0.196 for contagion, 4.3 for changes in terms of trade, 0.21 for advance, 2.06 for world interest rate and 0.263 for flex. Capital mobility is set at 25, 56 and 100 in Eq.(5.1), Eq.(5.2) and Eq.(5.3) respectively. * significant at 1%; ** significant at 5%; *** significant at 10%

Table 6
Marginal Effects and Predicted Probabilities of Sudden Stops
Under Alternative levels of the Current Account Deficit

	Moderate Deficits	Large Deficits
	Eq.(6.1)	Eq.(6.2)
CAD to GDP	0.009	0.012
	(9.86) ***	(7.97) ***
Contagion	0.253	0.331
	(3.04) ***	(3.04) ***
Terms of Trade Change	-0.001	-0.001
	(-1.57)	(-1.58)
Advanced	-0.027	-0.035
	(-0.99)	(-0.99)
Capital Mobility	0.001	0.001
	(2.41) **	(2.41) **
World Interest Rate	0.008	0.01
	(1.89) *	(1.89) *
Flexible	-0.063	-0.085
	(-3.63) ***	(-3.61) ***
Predicted Probability	0.143	0.219

For details on the computations in each column, see the text. Absolute value of z statistics are reported in parentheses. Sample means are: 0.196 for contagion, 4.3 for changes in terms of trade, 0.21 for advance, 56.7 for capital mobility, 2.06 for world interest rate and 0.263 for flex. 2.0 Current account deficit to GDP is set at 2.0 in Eq.(6.1) and 9.0 in Eq.(6.2). * significant at 1%; ** significant at 5%; *** significant at 10%

Table 7
Marginal Effects and Predicted Probabilities of Sudden Stops
Under Alternative Degrees of Capital Mobility and of Current Account Deficits

	Moderate Deficits		Large Deficits	
	Low Capital Mobility	High Capital Mobility	Low Capital Mobility	High Capital Mobility
	Eq.(7.1)	Eq.(7.2)	Eq.(7.3)	Eq.(7.4)
CAD to GDP	0.008	0.011	0.011	0.014
	(8.25) ***	(8.08) ***	(7.3) ***	(7.63) ***
Contagion	0.217	0.303	0.295	0.376
	(3.00) ***	(2.96) ***	(3.02) ***	(2.99) ***
Terms of Trade Change	-0.001	-0.001	-0.001	-0.001
	(-1.57)	(-1.56)	(-1.58)	(-1.57)
Advanced	-0.023	-0.032	-0.031	-0.04
	(-1.02)	(-0.96)	(-1.01)	(-0.96)
Capital Mobility	0.001	0.001	0.001	0.001
	(2.88) ***	(2.08) **	(2.74) ***	(2.17) **
World Interest Rate	0.007	0.009	0.009	0.012
	(1.88) *	(1.87) *	(1.89) *	(1.88) *
Flexible	-0.054	-0.077	-0.075	-0.097
	(-3.48) ***	(-3.53) ***	(-3.54) ***	(-3.54) ***
Predicted Probability	0.114	0.188	0.181	0.278

For details on the computations in each column, see the text. Absolute value of z statistics are reported in parentheses. Sample means are: 0.196 for contagion, 4.3 for changes in terms of trade, 0.21 for advance, 2.06 for world interest rate and 0.263 for flex. Current account deficit to GDP is set at 2.0 in Eq.(7.1) and Eq.(7.2), and at 9.0 in Eq.(7.3) and Eq.(7.4). Capital Mobility is set at 25 in Eq.(7.1) and Eq.(7.3), and at 100 in Eq.(7.2) and Eq.(7.4). * significant at 1%; ** significant at 5%; *** significant at 10%

Table 8
Marginal Effects and Predicted Probabilities of Sudden Stops
Under Two Alternative Definitions of Contagion (Regional and Other)

	Eq.(8.1)	Eq.(8.2)
CAD to GDP	0.042	0.0414
	(9.11) ***	(7.05) ***
Contagion Regional	1.1703	1.3579
	(3.15) ***	(3.34) ***
Contagion Other	-0.8235	-0.4102
	(-1.23)	(-0.58)
Terms of Trade Change	-0.003	-0.0025
	(-1.59)	(-1.23)
Advanced	-0.0999	0.0469
	(-0.77)	(0.36)
World Interest Rate	0.0431	0.0221
	(2.19) **	(1.04)
Flexible	-0.3055	-0.3323
	(-3.38) ***	(-3.44) ***
Capital Mobility	0.0044	--
	(2.45) **	
LMF	--	0.0429
		(2.14) **
Pseudo - R^2		
Log – Likelihood	-895.0618	-745.7535
σ_v	0.227	0.267
ρ	0.049	0.067
Likelihood-ratio test of ρ =0		
(p - value)	0.007	0.002
Number of Observations	2030	1769
Number of Countries	136	115

Absolute value of z statistics is reported in parentheses. All regressors are one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%. ρ is σ^2_v / σ^2_v + 1.

Table 9
Marginal Effects and Predicted Probabilities of Sudden Stops
For Alternative Samples: Emerging (and Transition) Countries and Large Countries

	Emerging Countries		Large Countries	
	Eq.(9.1)	Eq. (9.2)	Eq. (9.3)	Eq. (9.4)
CAD to GDP	0.043	0.043	0.046	0.05
	(9.20) ***	(7.10) ***	(2.92) ***	(3.16) ***
Contagion	1.192	1.418	1.388	1.515
	(3.13) ***	(3.37) ***	(2.21) **	(2.39) **
Terms of Trade Change	-0.004	-0.003	0.001	0.001
	(-1.86) *	(-1.49)	(0.19)	(0.17)
World Interest Rate	0.036	0.016	0.043	0.033
	(1.75) *	(0.72)	(1.37)	(1.03)
Flexible	-0.236	-0.274	-0.332	-0.326
	(-2.35) **	(-2.49) **	(-2.36) **	(-2.33) **
Advanced	--	--	-0.281	-0.152
			(-1.39)	(-0.91)
Capital Mobility	0.005	--	0.005	--
	(2.60) ***		(1.54)	
LMF	--	0.036	--	0.132
		(1.70) *		(2.32) **
Pseudo - R^2				
Log – Likelihood	-746.6942	-598.6257	-300.3775	-294.5784
σ_v	0.190	0.254	0.299	0.257
ρ	0.035	0.061	0.082	0.062
Likelihood-ratio test of ρ =0				
(p - value)	0.051	0.010	0.020	0.072
Number of Observations	1603	1342	789	783
Number of Countries	115	94	43	42

Absolute value of z statistics is reported in parentheses. All regressors are one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%. ρ is σ^2_v / σ^2_v + 1.

Table 10
Marginal Effects and Predicted Probabilities of Sudden Stops:
Results from Instrumental Variables (*IVPROB*) Estimates

	All Countries		Emerging Countries	
	Eq.(10.1)	Eq.(10.2)	Eq.(10.3)	Eq.(10.4)
CA to GDP	0.048	0.049	0.045	0.048
	(8.57) ***	(8.34) ***	(6.5) ***	(6.33) ***
Contagion	1.306	1.295	1.252	1.448
	(3.31) ***	(3.17) ***	(3.36) ***	(3.37) ***
World Interest Rate	0.027	0.027	0.004	0.005
	(1.45)	(1.25)	(0.2)	(0.23)
Terms of Trade Change	-0.004	-0.005	-0.003	-0.004
	(-1.62)	(-2.13) **	(-1.04)	(-1.45)
Flexible	-0.362	-0.236	-0.306	-0.239
	(-3.99) ***	(-2.21) **	(-3.28) ***	(-2.15) **
Capital Mobility	0.006	0.012	--	--
	(2.24) **	(2.16) **		
LMF	--	--	0.173	0.132
			(3.78) ***	(2.97) ***
Pseudo - R^2				
Number of Observations	1735	1308	1590	1163

Absolute value of z statistics is reported in parentheses. All regressors are one period lagged. Constant term is included, but not reported. *** significant at 1%; ** significant at 5%; * significant at 10%.

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