Inter-American Development Bank
Banco Interamericano de Desarrollo (BID)
Research Department
Departamento de Investigación
Working Paper #618

Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, or Less? Using Gravity to Establish Causality

by

Eduardo A. Cavallo*
Jeffrey A. Frankel**

*Inter-American Development Bank
**Harvard University

October 2007

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Cavallo, Eduardo A.

Does openness to trade make countries more vulnerable to sudden stops, or less? Using gravity to establish causality / by Eduardo A. Cavallo, Jeffrey A. Frankel.

p. cm. (Research Department Working paper series ; 618)
Includes bibliographical references.

1. Free trade. 2. Economic crises—Econometric models. I. Frankel, Jeffrey A. II. Inter-American Development Bank. Research Dept. III. Title. IV. Series.

HF1701 .C54 2007

Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, DC 20577

The Research Department (RES) produces a quarterly newsletter, *IDEA (Ideas for Development in the Americas)*, as well as working papers and books on diverse economic issues. To obtain a complete list of RES publications, and read or download them please visit our web site at: http://www.iadb.org/res.

Abstract[*]

Openness to trade is one factor that has been identified as determining whether a country is prone to sudden stops in capital inflows, crashes in currencies, or severe recessions. Some believe that openness *raises* vulnerability to foreign shocks, while others believe that it makes adjustment to crises *less* painful. Several authors have offered empirical evidence that having a large tradable sector reduces the contraction necessary to adjust to a given cut-off in funding. This would help explain lower vulnerability to crises in Asia than in Latin America. Such studies may, however, be subject to the problem that trade is endogenous. Using the gravity instrument for trade openness, which is constructed from geographical determinants of bilateral trade, this paper finds that openness indeed makes countries *les*s vulnerable, both to severe sudden stops and currency crashes, and that the relationship is even stronger when correcting for the endogeneity of trade.

Keywords: Sudden Stops; Current Account Adjustment; Trade; Gravity Model.
JEL Classification: F32; F36; F41.

[*] We thank Dani Rodrik, Andres Velasco, Alejandro Izquierdo, Sebnem Kalemi-Ozcan, Graciela Kaminsky, an anonymous referee, and seminar participants at the NBER IFM program meeting, Harvard University, the Federal Reserve Bank of Atlanta, LACEA, and the Latin American Finance Network (LFN) for valuable comments and suggestions. Francisco Arizala provided excellent research assistance. All errors are ours. The authors' respective e-mail address are cavalloe@iadb.org and Jeffrey_Frankel@ksg.harvard.edu.

1. Introduction

A "sudden stop"—an abrupt cut-off in capital inflows—entails a resource transfer to creditor countries from the debtor country. Often it also entails a financial or currency crisis in the latter, accompanied by a sharp fall in output.[1] Broadly speaking, there are two opposing views on the relationship between a country's openness to trade and whether it is prone to these external crises. The first view is that trade openness makes a country more vulnerable to crises, as a country highly integrated into world markets is more exposed to shocks coming from abroad. The second view is that countries that are open to international trade are less vulnerable to shocks originating in foreign markets. If the ratio of trade to GDP is structurally high, it is easier to adjust to a cut-off in international financing of a given magnitude. This paper tests the relationship between trade openness and vulnerability to sudden stops to help choose between the two hypotheses. Such tests have been performed before, but without fully taking into account the possible endogeneity of trade. Our incremental contribution here is to use the gravity instrument for trade openness—which aggregates geographically-determined bilateral trade across a country's partners—to correct for the possible endogeneity of trade.

The view that openness makes countries more vulnerable to crises comes in a number of forms. One variant is that a weakening in a country's export markets is sometimes the trigger for a sudden stop in capital flows, so that a high-trade country is more vulnerable. Another variant notes that sudden stops in finance often extend to a loss in trade credit—especially for imports, but sometimes also even for exports—and that the resulting shrinkage in trade is more painful if trade represents a larger share of the economy. A third variant says that openness to trade in practice goes hand in hand with openness to financial flows because, for example, much trade involves multinational corporations, who in turn need to be able to move money across national borders; or because it is harder to enforce capital controls if trade is free.[2] In the limiting case, a country that is in autarky with respect to trade must have a net capital account of zero due to the balance of payments constraint. Regardless of the specific reasoning, the notion that globalization leads to crises is a generalization that appeals to many.

[1] The expression "Sudden Stops" was first used by Dornbusch, Goldfajn and Valdés (1995) and has since become increasingly popular. The first analytic approach to the problem of sudden stops is Calvo (1998).
[2] Aizenman (2003), and Aizenman and Noy (2004).

The view that openness to trade makes countries less vulnerable also comes with a number of different specific mechanisms that have been proposed. Rose (2005) argues that the threatened penalty of lost trade is precisely the answer to the riddle "why do countries so seldom default on their international debts?" and offers empirical evidence that strong trade links are correlated with low default probabilities.[3] International investors will be less likely to pull out of a country with a high trade/GDP ratio, because they know the country is less likely to default. A higher ratio of trade is a form of "giving hostages" that makes a cut-off of lending less likely. In an early contribution, Sachs (1985) suggested that Asian countries had been less vulnerable to debt crises than Latin American countries in the early 1980s—despite similar debt/GDP ratios—because they had higher export/GDP ratios, which enabled them to accommodate the shocks better.

Consider first a country that faces a given cut-off in financing and must adjust without nominal or real exchange rate flexibility. The adjustment must then come through a reduction in spending. To achieve a $1 billion improvement in the trade balance, the contraction has to be $(1/*m*) billion, where *m* is defined as the marginal propensity to import (in a Keynesian model) or the share of spending that falls on tradable goods (in a tradable/nontradable model). The lower *m*, the more painful the adjustment. Whether output itself falls depends, of course, primarily on whether wages and prices are flexible. But even in a full-employment world, sharp reductions in consumption are painful.

Consider, second, a country that does have the option of nominal and real exchange rate flexibility. In traditional textbook models, if the adjustment is achieved in part through nominal and real depreciation, rather than exclusively through expenditure reduction, the country can accommodate the tougher new financing constraint without necessarily suffering a recession. This is true even if a relatively large devaluation is required to generate the necessary improvement in the trade balance. But since the emerging market crises of 1994-1998, economists have increasingly emphasized the contractionary effects of devaluation, particularly via the balance sheet effect: if the country's debts are denominated in foreign currency, the balance sheets of the indebted banks and corporations are hit in proportion to the devaluation. If the economy is starting from a high ratio of trade to GDP the necessary devaluation need not be

[3] Rose's argument has been contested. Martinez and Sandleris (2006) argue that in the aftermath of defaults, there seems to be no evidence of a larger decline in bilateral trade with creditor countries affected by the default. This

large, and therefore the adverse balance sheet effect need not be large. But if the economy is not very open to trade to begin with, the necessary devaluation, and the resulting balance sheet impact and recession, will all be large. Again we arrive at the result that whether the necessary adjustment will be large and painful depends inversely on openness. The balance sheet version of the openness story is modeled formally by Calvo, Izquierdo and Talvi (2003) and Cavallo (2006). Both have in mind the example of Argentina, which has traditionally had a low ratio of trade to GDP and has suffered some of the worst sudden stops.[4]

In a recent contribution, Martin and Rey (2006) show in the setting of a general equilibrium model, that when emerging markets start opening their financial account but are closed to trade in goods, they are more prone to financial crises because profits and dividends are very dependent on volatile domestic demand. Therefore a policy implication of the model is that trade openness reduces vulnerability to financial crises.

Despite the specific mechanisms, the hypothesis that openness to trade reduces a country's vulnerability to sudden stops transcends any one formal model, causal link, or country example. The same is true of the hypothesis that trade openness raises a country's vulnerability. These opposing views suggest that the relationship between openness to trade and probability of sudden stops is an empirical question. This paper seeks to choose empirically between the two competing hypotheses.

What do we mean by "vulnerability to sudden stops?" A long taxonomy of definitions of financial crises has developed in the literature in recent years (see Appendix A.3). Here we focus on two popular definitions: our first criterion will be a probit model measuring the probability of a sudden reduction in the magnitude of net capital inflows, following closely the definition of Calvo, Izquierdo and Mejía (2003). We also look at the definition of crisis episodes in Frankel and Rose (1996) and Frankel and Wei (2004), which is based on the exchange market pressure variable defined as percentage currency depreciation plus percentage loss in foreign exchange reserves. In addition to looking at the probability of a sudden stop or currency crisis, we also examine the subsequent output loss and its magnitude.

---

would imply that the declines in trade are not due to punishments imposed by these creditor countries.

[4] Even though there is empirical evidence that openness to trade ameliorates the negative effects of sudden stops that occur (see Guidotti, Sturzenegger and Villar, 2004, and Edwards, 2004a, there is a priori no reason why it should also affect the ex ante probability of a crisis. One possibility is that in a country where sudden stops are associated with large recessions, they are more likely to occur, because the country will default to avoid a recession, as stated in

We are not the first to test the relationship between trade openness and vulnerability to some form of financial crises. Edwards (2004a) is among the empirical papers that find that openness to trade is associated with fewer sudden stops. On the other hand, Milesi-Ferretti and Razin (1998, 2000) find conflicting evidence in their analysis of current account reversals and currency crises.[5]

These papers measure trade openness using the trade/GDP ratio. But a critic might argue that the trade/GDP ratio is endogenous. One way in which trade openness could be endogenous is via income: richer countries tend to liberalize trade barriers—in part because their mode of public finance shifts from tariff revenue to income or value added taxes. A second way is that trade liberalization could be part of a more general reform strategy driven by a pro-globalization philosophy or "Washington Consensus" forces. Other aspects of such a reform program, such as privatization, financial liberalization, or macroeconomic stabilization might affect the probability of crises, and yet an OLS regression analysis might inappropriately attribute the effect to trade. A third way that trade openness could be endogenous is that experience with crises—the dependent variable—may itself cause liberalization, via an IMF program. Or it might have the opposite effect, if a country's response to a crash is disenchantment with globalization and the Washington Consensus. A fourth way in which trade openness could be endogenous is through the feedbacks between trade and financial openness. Aizenman (2003) shows in the setting of a simple model how more commercial openness increases the effective cost of enforcing financial repression, rendering financial openness a by-product of greater trade integration. Similarly, one could potentially think of a reverse causality process whereby, for example, greater financial openness may reduce the cost of trade credit and encourage FDI, and both adjustments may facilitate more commercial trade.[6]

How can the endogeneity of trade be addressed? We use gravity estimates to construct an instrumental variable for trade openness. This methodology was developed by Frankel and Romer (1999) in the context of the effect of trade on growth and was later applied to a variety of

---

Cavallo (2006). The opposite relationship, however, is also possible. Dooley (2000) has suggested that when crises lead to recessions, countries are more likely to take care to avoid them, and so sudden stops are less likely.

[5] Along with current account balance, terms of trade, world interest rates and other variables. Easterly, Islam and Stiglitz (2001) find that trade openness raises output volatility.

[6] Aizenman and Noy (2004) empirically investigate the presence of two-way feedbacks between financial and trade integration.

settings in which trade and some other variable could potentially be jointly determined.[7] Basically, it consists of aggregating up across a country's partners the prediction of a gravity equation that explains trade with distance, population, language, land-border, land-area, and landlocked status. Gravity estimates are a good instrumental variable because they are based on geographical variables which are plausibly exogenous and yet, when aggregated across all bilateral trading partners, are highly correlated with a country's overall trade.

We use capital account (also known as financial account) and current account data for all countries in the world with data available from the IMF International Financial Statistics (IFS) to identify statistically sudden stops in capital flows. The data set covers 141 countries in total for the period 1970-2002. Using instrumental variables techniques and controls for other plausible determinants of external crises, we show that (lack of) trade openness is indeed a powerful predictor of these events: moving from Argentina's current trade share (approximately 20 percent of GDP) to Australia's average trade share (approximately 30 percent of GDP), reduces the probability of a sudden stop at least 1 percentage point. Given that sudden stops are low-probability events, this is equivalent to approximately 40 percent of the unconditional probability of a crisis. Some may find this result counterintuitive: trade protectionism does not "shield" countries from the volatility of world markets, as proponents might hope. On the contrary, less trade openness leads to greater vulnerability to sudden stops and currency crises.

The paper is organized as follows. In the next section we elaborate on the empirical strategy and discuss the estimation method. Next, we present standard probit results using sudden stop episodes as the dependent variable and confirm the negative correlation between trade openness and the probability of sudden stops that has already been noted in the literature. We then present instrumental variable probit results to show that the direction of causality goes from trade openness to reduced vulnerability to sudden stops. Next, we repeat the exercise using the Frankel and Rose (1996) definition of crisis episodes and confirm the previous results. We perform several robustness checks, including using alternative dependent variables. Among these are several measures of composite output loss in the aftermath of sudden stops. We find evidence that openness to trade effectively reduces the output cost of crises that occur. Finally, we discuss results and conclude.

[7] For example, Frankel and Rose (2002) shows that currency unions may raise output, via trade. For a survey of the gravity model in general, and applications and extensions, see Chapters 4 and 6 of Frankel (1997).

2. Empirical Strategy

We begin by testing whether countries that trade more are (all else equal) more or less prone to sudden stops in capital flows. We estimate variants of the following equation:

$$SS_{i,t} = c + \varphi(\text{Trade Openness})_{i,t-1} + \omega Z + \mu_{i,t} \qquad (1)$$

where

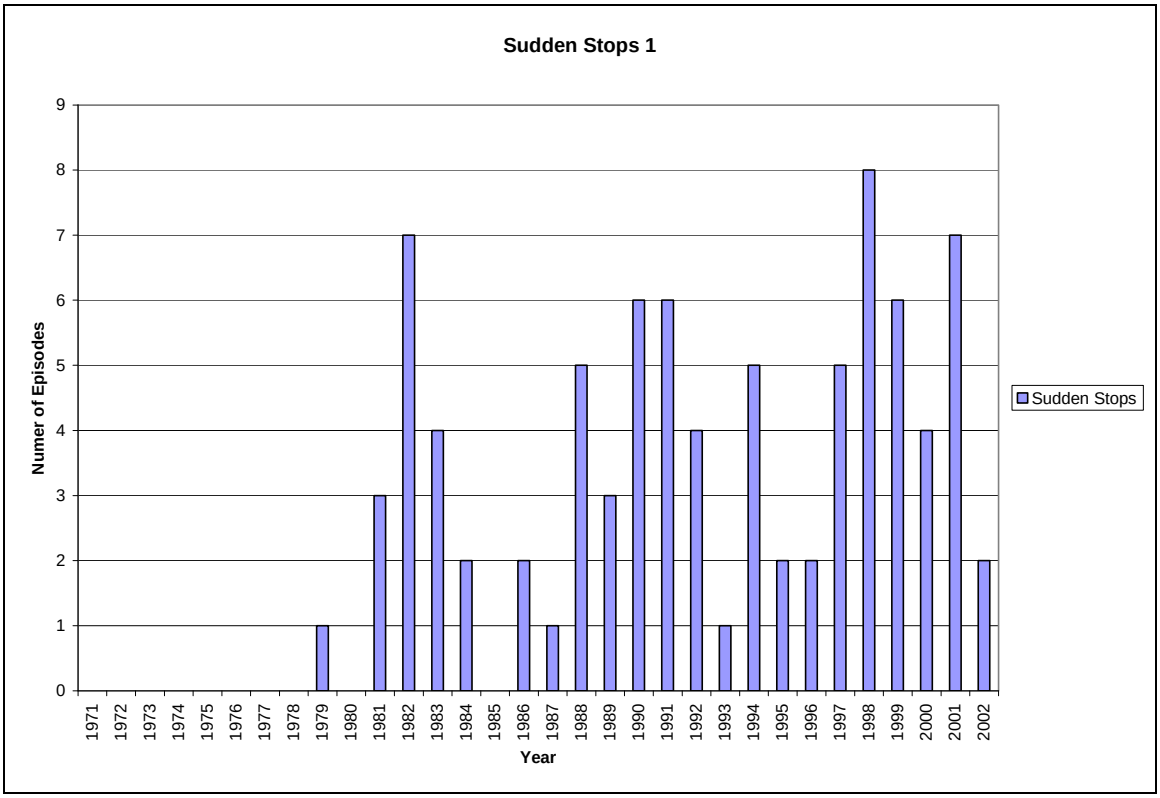
- $SS_{i,t}$ takes a value of 1 if a sudden stop hits country *i* at year *t* and 0 otherwise, and
- *Z* is a set of lagged regressors included for robustness check purposes.

Let us begin with the dependent variable. In order to construct $SS_{i,t}$, we follow the Calvo, Izquierdo and Mejía (2003) criteria for a sudden cut in foreign capital inflows (i.e., worsening of the financial account surplus, *FA*) that is not the consequence of a positive shock (namely a trade shock). Using a dataset containing annual observations for all the countries in the world with available data in the IMF International Financial Statistics database (IFS) for the period 1970-2002, we compute sudden stop episodes as a reduction in the CA deficit during the same year as a reduction in *FA* surplus. To guarantee that this reduction in the CA deficit is not the result of a boom—rising export,s imports and income—the episode has to be *disruptive*, i.e., accompanied by a simultaneous reduction in real output or international reserves. In other words, a sudden stop occurs during the year in which there is a noticeable reduction in the current account deficit that is accompanied by a recessionary reduction in foreign capital inflows.[8] Based on alternative definitions of what is "noticeable" and "disruptive," we compute five classifications of sudden stops to be used as robustness checks for the results.

The preferred definition is SS1. This algorithm classifies as a sudden stop a situation in which at a year *t*, the financial account surplus of country *i* (prevailing at year *t*-1) falls at least two standard deviations below the sample mean for that country; the current account deficit falls by any amount either in *t* or in *t*+1; and GDP per capita falls by any amount either in *t* or in *t*+1." The overall global pattern of sudden stops under this criterion is summarized in Figure 1.

[8] Technical details are left to the Data Appendix.

Figure 1. Sudden Stop 1



Source: Author's calculations.

The total number of episodes captured using this methodology is 86, which is 2.4 percent of total available country/year observations in the dataset.[9] As Figure 1 shows, these events take place around well-known crises periods: the early 198's debt crises in Latin America; the 1992-1993 European Monetary System crises; the 1997-1998 Asian crises; and the new wave of crises in developing countries in the late 1990s and 2001. In terms of regional distribution, 16 percent of all sudden stops occurred in the Asia-Pacific region; 13 percent in Europe; 33 percent in Latin America; 15 percent in the Middle East; 21 percent in Africa; and 1 percent each in South Asia and North America. Alternative definitions show similar patterns of temporal/spatial distribution (graphs available in Appendix A.5).

On the regressors' side of the equation, trade openness is typically measured as a country's ratio of total trade to GDP—($X + M / Y$). All these data are readily available from the IFS and the World Development Indicators CD-ROM (WDI) for almost all countries. But, as

[9] The complete list of crisis episodes per country, plus data availability, is in Table A.1. in Appendix A.1.

argued in the introduction, the problem of using this measure of trade openness is that it might be correlated with other unobserved country characteristics, creating identification problems and potentially biased estimators. The contribution we seek to make to the literature is to avoid these problems by using instrumental variables regression techniques. We instrument trade openness by the predicted ratio of trade to GDP based on gravity equations. In its most basic form, the gravity equation captures the intuitive notion that bilateral trade flows are proportional to the product of each country GDP level, and inversely related to the distance between them. Therefore, the "predicted" trade to GDP ratio can be computed from data on countries' geographic characteristics, bilateral trade flows, and GDP. The gravity model has become popular, and there are some very extensive databases that can be used for these computations. We used the dataset at Andrew Rose's webpage,[10] which is perhaps the most complete one available and has been widely used for empirical research. Details on the methodology are left to the Appendix. The important point is that, to the extent that the "predicted" trade to GDP ratio is highly correlated with the actual trade to GDP ratio,[11] it is a good instrument, because it is less likely that geography is related to economic outcomes through any channel other than trade. In other words, geography is quite plausibly exogenous.[12]

As for the control variables, Z is a set of *lagged* regressors included for robustness check purposes and to minimize potential omitted variable bias. These are the following:

- *Liability Dollarization*. This variable introduces "balance sheet" effects into the empirical model. According to the emerging markets crises literature,[13] the mismatch between the currency denomination of assets and liabilities in the private and public balance sheets of these countries increases the output costs of external shocks that trigger real exchange rate depreciations, such as sudden stops in capital flows. Indeed, some sort of "balance sheet" mismatch is required to explain why real depreciations are

[10] http://faculty.haas.berkeley.edu/arose/RecRes.htm. The data set consists of 41,678 bilateral trade observations spanning six different years (1970, 1975, 1980, 1985, 1990, and 1995). All 186 countries, dependencies, territories, overseas departments, colonies, and so forth for which the United Nations Statistical Office collects international trade data are included in the data set. The trade data are taken from the World Trade Database, a consistent recompilation of the U.N. trade data presented in Feenstra, Lipsey, and Bowen (1997), augmented with data from the UN *International Trade Statistics Yearbook*. This data set is estimated to cover at least 98 percent of all trade.

[11] The actual correlation between the variable "trade openness" and the instrument used in this paper is 0.52.

[12] To the best of our knowledge, the only other paper that addressed the problem of endogeneity explicitly is Calvo, Izquierdo and Mejía (2003). They use instruments in a probit context along the lines suggested by Rivers and Vuong (1998).

[13] See, for example, Krugman (1999).

contractionary in some countries, because in a world without these imperfections or some other explanation, real depreciations should be expansionary.[14] The impact of this variable on the probability of a crisis is a priori ambiguous:[15] there is no reason why something (i.e., liability dollarization) that makes the consequences of a crisis worst (i.e, more recessionary) should also necessarily make them more likely. Indeed, the effect could go the other way.[16] Since we cannot assume ex ante that there is no effect, we include it in some of the specifications. We use two alternative measures of "liability dollarization": (i) One is the ratio of foreign liabilities of the financial sector to money (IFS line 26C/Line 34). This is not a direct measure of the extent to which a country's balance sheets present a mismatch in the currency denomination of assets and liabilities. Nevertheless this variable has been used in the literature as a proxy,[17] primarily because it is available for almost all countries since 1970 and because it should be correlated to actual balance sheet mismatches. (ii) Our alternative proxy is a measure of deposit dollarization from Arteta (2005a and 2005b). This is "Dollar Deposits / Total Deposits" in the financial system. Intuitively, countries with a high percentage of deposit dollarization, but whose domestic currency is not the U.S. dollar, are (most likely) countries whose public and private sectors tend to borrow heavily in a currency different from their own. In Arteta's database, data on the aggregate volume of foreign-currency-denominated ("dollar") deposits of residents are available for 92 developing and transition economies. The time span varies across countries, with some having data from as early as 1975 and some having data only from about 1995 onwards.

- *Foreign Debt /GDP* is included to control for the level of de-facto financial openness. Without debt to service, there are no sudden stops to worry about. Data for "Foreign Debt/GDP" comes from IFS.[18]

[14] See Céspedes et al. (2003) for a thorough discussion.
[15] Calvo, Izquierdo and Talvi (2003) argue that "domestic liability dollarization" increases the probability of sudden stops.
[16] Cavallo (2006) builds a model where things that make the consequences of a crisis worst increase the probability that a bad shock (i.e., tight global liquidity) leads to a full-fledged crisis. On the other hand, in the spirit of Dooley (2000), one could expect countries that have higher dollarization ratios to do more to protect themselves against the crises because they are aware of the extent of the potential losses.
[17] E.g., Alesina and Wagner (2003) and Guidotti, Sturzenegger and Villar (2003).
[18] Foreign debt is line 89a in the IFS dataset.

- *CA/GDP* is "Current Account Balance/GDP." It controls for the "quantity" of the resource transfer required in the aftermath of a sudden stop in inflows. It is expected that, with other things equal, countries with larger current account deficits ex ante will have a higher probability of experiencing a crisis.
- *The log of Reserves in months of imports* is included because foreign exchange reserves could be used as self-insurance against sudden stops, making crises less likely.
- *The log of GDP per capita* is included to control for the stage of economic development.
- *FDI /GDP* is included because it is conceivable that stability of FDI flows could reduce the likelihood of sudden stops. But the reverse effect is also possible: Guimaraes and Morris (2003) develop a model where foreign direct investment (illiquid investments in the target currency) make crises more likely.
- *Institutional quality* is included to determine whether "trade openness," instrumented or uninstrumented, is incorrectly appropriating effects on sudden stops that really go through institutions.
- *The ratio of short term debt to total debt* controls for the effect of the term structure of the debt in the likelihood of a crisis.
- *Index of exchange rate rigidity*, the final variable, is a measure of nominal exchange rate rigidity that is included to test whether monetary policy affects the probability of sudden stops.

Most of these variables come from WDI CD-ROM, with the exception of the "institutional quality" data, which come from Kaufmann, Kraay and Zoido Lobatón (2002) and the Marshall and Jaggers (2002) Polity IV Project, and data on "index of exchange rate rigidity," which come from Levy Yeyati and Sturzenegger (2003) and are based on their "de facto" exchange rate classification.

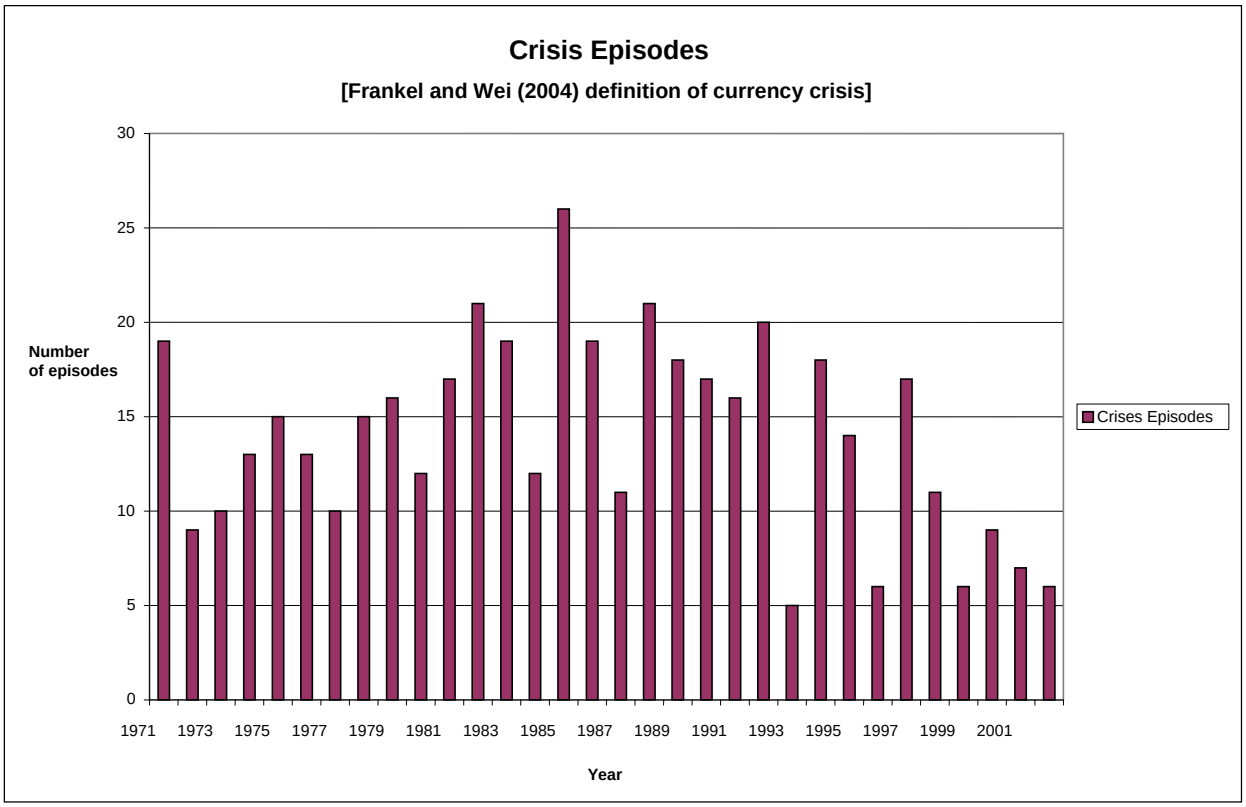
We first present results without instrumental variables in order to confirm the existence of a negative correlation between sudden stops and trade openness. Our specification is Probit. Then, we present the results based on instrumental variables for Probit (IV probit). We report fixed-effects results only for ordinary probit regressions because the instrument used in the IV regressions has, by construction, almost no time series variation. While this is not a serious limitation, because most of the variation in trade openness is *across* countries, not over time, the

problem is that without country fixed effects we cannot be sure that the estimated coefficient is not biased due to some omitted variable.[19] To minimize this problem, we include controls in all the regressions for various possible determinants of sudden stops. Reassuringly, the results we obtain are consistent across all the alternative specifications, suggesting that omitted variable bias is not driving our results. But even at the risk of some persistent omitted variable bias, the methodology used here is at least properly controlling for endogeneity so that reverse causality cannot be blamed for the estimated effect of trade openness on the probability of sudden stops. Summary statistics for all the variables are found in Appendix A.4.

We then run similar regressions where the dependent variable is currency crises, from the Frankel-Rose (1996) and Frankel-Wei (2004) definition, instead of the sudden stop measure.[20] They define crisis episodes based on the foreign market pressure index. This index is defined as the percentage fall in reserves plus the percentage fall in the foreign exchange value of the currency. The idea is that this index measures the fall in demand for the country's currency (which is conceivably another form of sudden stops); it is then up to the monetary authorities to determine whether to accommodate, by letting the money supply fall, or to depreciate. To avoid treating every year of a multi-year high-inflation period as a separate crisis, the approach followed by the authors requires that the increase in exchange market pressure represent an acceleration of at least an additional 10 percent over the preceding period to be considered a crisis episode; and they also adopt an exclusion window of three years. The total number of episodes captured using this methodology is 419, which is 13 percent of total available country/year observations in the dataset. This means that the alternative way of computing crisis episodes is much more comprehensive than the sudden stop criterion. The overall global pattern of crises events under this criterion is summarized in Figure 2.[21]

[19] We are aware of the incidental parameter problem with fixed effect probit. However, it is an asymptotic problem, and in our sample the number of countries is finite.
[20] Summary statistics are in Appendix A.4
[21] For further details on the methodology and additional summary statistics, please refer to Frankel and Wei (2004).

Figure 2: Crises Episodes Based on Frankel and Wei (2004)
"Foreign Exchange Market Pressure Index"



Source: Author's calculations.

3. Results

We begin by estimating non-instrumental variables variants of equation (1). We compute standard errors robust to clustered heteroskedasticity.[22] All independent variables are lagged one period to ameliorate endogeneity.[23] Estimation includes year fixed effects and regional dummies, but these coefficients are not reported. The results reported here are based on *SS1*, but, as shown in the robustness checks, all estimates are robust to the use of alternative definitions of sudden stops. We do not exclude contiguous crisis episodes, but all the results reported here are robust to the inclusion of a one-year, two-sided omission window around crisis episodes (see Appendix A.5).

[22] Clusters by country.
[23] Trade openness is lagged one year, in spite of the fact that it is ultimately instrumented, to avoid spurious correlation that could be due to the cases in which a sudden stop occurred at the beginning of the year and a decline

The explanatory power of the regressions is not high. This is not surprising; it is consistent with the performance of standard models of crises and the usual inability of leading-indicator exercises to properly predict events.[24] Table 1 summarizes the results for some variants of (1) using ordinary probit specification.

Table 1. Ordinary Probit Regressions

	Dependent Variable: Sudden Stop 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trade openness $_{t-1}$	**-0.322** (0.22)	**-0.516** (0.25)**	**-0.517** (0.25)**	**-0.58** (0.26)**	**-0.597** (0.26)**	**-0.812** (0.35)**	**-0.903** (0.34)***	**-0.858** (0.34)**	**-0.801** (0.37)**
Current Account/ GDP $_{t-1}$		**-3.587** (1.16)***	**-3.577** (1.19) ***	**-3.65** (1.22) ***	**-3.571** (1.25) ***	**-4.898** (1.61) ***	**-5.245** (1.77) ***	**-5.756** (1.96) ***	
Foreign Debt/GDP $_{t-1}$			**0.008** (0.2)	**0.017** (0.21)	**0.003** (0.30)	**0.028** (0.25)	**0.088** (0.25)	**0.084** (0.27)	
Liability Dollarization $_{t-1}$				**0.346** (0.18)*	**0.32** (0.22)	**0.321** (0.24)	**0.314** (0.23)	**0.311** (0.23)	
Short Term Debt/ Total Debt $_{t-1}$					**0.627** (0.65)	**1.033** (0.74)	**0.672** (0.76)	**0.534** (0.75)	
Effectiveness of Government						**0.163** (0.20)	**0.077** (0.24)	**0.069** (0.25)	
Ln GDP per capita $_{t-1}$							**0.151** (0.18)	**0.167** (0.18)	
FDI/GDP t-1								**-0.02** (0.03)	
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Country Fixed-Effects?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**
Constant	**-2.486** (0.32) ***	**-2.582** (0.36) ***	**-2.583** (0.36) ***	**-2.736** (0.37) ***	**-2.765** (0.55) ***	**-2.227** (0.42) ***	**-3.189** (1.26) ***	**-3.329** (1.29) ***	**-0.31** (0.61)
Observations	**1124**	**1124**	**1124**	**1124**	**905**	**773**	**773**	**773**	**1124**
Robust standard errors reported in parenthesis * significant at 10%; ** significant at 5%; *** significant at 1%									

These results confirm the existence of a negative correlation between trade openness and the likelihood of a sudden stop, as previously documented in Edwards (2004a). Column (1) includes only lagged trade openness alongside with regional and time dummies, while columns (2) to (8) sequentially include some of the control variables discussed in the previous section, to

in trade resulted from it. Introducing contemporaneous rather than lagged variables does not affect the results. See Tables A.5.1 and A.5.2 in Appendix A.5.

[24] See, for example, Arteta (2005b).

check that these results are not biased by omitted variables.[25] The effect of trade openness on the probability of sudden stops increases in absolute value and in statistical significance as additional control variables are included in the regressions, suggesting that, if anything, possible omitted variable bias is working in the direction of diminishing the effect that we identify.

As a first control, in column (2) we include the lagged current account balance as a share of GDP, to account for the size of the transfer that is required in the aftermath of the sudden stop. The estimated coefficient is negative and statistically significant. The implication is as conjectured: sudden stops are more likely when a larger resource transfer is expected in its aftermath (i.e., when the initial CA deficit is high).

The coefficient on the lagged *Foreign Debt / GDP*, although positive, does not appear statistically significant in column (3).[26] This is consistent with the hypothesis that different countries are able to tolerate different levels of debt.[27]

Similarly, the coefficient that seeks to capture the "balance sheet" effects – the lagged liability dollarization – is positive but only marginally statistically significant in column (4). We obtain similar results when we use Arteta's measure of liability dollarization. These measures of dollarization appear not to have significant detrimental effects in terms of increased vulnerability to sudden stops.

As for the other controls included in columns (4) to (8): the coefficient on "short term debt to total debt" appears as small and positive, but not statistically significant.[28] The institutional quality proxy is not statistically significant,[29] and neither are the level of GDP per capital nor the level of FDI flows. Importantly, the inclusion of these variables does not change significantly the estimate of the effect of trade openness on the probability of a sudden stops,

[25] We included controls for all the possible determinants of sudden stops as discussed in the previous section, but as the results remain unchanged, for brevity we only report a subset of all the regressions. Additional results are reported in Appendix A.5.

[26] Similarly, Calvo, Izquierdo and Mejía (2003) do not find a significant effect of total public debt in their probit regressions for sudden stops, nor do Frankel and Rose (1996) in their probit regressions of currency crashes.

[27] Reinhart, Rogoff, and Savastano (2003). Using "Foreign Debt/Exports" as a solution to concerns about how foreign debt and GDP are measured in domestic currency fails to change any results.

[28] The insignificance of this variable might also be explained by high collinearity between the "short-term debt to total debt" ratio and "liability dollarization." When the latter is excluded, the former is typically significant, with the correct sign. The correlation between these two explanatory variables is almost 0.40.

[29] As a measure of institutional quality we report the coefficient on "effectiveness of government" which is one of the six proxies of institutional quality in Kaufman et al. (2002). This institutional quality data is not in panel form, so every country in the sample is assigned a single (time-invariant) value. As additional robustness checks, we also use Marshall and Jaggers (2002)'s Polity IV Project data, which is panel (country/year). Using this alternative measure does not change the results, so we do not report them.

suggesting that the identified stabilizing effect of trade openness is not simply spurious. In order to probe this hypothesis further, in column (9) we replace all the control variables and the regional dummies with country fixed effects. The results are reassuringly similar to those in column (8), both qualitatively and quantitatively: trade openness significantly reduces the probability of sudden stops.

All the results reported in Table 1 are robust to the inclusion of additional variables in the regressions (see Table A.5.1 in Appendix A.5). Regional dummies (not reported) are insignificant. Nevertheless, as already noted, the methodology employed thus far cannot guarantee the exogeneity of trade openness and therefore, it falls short of establishing causality.

Now we come to what we hope is our contribution to the state of the art. Table 2 presents instrumental variable estimates for probit.[30]

Table 2. Instrumental Variables Probit Regressions

	Dependent Variable: Sudden Stop 1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade openness $_{t-1}$	**-1.632** (0.52)***	**-1.841** (0.68) ***	**-1.824** (0.63) ***	**-1.998** (0.59) ***	**-2.164** (0.60) ***	**-2.893** (0.52) ***	**-2.968** (0.53) ***	**-3.067** (0.55) ***
Current Account/ GDP $_{t-1}$		**-6.496** (1.33) ***	**-6.014** (1.39) ***	**-6.275** (1.41) ***	**-5.991** (1.31) ***	**-5.881** (1.40) ***	**-7.015** (1.61) ***	**-6.532** (1.65) ***
Foreign Debt/ GDP $_{t-1}$			**0.24** (0.25)	**0.272** (0.24)	**0.369** (0.28)	**0.697** (0.30)**	**0.801** (0.30) ***	**0.688** (0.31)**
Liability Dollarization $_{t-1}$				**0.512** (0.20)**	**0.353** (0.26)	**0.114** (0.28)	**0.089** (0.27)	**0.133** (0.27)
Short Term Debt/ Total Debt $_{t-1}$					**1.526** (0.78)*	**1.645** (0.89)*	**0.713** (1.05)	**0.742** (1.03)
Effectiveness of Government						**0.371** (0.19)**	**0.142** (0.22)	**0.123** (0.21)
Ln GDP per capita $^{t-1}$							**0.372** (0.20)*	**0.347** (0.20)*
FDI/GDP $_{t-1}$								**0.06** (0.04)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**

[30] The method of estimation is maximum likelihood, and standard errors are corrected to account for clustered heteroskedasticity. The results are robust when a two-sep estimator is implemented using the method of Newey (1987).

Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-1.709** (0.32) ***	**-1.847** (0.36) ***	**-1.882** (0.36) ***	**-2.028** (0.37) ***	**-1.807** (0.55) ***	**-0.823** (0.42)	**-3.276** (1.26)**	**-3.056** (1.29)**
Observations	**1039**	**1039**	**1039**	**1039**	**827**	**732**	**732**	**732**
Robust standard errors reported in parenthesis * significant at 10%; ** significant at 5%; *** significant at 1%								

Table 2.b. Marginal Effects (for trade openness) after ivprobit

	Marginal effects (dy/dx) are for discrete change of dummy variable from 0 to 1							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Trade openness $_{t-1}$	-0.098	-0.08	-0.08	-0.09	-0.12	-0.21	-0.21	-0.22
Probability of a positive outcome	2.6%	1.76%	1.8%	1.8%	2.4%	3.4%	3.1%	3.2%
	Estimated effects of a 10 percentage point change in trade openness							
Δ(PSS) in percentage points	-0.98	-0.8	-0.8	-0.9	-1.2	-2.1	-2.1	-2.2
% Δ(PSS)	-37%	-45%	-44%	-48%	50%	-63%	-66%	-68%

Δ(PSS) and **% Δ(PSS)** calculated for a 10 percentage point increase in trade openness(i.e., an increase of 0.10 in the independent variable).
Δ(PSS) is the estimated change in the probability of a positive outcome (line 2), in percentage points, given by a 10 percentage point increase in trade openness. The calculations are based on the marginal effects reported in line 1.
% Δ(PSS) is the estimated change in the probability of a sudden stop, calculated as a percentage of the unconditional probability of a crisis (line 2), given by 10 percentage point increase in trade openness It is computed by multiplying the marginal effect (line 1) by 0.10 and diving by the probability of a positive outcome (line 2).
Marginal effects estimated at the mean of the independent variables.

The results are qualitatively very similar to those in Table 1, although the point estimates of the coefficient on trade openness are quantitatively different. Interestingly, when we use gravity estimates as instrumental variables for trade openness, the point estimates are noticeably greater in absolute value. This means that correcting for the potential sources of endogeneity, the effect of trade openness on the probability of sudden stop is even stronger than what one would be led to conclude from the OLS regressions.[31]

[31] One possible reason why the IV coefficients are bigger in absolute value than the ordinary probit is because our instrumental variable might be correcting for measurement error that creates attenuation bias. If the actual recorded trade share measures the true "openness" variable (the relevant measure of openness for the question how severely the economy must contract to generate quickly a given quantity of foreign exchange) with error, and if the measurement error is more important than reverse causality and omitted variable bias, then we can expect to get bigger IV coefficients. A similar point is made in Acemoglu, Johnson and Robinson (2001). We thank Sebnem Kalemi-Ozcan for suggesting this possibility to us.

Table 2.b reports the implied marginal effects for trade openness estimated from the IV probit regressions at the mean of the independent variables (first row).[32] It also reports the predicted change in the probability of a sudden stop for a 10 percentage point increase in openness (which illustrates the effect of going from Argentina's situation to Australia's): it combines the marginal effects with the estimated probability of sudden stops (second row).[33] The results indicate that a 10 percentage point increase in trade openness reduces the probability of a crisis by between 1 and 2 percentage points (third row). Given that sudden stops are, by construction, low-probability events, these seemingly small changes constitute a large share of the probability of a crisis.[34] They range between 37 percent and 68 percent. That is, a country that trades 10 percent less of GDP (i.e., Argentina vis-à-vis Australia) is, ceteris paribus, at least 37 percent more likely to be hit by a sudden stop.

The rest of the point estimates are qualitatively similar to those found in Table 1. In spite of these results, it is worth reemphasizing that the methodology here only promises the exogeneity of trade openness, so no causal relationship can be derived from the other estimates.

Next, we redo the exercise using the Frankel-Rose and Frankel-Wei definition of crises as the dependent variable. In Table 3 we report ordinary probit results, and in Table 4 we present IV probit results with gravity estimates as the instrumental variable for trade. The sample size is smaller as, for comparability purposes, it is limited to countries for which we have data for sudden stops as well. Given that crises episodes are related to currency crashes, in the reported regressions we include as control variables the set of variables that are typically identified as determinants of currency crises in the literature (see Frankel and Rose, 1996).[35]

Table 3. Ordinary Probit Regressions

	Dependent Variable: Crisis Episodes				
	(1)	(2)	(3)	(4)	(5)
Trade openness $_{t-1}$	**-0.318**	**-0.43**	**-0.467**	**-0.542**	**-0.582**
	(0.22)	(0.21)**	(0.21) **	(0.21) **	(0.21)***
Ln Reserves in Months of		**-0.284**	**-0.277**	**-0.27**	**-0.236**

[32] Note that the magnitudes of the effects at the tail of the distribution will be lower than at the mean because a normal CDF is fitted to the data. Thus, the results reported below should be taken as an approximation.
[33] A 10 percentage point increase in the independent variable "trade openness" is, for example, an increase from the mean value of this variable in the sample, which is 0.73, to 0.83 (see Appendix A.4. for summary statistics). It is also an increase equal to approximately 0.25 standard deviations.
[34] Recall that the unconditional probability of a crisis in the whole sample is just 2.4 percent.
[35] Regressions with additional control variables and sample size that is not limited by the availability of data of sudden stops are reported in Tables A.5.3 and A.5.4 in Appendix A.5.

Imports		(0.06) ***	(0.06) ***	(0.06) ***	(0.07) ***
Exchange Rate Rigidity Index $_{t-1}$			**0.141** (0.08)*	**0.148** (0.08)*	**0.102** (0.09)
Foreign Debt / GDP $_{t-1}$				**0.265** (0.19)	**0.247** (0.19)
Effectiveness of Government					**-0.219** (0.11) **
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-1.538** (0.32) ***	**-1.15** (0.25) ***	**-1.356** (0.26) ***	**-1.48** (0.30) ***	**-1.29** (0.30) ***
Observations	**611**	**611**	**611**	**611**	**573**
Robust standard errors reported in parenthesis * significant at 10%; ** significant at 5%; *** significant at 1%					

Table 4. Instrumental Variables Probit Regressions

	Dependent Variable: Crisis Episodes				
	(1)	(2)	(3)	(4)	(5)
Trade openness t-1	**-0.877** (0.52)*	**-1.396** (0.52)***	**-1.477** (0.54) ***	**-1.37** (0.51) ***	**-1.314** (0.51) ***
Ln Reserves in Months of Imports		**-0.34** (0.07) ***	**-0.333** (0.07) ***	**-0.316** (0.07) ***	**-0.279** (0.07) ***
Exchange Rate Rigidity Index t-1			**0.152** (0.08)*	**0.155** (0.08)*	**0.111** (0.09)
Foreign Debt / GDP $_{t-1}$				**0.433** (0.25)	**0.411** (0.25)
Effectiveness of Government					**-0.143** (0.10)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-1.071** (0.65)	**-0.234** (0.73)	**-0.396** (0.78)	**-0.839** (0.67)	**-0.788** (0.63)
Observations	**583**	**583**	**583**	**583**	**548**
Robust standard errors reported in parenthesis * significant at 10%; ** significant at 5%; *** significant at 1%					

The main highlights are the following:

- Openness reduces the probability of a currency crisis. The point estimates are not as large in absolute value as those obtained when using *SS1*, but the new coefficients are always statistically significant at standard confidence levels, and the instrumental variables results are still stronger than the ordinary probit results. This reinforces the point already made, that correcting for the potential sources of endogeneity, the effect of trade openness on the probability of an external crisis is even stronger than what one would be led to conclude from the OLS regressions that use the trade to GDP ratio as a measure of openness.
- The coefficient on *Foreign Debt / GDP* is positive and (weakly) statistically significant in the IV probit regressions, suggesting that the presence of a large stock of foreign debt as a percentage of GDP increases the probability of crisis. The result is not robust in the ordinary probit regressions and is idiosyncratic to this particular definition of crisis episodes.

- The coefficient on *log of reserves in months of imports* is systematically negative and statistically significant across both, standard and IV probit regressions. This suggests that having a large stockpile of reserves reduces the probability of being hit by a crisis. This result is interesting because this variable is always insignificant in the regressions that use *SS1* as the dependent variable.[36] The most likely reason for the difference is the way in which crises are defined in both cases. The Frankel-Rose definition of crisis episodes uses the foreign exchange market pressure index, which itself includes change in reserves in the definition, while *SS1* does not.[37]
- The coefficient on *index of exchange rate rigidity* is positive and statistically significant across many of the regressions in both tables. This suggests that having a peg increases the chances of being hit by a crisis. This result is also idiosyncratic to this definition of crises.
- The variable "effectiveness of government" enters the regressions with the expected negative sign and is statistically significant (in the ordinary probit regressions) at standard confidence levels. This suggests that having better institutions reduces the likelihood of crises.

The rest of the controls never appear as statistically significant, but all the results are robust to the inclusion of these variables from the regressions. Regional dummies (not reported) are always insignificant.

We find it reassuring that we obtain very similar results using two very different definitions of crises. We also obtain some additional results in terms of other variables that increase or reduce the probability of a crisis, but we choose not to emphasize these so strongly because the methodology we propose here only promises the exogeneity of openness.

[36] Variable not reported in regressions in Tables 1 and 2, but reported in Tables A.5.1 and A.5.2 in appendix A.5.

[37] Although we don't report it here, the coefficient on "CA / GDP" is systematically insignificant across all regressions that use Frankel-Rose's crises episodes as the dependant variable. This is also different from the case in which the dependent variable is "SS1." Once again the most likely reason is the definition of the crisis variable itself. Recall that "SS1" is built upon the assumption that there is an outstanding current account deficit that has to be abruptly reduced in the presence of a crisis; while in the alternative definition of crises, an episode can occur independently of what happens to the current account if the government is willing to give up reserves to finance an outstanding deficit.

4. Robustness Checks

Finally, we perform a variety of robustness checks. First, we look at alternative definitions of sudden stops. Based on variants of what is "noticeable" and "disruptive" we compute five classifications of sudden stops to be used as robustness checks: our preferred definition "SS1," and four alternative: "SS2," "SS3," "SS4," and "SS5." These definitions are fully described in Appendix A1. "SS2" and "SS3" are conceptually equivalent to "SS1," but are more restrictive in that they capture fewer episodes because they have more stringent definitions of financial flows volatility. "SS4" is, instead, equivalent to "SS1" but is less restrictive in that classifies as sudden stops events that do not necessarily trigger output contractions. "SS5" is equivalent to "SS1" but uses the criterion that the sudden stop be accompanied by a loss of reserves rather than a fall in output. Finally, we also use Calvo, Izquierdo and Loo-Kung (2006) definition of sudden stops, which we call "systemic" because, in order to isolate episodes of capital account reversals related to systemic events of an external origin, these authors defined crises as periods of net capital inflows collapse that are accompanied by skyrocketing Emerging Markets bond spreads. The new definition necessarily restricts the sample to those Emerging Market Economies that are integrated into world capital markets (i.e., that are included in the EMBI index).Table 5 summarizes the IV probit results for these alternative definitions. As shown in the table, trade openness always enters the regressions with a negative and statistically significant point estimate. This suggests that the result that openness reduces the vulnerability to sudden stops is not idiosyncratic to a particular definition.

Table 5. Instrumental Variables Probit Regressions
(Alternative Sudden Stop Definitions)

	SS1	SS2	SS3	SS4	SS5	Systemic
Trade Openness $_{t-1}$	**-1.95** (0.55)***	**-1.45** (0.53)**	**-2.43** (0.67)***	**-0.89** (0.48)*	**-2.48** (0.59)***	**-1.55** (0.54)***
Foreign Debt/ GDP $_{t-1}$	**0.20** (0.24)	**0.28** (0.22)	**-0.42** (0.44)	**0.13** (0.156)	**-1.38** (0.58)**	**0.47** (0.46)
Liability Dollarization $_{t-1}$	**0.56** (0.22)**	**0.7** (0.17)***	**0.79** (0.19)***	**0.51** (0.19)**	**0.43** (0.29)	**0.65** (0.36)*
Current Account/ GDP $_{t-1}$	**-5.66** (1.14)***	**-4.79** (1.27)***	**-6.5** (1.78)***	**-5.11** (1.21)***	**-5.67** (1.54)***	**-5.91** (2.34)**
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-1.33** (0.54)**	**-1.89** (0.50)***	**-1.29** (0.60)	**-2.05** (0.39)	**-1.87** (0.46)***	**-1.19** (0.45)***
Obs.	**1040**	**1040**	**1040**	**1040**	**1024**	**355**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1% / ** Statistically Significant at 5% / * Statistically Significant at 10%
We use five alternative definitions of sudden stops: our preferred definition "SS1", and four alternative "SS2", "SS3" ,"SS4" and "SS5". "SS2" and "SS3" are conceptually equivalent to "SS1", but are more restrictive in that they capture fewer episodes. "SS4" is, instead, equivalent to "SS1" but is less restrictive in that classifies as sudden stops events that don't necessarily trigger output contractions. "SS5" is equivalent to "SS1" but uses the criterion that the sudden stop be accompanied by a loss of reserves rather than a fall in output.
"Systemic" is borrowed from Calvo et. al. (2006) and combines a fall in net capital inflows with an increase in emerging markets bond spreads.

We also check that our results are not determined by outliers. In particular, we check that they are not driven by the inclusion of African countries, or other poor nations that have limited access to private capital markets. In Table 6 we show that our results for both ordinary probit and IV regressions are robust to the exclusion of African countries and also to the poorest 25% percentile countries.

Table 6. Excluding Poor Countries

	Ordinary Probit	IV Probit	Ordinary Probit	IV Probit	Ordinary Probit	IV Probit	Ordinary Probit	IV Probit
	Excluding Poorest 25% percentile	Excluding Poorest 25% percentile	Excluding Africa	Excluding Africa	Excluding Poorest 25% percentile	Excluding Poorest 25% percentile	Excluding Africa	Excluding Africa
	Sudden Stop (SS1)	Sudden Stop (SS1)	Sudden Stop (SS1)	Sudden Stop (SS1)	Crisis Episode (F&W)	Crisis Episode (F&W)	Crisis Episode (F&W)	Crisis Episode (F&W)
Trade Openness $_{t-1}$	**-0.54** (0.28)**	**-2.30** (0.53)***	**-0.66** (0.33)**	**-2.22** (0.55)***	**-1.28** (0.34)***	**-1.15** (0.54)**	**-1.18** (0.34)***	**-2.27** (1.02)**
Foreign Debt/ GDP $_{t-1}$	**-0.008** (0.22)	**0.24** (0.29)	**0.07** (0.23)	**0.38** (0.29)	**0.69** (0.35)**	**0.68** (0.34)**	**0.74** (0.45)*	**1.10** (0.67)*
Liability Dollarization $_{t-1}$	**0.30** (0.19)	**0.52** (0.22)**	**0.36** (0.19)*	**0.56** (0.22)**	**0.23** (0.20)	**0.26** (0.21)	**0.05** (0.26)	**0.03** (0.27)
Exchange Rate Rigidity Index $_{t-1}$					**0.22** (0.11)*	**0.20** (0.12)*	**0.13** (0.11)	**0.11** (0.10)
Current Account/ GDP $_{t-1}$	**-3.48** (1.34)***	**-6.82** (1.52)***	**-4.16** (1.6)**	**-6.22** (1.54)***	**-1.88** (1.64)	**0.63** (2.06)	**3.6** (2.28)	**3.83** (2.29)*
Ln Reserves in Months of Imports $_{t-1}$					**-0.22** (0.08)**	**-0.32** (0.10)**	**-0.46** (0.12)***	**-0.51** (0.14)***
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-2.73** (0.38)***	**-2.04** (0.68)**	**-2.73** (0.38)***	**-1.81** (0.73)**	**-1.49** (0.39)***	**-1.49** (0.66)**	**-0.79** (0.46)*	**0.25** (1.07)
Obs.	**870**	**801**	**825**	**816**	**430**	**413**	**403**	**413**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1% / ** Statistically Significant at 5% / * Statistically Significant at 10%

The next step is to look at an alternative dependent variable, one that combines crisis episodes with the depth of the crisis, where the latter is measured in terms of the recessionary impact of an event. We choose to use the output lost during the crisis year (Loss1), plus the year immediately after the crisis (Loss2), and up to three years after the crisis (Loss3).[38] Because output losses are conditional on sudden stops, a natural approach is a Heckman selection model that takes the probit regression of sudden stops as a first stage, and estimate a linear model in the second stage only for the cases when sudden stops actually occurred.[39] The results are reported in Table 7.

[38] Summary statistics are in Appendix A.4.
[39] See Maddala (1983) for more detailed specification requirements.

Table 7. Heckman Selection Model

Outcome Equation	Loss1 (1)	Loss2 (2)	Loss3 (3)
Trade openness $_{t-1}$	**-10.778** (4.53)**	**-6.999** (3.27) **	**-4.904** (2.40) **
Foreign Debt/ GDP t-1	**-0.315** (3.94)	**-1.865** (1.46)	**-1.829** (1.85)
Liability Dollarization $_{t-1}$	**-1.892** (1.84)	**0.229** (-0.26)	**0.294** (-0.33)
Ln Reserves in Months of Imports	**-4.288** (3.00)	**-1.954** (0.73)***	**-1.835** (0.71) ***
Short Term Debt/ Total Debt $_{t-1}$	**-0.224** (0.18)	**0.062** (-0.09)	**0.097** (-0.08)
Constant	**28.57** (-32.47)	**8.546** (-9.09)	**5.57** (-7.43)
Selection Equation	Sudden Stop	Sudden Stop	Sudden Stop
Trade openness $_{t-1}$	**-0.214** (0.21)	**-0.229** (0.22)	**-0.298** (0.23)
Current Account/ GDP t-1	**-2.083** (0.50) ***	**-1.068** (0.49) **	**-0.323** (0.53)
Constant	**-2.929** (0.41)***	**-2.767** (0.37)***	**-2.63** (0.35)***
Year Fixed-Effects	**YES**	**YES**	**YES**
Regional Dummies	**YES**	**YES**	**YES**
Observations	**2948**	**2903**	**2861**
Uncensored observations	**32**	**57**	**76**

Robust standard errors reported in parenthesis * significant at 10%; ** significant at 5%; *** significant at 1%

We find that openness dampens the contractionary effects of crises, in a very significant way: taking the output loss during the year of the crisis as a reference point (column 1), the results suggest that a 10 percent point increase in trade openness reduces the output loss of crises that occur by a full percentage point of GDP.[40] The "Lag of reserves in months of imports" is

[40] To arrive to this result, we multiply the variation in the independent variable (0.10) by the coefficient of trade openness in the outcome equation (-10.778). The result is the cumulative output loss expressed as a share of GDP.

typically negative and statistically significant, meaning that the presence of a large stockpile of reserves tends to dampen the recession that might come in the aftermath of an external crisis. The other variables are not significant. These control variables were selected after some experimentation to achieve the best possible fit for the regression, but without regard to the coefficient on openness per se.[41]

In short, the evidence suggests that openness tends to reduce the contractions that might follow crisis episodes. Some additional robustness checks are reported in Appendix A.5.

5. Conclusion

In summary, the evidence overall appears to be quite robust. Economies that trade less with other countries are more prone to sudden stops and to currency crashes. Controlling for other plausible determinants of these shocks and instrumenting trade openness by gravity estimates to avoid identification problems, we find a causal link between lack of openness to trade and the instability of financial flows. In fact, out of the set of controls we tried, only trade openness and the size of current account deficit before the shock appear as significant predictors of sudden stops. Trade openness, foreign debt, reserves and the nominal exchange rate rigidity also appear as significant predictors of the other form of external crises analyzed.

The effect of trade openness on the probability of sudden stop appears to be not only qualitatively robust, but also quantitatively significant. A conservative estimate yields the surprising result that, all else equal, increasing the trade to GDP ratio by 10 percentage points (i.e., going from Argentina's current trade share to Australia's average trade share) reduces the probability of a sudden stop by approximately 1 percentage point. Given that sudden stops are low-probability events, this is equivalent to approximately 40 percent of the unconditional probability of a crisis. We also find some evidence that more openness reduces the output cost associated with crises.

[41] With the Heckman selection model, better identification is achieved if some of the variables included in the first stage (selection model) are not included in the second stage (outcome equation). Thus, in the selection model we have only included lagged trade openness, the lagged current account balance as a share of GDP, year fixed-effects and regional dummies.

References

Acemoglu, D., S. Johnson and J. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91(5): 1369-1401.

Aghion, P., P. Bacchetta and A. Banerjee. 2000. "A Simple Model of Monetary Policy and Currency Crises." *European Economic Review* 44 (4-6): 728-738.

Aizenman, J. 2003. "On the Hidden Links Between Financial and Trade Opening." NBER Working Paper 9906. Cambridge, United States: National Bureau of Economic Reserch. Forthcoming in *Journal of International Money and Finance*.

Aizenman, J., and I. Noy. 2004. "On the Two Way Feedback between Financial and Trade Openness." NBER Working Paper 10496. Cambridge, United States: National Bureau of Economic Research.

Alesina, A., and A. Wagner. 2003. "Choosing (and Reneging on) Exchange Rate Regimes." NBER Working Paper 9809. Cambridge, United States: National Bureau of Economic Research.

Arteta, C. 2005a. "Exchange Rate Regimes and Financial Dollarization: Does Flexibility Reduce Bank Currency Mismatches?" *Berkeley Electronic Journals in Macroeconomics*, *Topics in Macroeconomics* 5(1): Article 10. http://www.bepress.com/bejm/topics/vol5/iss1/art10.

----. 2005b. "Are Financially Dollarized Countries More Prone to Costly Crises?" *Monetaria* 28(2): 105-160.

Caballero, R., and A. Krishnamurthy. 2003. "Excessive Dollar Debt: Financial Development and Underinsurance." *Journal of Finance* 58(2): 867-893

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

Calvo, G.A., A. Izquierdo and E. Talvi. 2003. "Sudden Stops, The Real Exchange Rate, and Fiscal Sustainability: Argentina's Lessons." NBER Working Paper 9828. Cambridge, United States: National Bureau of Economic Research.

Calvo, G.A., A. Izquierdo and L.F. Mejía. 2003. "On the Empirics of Sudden Stops." NBER Working Paper 10520. Cambridge, United States: National Bureau of Economic Research.

Calvo, G.A., A. Izquierdo and R. Loo-Kung. 2006, "Relative Price Volatility Under Sudden Stops: The Relevance of Balance Sheet Effects." *Journal of International Economics* 69(1): 231-254.

Calvo, G.A., and E. Talvi. 2004. "Sudden Stop, Financial Factors and Economic Collapse: A View from the Latin American Frontlines." Paper presented at the conference" From the Washington Consensus Towards a New Global Governance," Barcelona, Spain, September 24-26. http://www0.gsb.columbia.edu/ipd/programs/item.cfm?prid=18&iyid=13&itid=562.

Cavallo, E.A. 2006. "Trade, Gravity and Sudden Stops: On How Commercial Trade Can Increase the Stability of Capital Flows." Research Department Working Paper 588. Washington, DC, United States: Inter-American Development Bank.

Cavallo, E.A., and J.A. Frankel. 2004. "Does Openness to Trade Make Countries More Vulnerable to Sudden Stops, or Less? Using Gravity to Establish Causality." NBER Working Paper 10957. Cambridge, United States: National Bureau of Economic Research.

Cavallo, M. et al. 2005. "Exchange Rate Overshooting and the Costs of Floating." Working Paper 2005-07. San Francisco, United States: Federal Reserve Bank of San Francisco. http://www.frbsf.org/publications/economics/papers/2005/wp05-07bk.pdf

Céspedes, L.F., R. Chang and A. Velasco. 2003. "IS-LM-BP in the Pampas." *IMF Staff Papers*, Vol. 50, (special issue): 143-156.

----. 2004. "Balance Sheets and Exchange Rate Policy." *American Economic Review* 94(4): 1183-1193.

Chang, R., and A. Velasco. 1999. "Financial Crises in Emerging Markets: A Canonical Model." *FRBA* 84(2): 4-17.

Christiano, L.J., C. Gust and J. Roldos. 2004. "Monetary Policy in a Financial Crisis." *Journal of Economic Theory* 119(1): 64-103.

Desai, P., and P. Mitra. 2004. "Why Do Some Countries Recover More Readily from Financial Crises." Festschrift in Honor of Guillermo A. Calvo, April 15-16, 2004. New York, United States: International Monetary Fund and Columbia University. http://www.imf.org/external/np/res/seminars/2004/calvo/pdf/desai.pdf

Dooley, M. 2000. "International Financial Architecture And Strategic Default: Can Financial Crises Be Less Painful?" *Carnegie-Rochester Conference Series on Public Policy* 53(1): 361-377.

Dornbusch, R. 2002. "A Primer on Emerging Market Crises." In: S. Edwards and J.A. Frankel, editors. *Managing Currency Crises in Emerging Markets*. Chicago, United States: University of Chicago Press.

Dornbusch, R., I. Goldfajn and R. Valdés. 1995. "Currency Crises and Collapses." *Brooking Papers on Economic Activity* 2: 219-293.

Easterly, W., R. Islam and J. Stiglitz. 2001. "Shaken and Stirred: Explaining Growth Volatility." In: B. Plesokovic and N. Stern, editors. *Annual World Bank Conference on Development Economics*. Washington, DC, United States: World Bank.

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

----. 2004b. "Thirty Years of Current Account Imbalances, Current Account Reversals and Sudden Stops." *IMF Staff Papers* 51: 1-49.

Eichengreen, B., A. Rose and C. Wyplosz. 1995. "Exchange Market Mayhem: The Antecedents and Aftermath of Speculative Attacks." *Economic Policy* 21, pp.249-312.

Feenstra, R., R. Lipsey and H. Bowen. 1997. "World Trade Flows, 1970-1992, with Production and Tariff Data." NBER Working Paper 5910. Cambridge, United States: National Bureau of Economic Research.

Frankel, J.A. 1997. *Regional Trading Blocs*. Washington, DC, United States: Institute for International Economics.

----. 2005. "Contractionary Currency Crashes in Developing Countries. " *IMF Staff Papers* 52(2): 149-192.

Frankel, J.A., and D. Romer. 1999. "Does Trade Cause Growth?" *American Economic Review* 89(3): 379-399.

Frankel, J.A., and A.K. Rose. 1996. "Currency Crashes in Emerging Markets: An Empirical Treatment." *Journal of International Economics* 41: 351-368.

----. 2002. "An Estimate of the Effect of Common Currencies on Trade and Income." *Quarterly Journal of Economics* 117(2): 437-466

Frankel, J.A., and S-J. Wei. 2004. "Managing Macroeconomic Crises: Policy Lessons." In: J. Aizenman and B. Pinto, editors. *Economic Volatility and Crises: A Policy-Oriented Guide*. Washington, DC, United States: World Bank.

Guidotti, P., F. Sturzenegger and A. Villar. 2004. "On the Consequences of Sudden Stops." *Economía* 4(2): 1-44.

Guimaraes, B., and S.E. Morris. 2003. "Risk and Wealth in a Model of Self-Fulfilling Currency Attacks." Cowles Foundation Discussion Paper 1433. New Haven, United States: Yale University, Cowles Foundation for Research in Economics.

Hutchinson, M.H., and I. Noy. 2004. "Sudden Stops and the Mexican Wave: Currency Crises, Capital Flow Reversals and Output Loss in Emerging Markets." EPRU Working Paper Series 02-12. Copenhagen, Denmark: University of Copenhagen, Economic Policy Research Unit (EPRU). University of Copenhagen.

Kaufmann, D., A. Kraay, and P. Zoido-Lobatón. 2002, "Governance Matters II—Updated Indicators for 2000/01." World Bank Policy Research Department Working Paper 2772. Washington, DC, United States: World Bank.

Kiyotaki, N., and J. Moore. 1997. "Credit Cycles." *Journal of Political Economy* 105(2): 211-248.

Kose, M.A., E. Prasad and M. Perrones. 2005. "How do Trade and Financial Integration Affect the Relationship Between Growth and Volatility?" IMF Working Paper 05/19. Washington, DC, United States: International Monetary Fund.

Krugman, P. 1999. "Balance Sheets Effects, the Transfer Problem and Financial Crises." In: P. Isard, A. Razin and A.K. Rose, editors. *International Finance and Financial Crises: Essays in Honour of Robert P. Flood, Jr.* Amsterdam, The Netherlands: Kluwer Academic Publishers.

Levy Yeyati, E., and F. Sturzenegger. 2003. "A De Facto Classification of Exchange Rate Regimes: A Methodological Note." *American Economic Review* 93(4): 1173-1193.

Maddala, G.S. 1983. *Limited-Dependent and Qualitative Variables in Econometrics*. Cambridge, United Kingdom: Cambridge University Press.

Marshall, M.G., and K. Jaggers. 2002. "Polity IV Project, Political Regime Characteristics and Transitions, 1800-2002." College Park, Maryland, United States: Center for International

Development and Conflict Management (CIDCM), Integrated Network for Societal Conflict Research (INSCR) Program. www.cidcm.umd.edu/inscr/polity

Martin, P., and H. Rey. 2006. "Globalization and Emerging Markets: With or Without Crash?" *American Economic Review* 96(5): 1631-1651.

Martinez, J.V., and G. Sandleris. 2006. "Is it Punishment? Sovereign Defaults and the Decline in Trade." Washington, DC, United States: Johns Hopkins University, School of Advanced International Studies. http://www.sais-jhu.edu/faculty/sandleris/Research/Martinez-Sandleris_Is_it_punishment060718.pdf

Mendoza, E. 2002. "Credit, Prices and Crashes: Business Cycles with a Sudden Stop." In: J.A. Frankel and S. Edwards, editors. *Preventing Currency Crises in Emerging Markets*. Chicago, United States: University of Chicago Press.

Milesi-Ferretti, G.M., and A. Razin. 1998. "Sharp Reductions in Current Account Deficits: An Empirical Analysis." *European Economic Review* 42 (3-5): 897-908.

----. 2000. "Current Account Reversals and Currency Crises: Empirical Regularities." In: P. Krugman, editor. *Currency Crises*. Chicago, United States: University of Chicago Press.

Newey, W.K. 1987. "Efficient Estimation of Limited Dependent Variable Models with Endogenous Explanatory Variables." *Journal of Econometrics* 36(3): 231-250.

Prasad, E. et al. 2003. "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence." Occasional Paper 220. Washington, DC, United States: International Monetary Fund, Research Department.

Reinhart, C.M., K.S. Rogoff and M.A. Savastano.2003. "Debt Intolerance." 2003. *Brookings Papers on Economic Activity* 1: 1-74.

Rivers, D., and Q. Vuong. 1988. "Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models." *Journal of Econometrics* 39: 347-366.

Rose, A. 2005. "A Reason Why Countries Pay their Debts: Renegotiation and International Trade." *Journal of Development Economics* 77(1): 189-206.

Sachs, J.D. 1985. "External Debt and Macroeconomic Performance in Latin America and East Asia." *Brookings Papers on Economic Activity* 2: 523-573.

Appendices

A.1 Sudden Stops

We use five alternative definitions of sudden stops: our preferred definition "SS1", and four alternative "SS2", "SS3" and "SS4". "SS2" and "SS3" are conceptually equivalent to "SS1", but are more restrictive in that they capture fewer episodes. "SS4" is, instead, equivalent to "SS1" but is less restrictive in that it classifies as sudden stops events that do not necessarily trigger recessions. "SS5" is equivalent to "SS1" but uses the criterion that the sudden stop be accompanied by a loss of reserves rather than a fall in output.

Algorithm used to compute "Sudden Stop 1" (SS1):

1) Use IFS Financial Account Data (Line 78B) annual data for all available countries in the period 1970-2002.
2) Compute the standard deviation of observations for each decade (70s, 80s, 90s+) separately and then compute the mean standard deviation by averaging the results obtained for each decade.
3) Compute the year to year changes in the financial account (FA) for all countries in the sample. Unavailable data points are classified as "n.a."
4) Filter to keep observations (country/year) that show reductions in the financial account between years "t" and "t-1" if at "t-1" FA was in surplus (i.e. keep only observations that show reductions in FA surpluses). Observations that don't pass this filter, because they show either a year-to-year increase in the FA; or a year-to-year reduction in an outstanding FA deficit are classified as "0".
5) Filter again to keep (out of the observations already filtered in step (4)) only those that represent a reduction in the FA surplus that is above two standard deviations from the mean standard deviation computed in step (2). Observations that do not pass this filter are classified as "0" adding to the "0's" from step (4).
6) Filter again to keep only those observations that are accompanied by a fall in GDP per capita in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4) and (5)
7) Filter again to keep only those that are accompanied by a fall in the current account deficit in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4), (5) and (6).
8) Classify the observations that survive all filters as "1" indicating that they represent episodes (country/year) when SS took place. The other observations are classified as either "0" which means no episodes were registered during that year in that country, or "n.a" which means that some data is missing.
9) Results:

Number of Observations in the Dataset

"1" sudden stop	"0" no episode	"n.a." no data
86	3510	1651

Algorithm used to compute "Sudden Stop 2" (SS2):

1) Use IFS Financial Account Data (Line 78B) annual data for all available countries in the period 1970-2002.
2) Compute the standard deviation of observations for each decade (70s, 80s, 90s+) separately.
3) Compute the year to year changes in the financial account (FA) for all countries in the sample. Unavailable data points are classified as "n.a."
4) Filter to keep observations (country/year) that show reductions in the financial account between years "t" and "t-1" if at "t-1" FA was in surplus (i.e., keep only observations that show reductions in FA surpluses). Observations that do not pass this filter, because they show either a year-to-year increase in the FA; or a year-to-year reduction in an outstanding FA deficit are classified as "0".
5) Filter again to keep (out of the observations already filtered in step (4)) only those that represent a reduction in the FA surplus that is above 2 standard deviations from the corresponding decade standard deviation computed in step (2). Observations that do not pass this filter are classified as "0" adding to the "0's" from step (4).
6) Filter again to keep only those observations that are accompanied by a fall in GDP per capita in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4) and (5)
7) Filter again to keep only those that are accompanied by a fall in the current account deficit in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4), (5) and (6).
8) Classify the observations that survive all filters as "1" indicating that they represent episodes (country/year) when SS took place. The other observations are classified as either "0" which means no episodes were registered during that year in that country, or "n.a" which means that some data is missing.
9) Results:

Number of Observations in the Dataset

"1" sudden stop	**"0" no episode**	**"n.a." no data**
68	3531	1648

Algorithm used to compute "Sudden Stop 3" (SS3):

1) Use IFS Financial Account Data (Line 78B) annual data for all available countries in the period 1970-2002.
2) Compute the year to year changes in the financial account (FA) for all countries in the sample. Unavailable data points are classified as "n.a."
3) Compute the standard deviation the year to year changes for each decade (70s, 80s, 90s+) separately and then compute the mean standard deviation by averaging the results obtained for each decade
4) Filter to keep observations (country/year) that show reductions in the financial account between years "t" and "t-1" if at "t-1" FA was in surplus (i.e., keep only observations that show reductions in FA surpluses). Observations that do not pass this filter, because they show either a year-to-year increase in the FA; or a year-to-year reduction in an outstanding FA deficit are classified as "0".
5) Filter again to keep (out of the observations already filtered in step (4)) only those that represent a reduction in the FA surplus that is above 2 standard deviations from the mean standard deviation computed in step (3). Observations that do not pass this filter are classified as "0" adding to the "0's" from step (4).
6) Filter again to keep only those observations that are accompanied by a fall in GDP per capita in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4) and (5)
7) Filter again to keep only those that are accompanied by a fall in the current account deficit in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4), (5) and (6).
8) Classify the observations that survive all filters as "1" indicating that they represent episodes (country/year) when SS took place. The other observations are classified as either "0" which means no episodes were registered during that year in that country, or "n.a" which means that some data is missing.
9) Results:

Number of Observations in the Dataset

"1" sudden stop	**"0" no episode**	**"n.a." no data**
48	3551	1648

Algorithm used to compute "Sudden Stop 4" (SS4):

1) Use IFS Financial Account Data (Line 78B) annual data for all available countries in the period 1970-2002.
2) Compute the standard deviation of observations for each decade (70s, 80s, 9's+) separately and then compute the mean standard deviation by averaging the results obtained for each decade.
3) Compute the year to year changes in the financial account (FA) for all countries in the sample. Unavailable data points are classified as "n.a."
4) Filter to keep observations (country/year) that show reductions in the financial account between years "t" and "t-1" if at "t-1" FA was in surplus (i.e. keep only observations that show reductions in FA surpluses). Observations that do not pass this filter, because they show either a year-to-year increase in the FA; or a year-to-year reduction in an outstanding FA deficit are classified as "0".
5) Filter again to keep (out of the observations already filtered in step (4)) only those that represent a reduction in the FA surplus that is above 2 standard deviations from the mean standard deviation computed in step (2). Observations that do not pass this filter are classified as "0" adding to the "0's" from step (4).
6) Filter again to keep only those that are accompanied by a fall in the current account deficit in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4), (5) and (6).
7) Classify the observations that survive all filters as "1" indicating that they represent episodes (country/year) when SS took place. The other observations are classified as either "0" which means no episodes were registered during that year in that country, or "n.a" which means that some data is missing.
8) Results:

Number of Observations in the Dataset

"1" sudden stop	**"0" no episode**	**"n.a." no data**
145	3450	1652

Algorithm used to compute "Sudden Stop 5" (SS5):

1) Use IFS Financial Account Data (Line 78B) annual data for all available countries in the period 1970-2002.
2) Compute the standard deviation of observations for each decade (70s, 80s, 90s+) separately and then compute the mean standard deviation by averaging the results obtained for each decade.
3) Compute the year to year changes in the financial account (FA) for all countries in the sample. Unavailable data points are classified as "n.a."
4) Filter to keep observations (country/year) that show reductions in the financial account between years "t" and "t-1" if at "t-1" FA was in surplus (i.e., keep only observations that show reductions in FA surpluses). Observations that do not pass this filter, because they show either a year-to-year increase in the FA; or a year-to-year reduction in an outstanding FA deficit are classified as "0".
5) Filter again to keep (out of the observations already filtered in step (4)) only those that represent a reduction in the FA surplus that is above 2 standard deviations from the mean standard deviation computed in step (2). Observations that do not pass this filter are classified as "0" adding to the "0's" from step (4).
6) Filter again to keep only those observations that are accompanied by a fall in International Reserves (Line 1L.DZF) of 10% or more with respect the level in the previous year in that country during the same year. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4) and (5)
7) Filter again to keep only those that are accompanied by a fall in the current account deficit in that country during the same year or the year immediately after. Observations that do not pass this filter are classified as "0" adding to the "0's" from steps (4), (5) and (6).
8) Classify the observations that survive all filters as "1" indicating that they represent episodes (country/year) when SS took place. The other observations are classified as either "0" which means no episodes were registered during that year in that country, or "n.a" which means that some data is missing.
9) Results:

Number of Observations in the Dataset

"1" sudden stop	**"0" no episode**	**"n.a." no data**
55	3343	2407

Table A.1. Sudden Stop 1

Country	Data Availability	Episodes			
Afghanistan, I.S. of	1980 - 1989	0			
Algeria	1978 - 1991	1	1990		
Angola	1986 - 2001	0			
Antigua and Barbuda	1978 - 2001	0			
Argentina	1977 - 2002	1	2001		
Aruba	1987 - 2001	0			
Australia	1971 - 2002	0			
Austria	1971 - 2002	0			
Bahamas, The	1977 – 1982 1985 - 2001	0			
Bahrain, Kingdom of	1976 - 2002	0			
Bangladesh	1977 - 2002	0			
Barbados	1971 - 2001	1	1982		
Belize	1985 - 2002	0			
Benin	1975 - 2001	1	1983		
Bolivia	1977 - 2002	1	1982		
Bosnia & Herzegovina	1999 - 2002	0			
Botswana	1976 - 1999	0			
Brazil	1976 - 2002	0			
Bulgaria	1981 - 2002	0			
Burkina Faso	1975 - 1996	1	1989		
Burundi	1986 - 2002	0			
Cambodia	1993 - 2002	0			
Cameroon	1978 - 1995	2	1988	1990	
Canada	1971 - 2002	1	1982		
Cape Verde	1978 - 2002	1	1990		
Central African Rep.	1978 - 1994	1	1988		
Chad	1978 - 1994	0			
Chile	1976 - 2002	3	1982	1983	1998
China,P.R.: Mainland	1983 - 2002	0			
China,P.R.:Hong Kong	1999 - 2002	0			
Colombia	1971 - 2002	2	1998	1999	
Comoros	1981 - 1995	1	1988		
Congo, Republic of	1979 - 2002	2	1984	1996	
Costa Rica	1978 - 2002	2	1981	1996	
Côte d'Ivoire	1976 - 2002	0			
Croatia	1994 - 2002	0			
Cyprus	1977 - 2002	0			
Czech Republic	1994 - 2002	0			
Denmark	1976 - 1978 1982 - 2002	0			
Djibouti	1993 - 1995	0			

Country	Data Availability	Episodes			
Dominica	1977 - 2001	1	2001		
Dominican Republic	1971 - 2002	0			
Ecuador	1977 - 2002	2	1983	1999	
Egypt	1978 - 2002	1	1990		
El Salvador	1977 - 2002	1	1979		
Equatorial Guinea	1988 - 1996	0			
Ethiopia	1978 - 2002	2	1982	1991	
Fiji	1980 - 1999	1	1999		
Finland	1976 - 2002	1	1991		
France	1976 - 2002	0			
Gabon	1979 - 1999	0			
Gambia, The	1979 - 1997	1	1982		
Germany	1972 - 2002	1	2001		
Ghana	1976 - 2002	0			
Greece	1977 - 1997 2000 - 2002	0			
Grenada	1978 - 2000	0			
Guatemala	1978 - 2002	0			
Guinea	1987 - 2002	0			
Guinea-Bissau	1983 - 1997	1	1986		
Guyana	1978 - 1985 1993 - 1997	0			
Haiti	1972 - 1998	0			
Honduras	1975 - 2002	0			
Hungary	1983 - 2002	0			
Iceland	1977 - 2002	1	2001		
India	1976 - 2002	0			
Indonesia	1982 - 2002	1	1997		
Iran, I.R. of	1977 - 2000	0			
Iraq	1977 - 1977	0			
Ireland	1975 - 2002	0			
Israel	1971 - 2002	2	1988	1998	
Italy	1971 - 2002	0			
Jamaica	1977 - 2002	0			
Japan	1978 - 2002	0			
Jordan	1973 - 2002	2	1992	1993	
Kenya	1976 - 2001	0			
Kiribati	1980 - 1994	0			
Korea	1977 - 2002	1	1997		
Kuwait	1976 - 2002	0			
Kyrgyz Republic	1994 - 2002	0			
Lao People's Dem.Rep	1985 - 2001	0			

Country	Data Availability	Episodes			
Lesotho	1976 - 2002	0			
Liberia	1980 - 1987	0			
Libya	1978 - 1999	0			
Macedonia, FYR	1976 - 2001	0			
Madagascar	1997 - 2002	0			
Malawi	1975 - 2002	1	1981		
Malaysia	1978 - 2002	1	1997		
Maldives	1975 - 2002	0			
Mali	1978 - 2002	0			
Malta	1976 - 2001	1	2000		
Mauritania	1972 - 2002	0			
Mauritius	1976 - 1998	0			
Mexico	1977 - 2002	3	1982	1994	1995
Mongolia	1980 - 2002	2	1990	1991	
Montserrat	1982 - 2002	0			
Morocco	1976 - 2002	1	1995		
Mozambique	1981 - 2001	0			
Myanmar	1977 - 2001	0			
Namibia	1991 - 2002	0			
Nepal	1977 - 2000	0			
Netherlands	1971 - 2002	1	1981		
Netherlands Antilles	1977 - 2002	0			
New Zealand	1973 - 2002	2	1988	1998	
Nicaragua	1978 - 2002	1	1986		
Niger	1975 - 1995	0			
Nigeria	1978 - 1999	1	1999		
Norway	1976 - 2002	0			
Oman	1975 - 2001	2	1987	1999	
Pakistan	1977 - 2002	0			
Panama	1978 - 2002	1	2000		
Papua New Guinea	1977 - 2001	0			
Paraguay	1976 - 2002	1	2002		
Peru	1978 - 2002	1	1998		
Philippines	1978 - 2002	2	1997	1998	
Poland	1977 - 2002	0			
Portugal	1976 - 2002	1	1992		
Romania	1972 - 2002	0			
Rwanda	1977 - 2002	1	1994		
Samoa	1978 - 1999	0			
São Tomé & Príncipe	1975 - 1990 2000 - 2002	0			

Country	Data Availability	Episodes				
Saudi Arabia	1972 - 2002	0				
Senegal	1975 - 1999	0				
Seychelles	1977 - 2002	1	2000			
Sierra Leone	1978 - 1995	0				
Singapore	1973 - 2002	0				
Slovak Republic	1994 - 2000	0				
Slovenia	1993 - 2002	0				
Solomon Islands	1976 - 1998	1	1998			
Somalia	1978 - 1989	0				
South Africa	1986 - 2002	0				
Spain	1976 - 2002	1	1992			
Sri Lanka	1976 - 2002	1	2001			
St. Kitts and Nevis	1981 - 2001	0				
St. Lucia	1977 - 2001	1	2001			
St. Vincent & Grens.	1979 - 2001	1	2000			
Sudan	1978 - 2002	0				
Suriname	1978 - 2002	1	1992			
Swaziland	1975 - 2002	1	1999			
Sweden	1971 - 2002	1	1991			
Switzerland	1978 - 2002	0				
Syrian Arab Republic	1978 - 2000	1	1989			
Tanzania	1977 - 2002	0				
Thailand	1976 - 2002	1	1997			
Togo	1975 - 2001	0				
Tonga	1972 - 1993	1	1989			
Trinidad and Tobago	1976 - 2001	1	1984			
Tunisia	1977 - 2002	0				
Turkey	1975 - 2002	4	1991	1994	1998	2001
Uganda	1981 - 2002	0				
United Kingdom	1971 - 2002	0				
United States	1971 - 2002	0				
Uruguay	1979 - 2002	1	2002			
Vanuatu	1983 - 2001	1	1991			
Venezuela, Rep. Bol.	1971 - 2002	1	1994			
Vietnam	1997 - 2002	0				
Yemen, Republic of	1991 - 2002	1	1994			
Zambia	1979 – 1991 1998 - 2000	1	1990			
Zimbabwe	1978 - 1993	1	1983			

A.2. Gravity Estimates

To compute the gravity estimates we use the Frankel and Rose (2002) dataset. It consists of 41,678 bilateral trade observations spanning six different years (1970, 1975, 1980, 1985, 1990, and 1995). All 186 countries, dependencies, territories, overseas departments, colonies, and so forth for which the United Nations Statistical Office collects international trade data are included in the data set. The trade data are taken from the World Trade Database, a consistent recompilation of the U.N. trade data presented in Feenstra, Lipsey, and Bowen (1997), augmented with data from the U.N.'s *International Trade Statistics Yearbook*. This data set is estimated to cover at least 98 percent of all trade.

For each of the six different years for which we have data we compute OLS regressions of the following form:

$$\text{Log}\,(T_{i,j} / Y_i) = c + \alpha\, \text{logdist}_{i,j} + \beta \text{logpop}_2 + \gamma \text{comlang}_{i,j} + \delta \text{border}_{i,j} + \theta \text{areap}_{i,j} + \rho \text{landlock} + \mu$$

Where "$T_{i,j}$" is the bilateral trade value between countries "i" and "j"; "Y_i" is the real GDP of country "i"; "c" is a constant term; "$\text{logdist}_{i,j}$" is the log of the distance between the economic centers of countries "i" and "j"; "comlang" is a dummy variable that takes value one if "i" and "j" share a common language and is zero otherwise; "border" is a dummy variable that takes value one if "i" and "j" share a border and is zero otherwise; "$\text{areap}_{i,j}$" is the log of the product of the areas (in km^2) of countries "i" and "j"; and "landlock" takes values two if "i" and "j" are both landlocked, one if either "i" or "j" are landlocked, and zero otherwise; and "μ" is the error term.

As an example, we report the results obtained for the equation estimated for 1990:

Instrumental Variable (First Stage) Generation

$$\begin{aligned}\text{Log}\,(T_{i,j} / Y_i) = {} & -0.94\ \text{logdist}_{i,j} + 0.82 \text{logpop}_2 + 0.53\ \text{comlang}_{i,j} \\ & \quad (0.05) \qquad\quad (0.02) \qquad\quad (0.11) \\ & + 0.64\ \text{border}_{i,j} - 0.27 \text{areap}_{i,j} - 0.47\ \text{landlock} \\ & \quad (0.21) \qquad\quad (0.01) \qquad\quad (0.08)\end{aligned}$$

Equation estimated for 1990 using OLS. $R^2 = 0.28$; Number of Observations = 4052.
Robust standard errors in parentheses; intercept not reported.

The correlation between trade ratio and generated IV for the entire panel is 0.52.

The gravity estimates (or predicted trade to GDP ratios used in the regressions) are generated by taking the exponent of fitted values and summing across bilateral partners *j*. This yields estimates for six different years: 1970, 1975, 1980, 1985, 1990 and 1995. The missing values of the panel are generated by taking the observation corresponding to the closest year with data.

A.3. A Short Taxonomy of Crisis Definitions

There are a variety of definitions of external crises available in the literature. A popular one is the concept of "current account reversal" (for example, Milesi-Ferreti and Razin 1998, 2000 and Edwards 2004a, 2004b), which is typically defined as a reduction in the current account deficit of a certain percentage of GDP in one year. A somewhat related concept is the definition of "Sudden Stops" in capital flows, popularized by Guillermo Calvo and his associates, which is typically defined as an unexpected reduction in net capital inflows. The way the concept is made operational varies from author to author and from sample to sample. Calvo, Izquierdo and Mejía (2003) originally defined it as episodes when capital flows fall at least two standard deviations below the sample mean (this addresses the "unexpected" requirement of sudden stops). Additionally, to guarantee that the fall in capital inflows is not the result of a positive shock such as an improvement in the terms-of-trade, they add the criterion of costly reduction in economic activity. Another way of making sure that sudden stop include only cutoffs of capital inflow and not reversals in the current account arising from positive trade developments might be to add the criterion that the initial impact is a loss of reserves.

In order to isolate episodes of capital account reversals related to systemic events of an external origin, Calvo, Izquierdo and Loo-Kung (2006) refined the definition of sudden stops as periods of capital inflows collapse with skyrocketing Emerging Markets bond spreads. The new definition necessarily restricts the sample to those Emerging Market Economies that are integrated to world capital markets (i.e., that are included in the EMBI index). Some authors who have sought to identify capital account reversals for a wider sample of countries (including Edwards 2004b and ourselves in this paper) have continued to follow the original sudden stops definition with minimal variations.

Guidotti, Sturzenegger and Villar (2004), also building on a slightly modified version of the original sudden stop definition, distinguish between sudden stops that lead to current account reversals and those that do not. When sudden stops are not accompanied by current account reversals, then presumably the country found an alternative source of financing, namely reserve depletion or exceptional funding from an international financial institution. Reserve depletion is feasible only when the Central Bank has sufficient international reserves to spend and is willing to use them. If the sudden stop is persistent (i.e., if capital inflows are not restored promptly), then the strategy of reserve depletion could lead to a "currency crisis."

There is no single unambiguous definition of currency crises. One widely-used measure comes from the work of Frankel and Rose (1996), updated in Frankel and Wei (2004). The latter define crisis episodes based on the foreign market pressure index. This index is defined as the percentage fall in reserves plus the percentage fall in the foreign exchange value of the currency. The idea of the index is that it measures the fall in demand for the country's currency; it is then up to the monetary authorities to determine whether to accommodate, by letting the money supply fall, or to depreciate. A related definition, also from Frankel and Rose (1996) updated in Frankel (2005), is that of "currency crashes." A currency crash is simply a large fall in the value of the currency (the devaluation must be at least 25 percent on a cumulative 12-month basis), and one that also represents an acceleration over preceding years (the devaluation must represent an

acceleration of at least 10 percentage points, relative to the rate of depreciation in the 12 months before that). Finally, a currency crash must have been at least three years since the last crisis. Eichengreen et. al. (1995) have a similar approach, but they expand the definition to include "speculative attacks" that are successfully warded off by the authorities, not just speculative attacks that end up in currency crises. They make the idea of an unsuccessful speculative attack operational by searching for sudden falls in reserves and/or increases in interest rate. This alternative definition has as a drawback that because few countries have market-determined short-interest rates with long histories, it has limited applicability in broader samples such as we wish to use in this paper.

Most of these concepts are closely related, but they do not always occur together. More likely than not, a sudden stop, particularly a large and persistent one, will eventually lead to a current account reversal. Whether it also entails a currency crisis or not depends on whether reserves become depleted, and on the exchange rate regime in place before the shock.

Milesi-Ferreti and Razin (1998, 2000) study the relation between currency crises and current account reversals. They conclude that they are only tenuously related. Similarly, in this paper we find only weak correlation between sudden stops and currency crises. The weak correlation has two possible explanations: perhaps only a subset of sudden stops and current account reversals ultimately lead to currency crisis, and/or currency crises constitute a broader concept of crises with additional (or perhaps different) triggers. Both explanations appear to be supported by the data. Milesi-Ferreti and Razin report that less than one-third of all current account reversals in their sample were associated to currency crises. In our sample, we find that currency crises are more than three times more frequent than sudden stops. Sebastian Edwards finds that current account reversals are approximately twice as common as sudden stops in his sample.

A.4. Summary Statistics and Data Sources

Variable	Obs.	Mean	Std. Dev.	Min	Max
SS1	3596	.0239155	.1528071	0	1
SS1bis (no contiguous crises)	3590	.0222841	.1476266	0	1
SS2	3599	.0188941	.1361701	0	1
SS2bis (no contiguous crises)	3596	.0180756	.1332436	0	1
SS3	3599	.013337	.1147293	0	1
SS3bis (no contiguous crises)	3597	.0127884	.1123762	0	1
SS4	3595	.0403338	.1967683	0	1
SS4bis (no contiguous crises)	3587	.0381935	.1916898	0	1
Trade Openness (A)	4247	.7322445	.432648	2.960163	.0153068
Fitted Openess (B)	4261	.1487951	.1497813	1.364657	.0016543
Liability Dollarization (1) (C)	3454	.3207969	.3902904	0	1.999936
Liability Dollarization (2) (D)	897	.2666019	.2752479	0	1
CA / GDP (F)	3630	-.038277	.1034782	-2.404958	.58553
Foreign Debt / GDP (G)	1791	.2779454	.4373619	0	5.844839
Index of Exchange Rate Rigidity (H)	3059	2.411246	.8072297	1	3
Voice and Accountability (I)	3255	.3525906	.9023457	-1.623367	1.693636
Political Stability/Lack of Violence (I)	3038	.2303492	.8255066	-1.694225	1.69047
Effectiveness of Government (I)	3038	.3136892	.8409723	-1.320767	2.082198
Regulatory Framework (I)	3224	.3598345	.5851707	-1.500832	1.244778
Rule of Law (I)	3224	.2939932	.871838	-1.203638	1.995832
Control of Corruption (I)	3038	.2972141	.9230486	-1.104606	2.129017
FDI / GDP (J)	3963	1.902769	4.577513	-82.81054	145.2095
Reserves in Month of Imports (K)	3795	3.420814	2.958747	-.0919	32.14791
GDP per capita (L)	2799	6840.761	9583.074	84.72	52675.27
Short Term Debt / Total External Debt (M)	3430	12.39872	12.85917	0	99.90642
Polity 2 (O)	4102	.4193077	7.567316	-10	10
Crisis Episodes (P)	3039	.1378743	.3448247	0	1
Loss1 (Q)	3414	.0223084	1.162598	-18.82909	50.24807
Loss2 (Q)	3419	.0076576	1.527236	- 35.22408	50.24807
Loss3 (Q)	3425	-.0485739	1.733652	-35.22408	50.24807

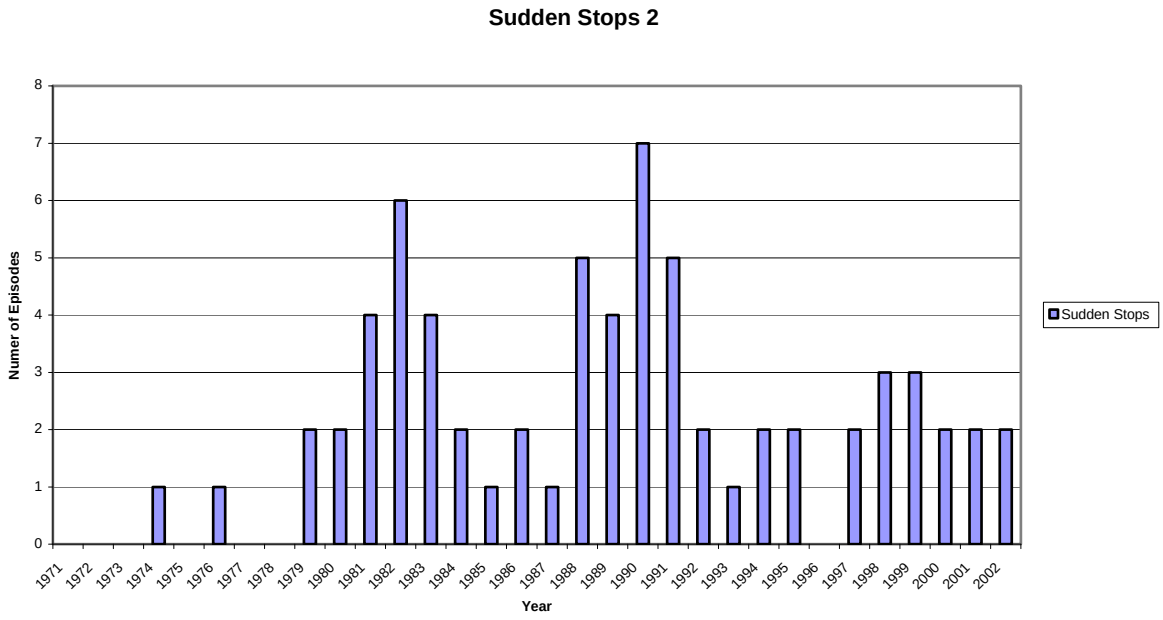
(A) The negative of the trade to GDP ratio over 100. *Source:* WDI-CD ROM.
(B) See Appendix A.2 for an explanation of the methodology employed and data used.
(C) The ratio of foreign liabilities of the financial sector to money. *Source:* IFS (Line 26C/line 34).
(D) The ratio of "Total Dollar Deposits/Total Deposits. *Source:* Arteta (2005a) and Arteta (2005b).
(F) Ratio over 100. *Source:* WDI-CD ROM.
(G) *Source:* IFS line 89c.
(H) index=1 is (de-facto) flexible exchange rate; index=2 is (de-facto) intermediate arrangement; and index=3 is (de-facto) peg. *Source:* Levy Yeyati and Sturzenegger (2003).
(I) *Source:* Kaufman et al. (2002).
(J) *Source:* WDI-CR ROM.
(K) *Source:* WDI-CD ROM.
(L) *Source:* WDI-CD ROM.

(M) Ratio over 100. *Source:* WDI-CD Rom
(O) Range = -10 to 10 (-10 = high autocracy; 10 = high democracy). Combined Polity Score: Computed by subtracting AUTOC from DEMOC; normal range polity scores are imputed for coded “interregnum" and "transition period" special polity conditions, polities coded “interruption" on the POLITY variable are left blank. *Source:* Marshall and Jaggers (2002).
(P) *Source:* Frankel and Wei (2004). The approach in Frankel and Wei (2004) is to use the foreign exchange market pressure index. This index is defined as the percentage fall in reserves plus the percentage fall in the foreign exchange value of the currency. The idea is that this index measures the fall in demand for the country’s currency; it is then up to the monetary authorities to determine whether to accommodate, by letting the money supply fall, or to depreciate. To avoid treating every year of a multi-year high-inflation period as a separate crisis, the approach followed by the authors requires that for an event to be considered a crisis episode, the increase in exchange market pressure must represent an acceleration of at least an additional 10 percent over the preceding period; and they also adopt an exclusion window of three years.
(Q) *Source:* WDI-CD ROM.

A.5. Additional Graphs and Tables

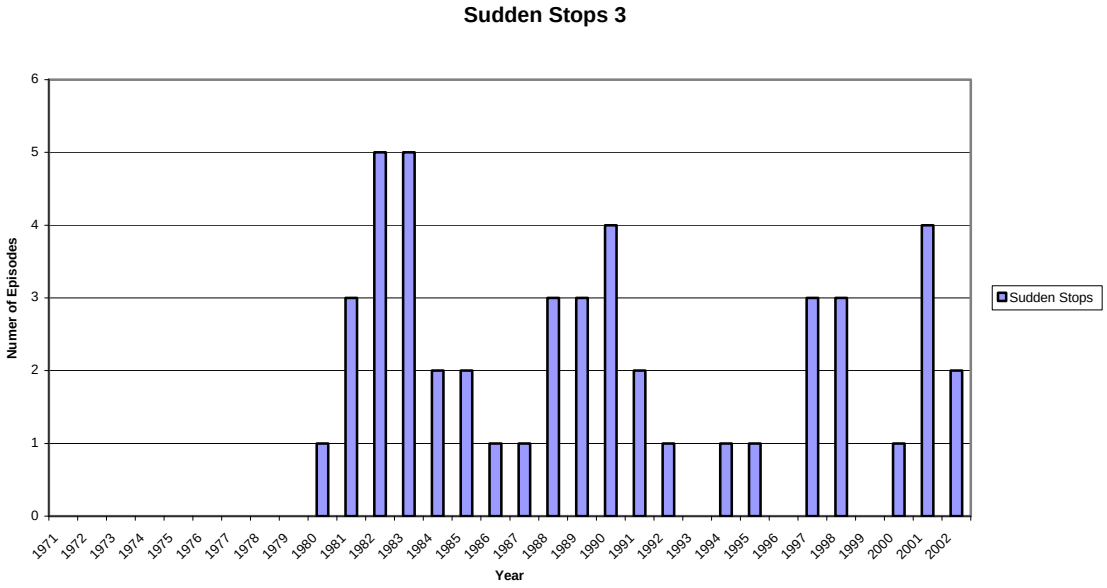
The following figures depict the temporal distribution of the additional sudden stops definitions that have been tried for robustness checks purposes. As shown, the distribution is very similar to that of "SS1" in Figure 1.

Figure A.5.1. Sudden Stop 2



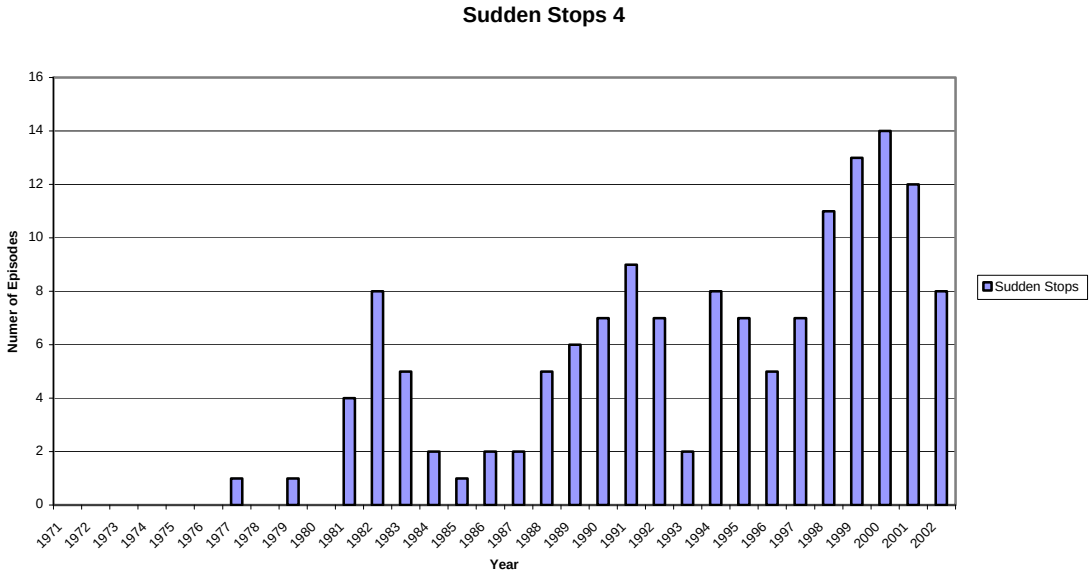
Source: Author's calculations.

Figure A.5.2. Sudden Stop 3



Source: Author's calculations.

Figure A.5.3. Sudden Stop 4

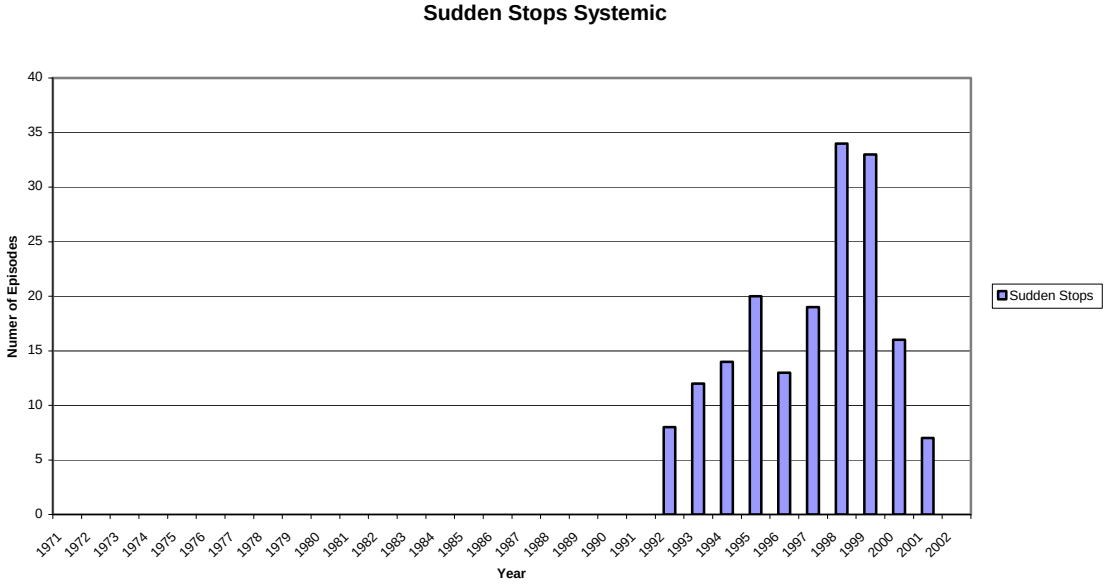


Source: Author's calculations.

Figure A.5.4: Sudden Stop 5

Source: Author's calculations.

Figure A.5.5. "Systemic Sudden Stop" (Calvo et al., 2006)



Source: Author's calculations.
Note: No data are available for the 1970s and 1980s.

The following tables complement Tables 1 and 2 in the main text. The main differences are that trade openness is not lagged (to verify that the results are robust when contemporaneous rather than lagged variables are used) and that some additional control variables are also included.

Table A.5.1. Ordinary Probit Regressions

	Dependent Variable: Sudden Stop 1								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Trade openness $_{t}$	**-0.53** (0.259)**	**-0.691** (0.329)**	**-0.898** (0.348)**	**-0.705** (0.278)**	**-0.831** (0.344)**	**-0.86** (0.343)**	**-0.479** (0.247)*	**-3.01** (0.998)**	**-1.025** (0.671)
Current Account/ GDP $_{t-1}$	**-4.068** (1.297)**	**-4.98** (1.781)**	**-5.60** (1.888)**	**-4.99** (1.632)**	**-5.50** (1.862)**	**-5.417** (1.902)**	**-3.42** (1.308)**	**-9.69** (2.86)***	**-8.68** (2.928)**
Foreign Debt/ GDP $_{t-1}$	**-0.080** (0.217)	**-0.144** (0.243)	**-0.028** (0.238)	**-0.063** (0.236)	**-0.087** (0.235)	**-0.07** (0.243)		**-0.860** (0.685)	**-0.995** (0.453)**
Short Term Debt/ Total Debt $_{t-1}$			**1.168** (0.765)	**0.553** (0.686)	**0.9776** (0.772)	**0.951** (0.855)	**0.358** (0.601)	**5.253** (2.567)**	**1.829** (1. 553)
Liability Dollarization $_{t-1}$ (1)	**0.316** (0.195)	**0.399** (0.216)**		**0.244** (0.242)	**0.324** (0.268)	**0.236** (0.266)	**0.302** 0.2455		**0.599** (0.229)**
Effectiveness of Government $_{t}$		**-0.059** (0.245)	**0.170** (0.269)		**0.137** (0.201)	**0.141** (0.268)	**0.065** (0.187)		**0.4143** (0.359)
Ln GDP per capita $_{t-1}$		**-0.101** (0.136)	**0.037** (0.193)	**0.106** (0.134)		**0.035** (0.190)	**0.175** (0.152)		**-0.075** (0.223)
Liability Dollarization $_{t-1}$ (2)								**0.733** (1.416)	
Exchange Rate Rigidity Index $_{t-1}$									**0.224** (0.146)
FDI/GDP $_{t-1}$									**-0.0974** (0.074)
Ln Reserves in Months of Imports $_{t-1}$									**-0.121** (0.1165)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-2.544** (0.63)***	**-1.255** (1.064)	**-2.165** (1.372)	**-2.62** (1.121)**	**-1.95** (0.737)**	**-2.065** (1.383)	**-3.21** (1.08)**	**-0.244** (1.099)	**-1.99** (1.73)
Obs.	**778**	**597**	**447**	**564**	**508**	**464**	**904**	**113**	**296**
R^2	**0.0992**	**0.1178**	**0.1115**	**0.1037**	**0.1156**	**0.1154**	**0.0872**	**0.2927**	**0.2033**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Table A.5.2. Instrumental Variables Probit Regressions

	Dependent Variable: Sudden Stop 1							
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Trade Openness $_{t}$	**-1.95** (0.55)***	**-2.42** (0.52)***	**-1.86** (0.47)***	**-2.92** (0.45)***	**-1.58** (0.49)***	**-2.98** (0.49)***	**-2.81** (1.38)**	**-2.69** (0.89)***
Current Account/ GDP $_{t-1}$	**-5.66** (1.14)***	**-5.46** (1.32)***	**-4.09** (1.14)***	**-5.53** (1.49)***	**-3.96** (1.07)***	**-5.29** (1.52)***	**-8.02** (2.42)***	**-7.20** (1.82)***
Foreign Debt/ GDP $_{t-1}$	**0.20** (0.24)	**0.40** (0.26)		**0.79** (0.26)***		**0.75** (0.27)***	**-0.039** (0.81)	**0.22** (0.42)
Short Term Debt/ Total Debt $_{t-1}$			**0.13** (0.69)	**1.12** (0.85)		**0.96** (0.98)	**1.33** (1.46)	**1.21** (1.08)
Liability Dollarization $_{t-1}$ (1)	**0.56** (0.22)**	**0.65** (0.27)**	**0.36** (0.29)		**0.59** (0.23)**	**0.034** (0.31)		**0.33** (0.30)
Effectiveness of Government $_{t}$		**-0.26** (0.23)	**0.16** (0.15)	**0.17** (0.25)	**-0.05** (0.15)	**0.21** (0.25)		**0.22** (0.29)
Ln GDP per capita $_{t-1}$		**0.067** (0.15)	**0.29** (0.15)*	**0.48** (0.21)**	**-0.009** (0.10)	**0.40** (0.20)*		**0.15** (0.21)
Liability Dollarization $_{t-1}$ (2)							**-0.78** (0.99)	
Exchange Rate Rigidity Index $_{t-1}$								**0.07** (0.165)
FDI/GDP $_{t-1}$								**0.064** (0.05)
Ln Reserves in Months of Imports $_{t-1}$								**0.062** (0.14)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-1.33** (0.54)**	**-1.29** (1.17)	**-2.82** (1.05)**	**-3.54** (1.50)**	**-1.24** (0.93)	**-2.79** (1.46)*	**0.24** (1.51)	**-1.99** (1.63)
Obs.	**1040**	**915**	**1177**	**748**	**1458**	**706**	**260**	**560**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1% / ** Statistically Significant at 5% / * Statistically Significant at 10%

Next, we show that excluding contiguous crises episodes from our sudden stops variables does not change the result. Table A.5.3 reports the results using SS1bis and SS3bis as alternative dependent variables. These are the same as SS1 and SS3 but exclude contiguous crises episodes.

Table A.5.3. Sudden Stops Excluding Contiguous Crises Episodes

	Ordinary Probit	**IV Probit**	**Ordinary Probit**	**IV Probit**
	Sudden Stop (SS1 bis)	Sudden Stop (SS1 bis)	Sudden Stop (SS3 bis)	Sudden Stop (SS3 bis)
Trade openness $_{t-1}$	**-0.456** (0.24)*	**-1.748** (0.57)***	**-1.75** (0.64)***	**-2.77** (0.90)***
Current Account/ GDP $_{t-1}$	**-3.25** (1.15)***	**-5.607** (1.32)***	**-3.829** (1.85)**	**-7.834** (2.02)***
Foreign Debt/ GDP $_{t-1}$	**-0.085** (0.27)	**0.162** (0.28)	**-0.751** (0.66)	**-0.424** (0.45)
Liability Dollarization $_{t-1}$	**0.249** (0.19)	**0.403** (0.21)**	**0.826** (0.21)***	**0.952** (0.20)***
Regional Dummies?	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**
Constant	**-2.643** (0.34)***	**-2.02** (0.43)***	**-2.09** (0.38)***	**-1.658** (0.48)***
Observations	**1069**	**1035**	**735**	**869**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1% / ** Statistically Significant at 5% / * Statistically Significant at 10%

The following tables complement Tables 3 and 4 in the main text. The main differences are that trade openness is not lagged (to verify that the results are robust when contemporaneous rather than lagged variables are used), that some additional control variables are also included, and that the sample size is not limited by the availability of data on sudden stops.

Table A.5.4. Ordinary Probit Regressions

	Dependent Variable: Crisis Episodes [Frankel and Wei (2004) definition of exchange market pressure]						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Trade openness $_{t}$	**-0.32** (0.129)**	**-0.57** (0.269)**	**-0.59** (0.307)**	**-0.64** (0.249)**	**-0.64** (0.262)**	**-0.58** (0.281)**	**-0.58** (0.303)**
Ln Reserves in Months of Imports $_{t-1}$	**-0.21** (0.036)***	**-0.26** (0.082)***	**-0.19** (0.087)**	**-0.30** (0.079)**	**-0.22** (0.069)***	**-0.25** (0.077)***	**-0.29** (0.083)***
Foreign Debt/ GDP $_{t-1}$		**0.23** (0.231)	**0.31** (0.257)	**0.21** (0.196)	**0.34** (0.209)	**0.27** (0.218)	**0.24** (0.233)
Exchange Rate Rigidity Index $_{t-1}$		**0.13** (0.094)	**0.18** (0.098)**		**0.15** (0.090)*	**0.14** (0.097)	**0.15** (0.103)
Liability Dollarization $_{t-1}$ **(1)**	**-0.0003** (0.148)	**0.027** (0.249)	**0.024** (0.288)	**0.062** (0.224)			
Current Account/ GDP $_{t-1}$		**-0.272** (1.392)	**-0.95** (1.54)	**0.004** (1.406)			**0.55** (1.381)
FDI/GDP $_{t-1}$			**0.03** (0.058)				**0.03** (0.032)
Effectiveness of Government $_{t}$				**0.09** (0.152)	**0.17** (0.153)	**0.25** (0.158)	**0.25** (0.172)
Short Term Debt/ Total Debt $_{t-1}$				**0.39** (0.694)	**0.30** (0.711)		**0.83** (0.877)
Ln GDP per capita $_{t-1}$						**0.009** (0.1114)	**-0.058** (0.139)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-0.599** (0.498)	**-0.99** (0.749)	**-0.581** (1.085)	**-0.009** (0.562)	**-0.486** (0.568)	**-0.531** (1.069)**	**-0.461** (0.958)
Obs.	**1841**	**557**	**481**	**690**	**622**	**586**	**561**
R^2	**0.0857**	**0.1186**	**0.1201**	**0.1252**	**0.1253**	**0.1211**	**0.1238**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Table A.5.5. Instrumental Variables Probit Regressions

	Dependent Variable: Crisis Episodes [Frankel and Wei (2004) definition of exchange market pressure]						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Trade openness $_{t}$	**-1.41** (0.58)**	**-1.42** (0.59)**	**-1.05** (0.43)**	**-1.09** (0.48)**	**-1.02** (0.46)**	**-0.40** (0.22)*	**-1.41** (0.60)**
Ln Reserves in Months of Imports $_{t-1}$	**-0.33** (0.08)***	**-0.34** (0.08)***	**-0.32** (0.07)***	**-0.24** (0.06)***	**-0.329** (0.07)***	**-0.20** (0.03)***	**-0.29** (0.08)**
Foreign Debt/ GDP $_{t-1}$	**0.47** (0.25)*	**0.47** (0.25)*	**0.31** (0.19)	**0.37** (0.22)*	**0.44** (0.22)*		**0.44** (0.25)*
Exchange Rate Rigidity Index $_{t-1}$	**0.16** (0.08)**	**0.15** (0.08)*		**0.11** (0.09)	**0.12** (0.08)		**0.11** (0.09)
Liability Dollarization $_{t-1}$ **(1)**	**0.09** (0.25)	**0.09** (0.25)	**0.18** (0.23)				**0.14** (0.26)
Current Account/ GDP $_{t-1}$	**0.75** (1.28)	**0.89** (1.32)	**1.09** (1.39)			**-0.97** (0.59)	**0.65** (1.57)
FDI/GDP $_{t-1}$		**0.01** (0.04)					**0.009** (0.03)
Effectiveness of Government $_{t}$			**-0.21** (0.09)**	**-0.17** (0.11)*	**-0.24** (0.10)**	**-0.28** (0.07)***	**-0.21** (0.12)*
Short Term Debt/ Total Debt $_{t-1}$			**0.04** (0.53)	**0.14** (0.51)			**-0.16** (0.85)
Ln GDP per capita $_{t-1}$					**0.00007** (0.00004)	**0.0002** (0.0002)	**0.05** (0.12)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-0.8** (0.73)	**-1.30** (0.49)**	**-1.17** (0.45)**	**-1.67** (0.44)***	**-1.79** (0.44)***	**-1.45** (0.29)***	**-1.13** (0.98)
Obs.	**586**	**582**	**637**	**603**	**564**	**1159**	**522**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Finally, we redo all regressions using linear models rather than probit. All of the aforementioned results are robust to this alteration. We report these regressions in Tables A.5.6. and A.5.7. In Table A.5.6 we report results for instrumental variables GLS random effects estimates. Reassuringly, results are both quantitatively and qualitative similar to those in the comparable Table A.5.5.

Table A.5.5. Pooled OLS (Linear) Regressions

	Dependent Variable: Sudden Stop 1								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Trade openness $_{t}$	**-0.024** (0.013)*	**-0.030** (0.0159)*	**-0.041** (0.019)**	**-0.033** (0.0179)*	**-0.035** (0.017)**	**-0.038** (0.019)**	**-0.021** (0.0137)	**-0.191** (0.063)**	**-0.021** (0.0241)
Current Account/ GDP $_{t-1}$	**-0.22** (0.072)**	**-0.235** (0.088)**	**-0.274** (0.103)**	**-0.275** (0.095)**	**-0.261** (0.099)**	**-0.265** (0.105)**	**-0.170** (0.065)**	**-0.661** (0.298)**	**-0.343** (0.139)**
Foreign Debt/ GDP $_{t-1}$	**-0.009** (0.0175)	**-0.013** (0.0198)	**-0.003** (0.022)	**-0.009** (0.0208)	**-0.009** (0.021)	**-0.008** (0.0222)		**0.100** (0.130)	**-0.029** (0.0193)
Short Term Debt/ Total Debt $_{t-1}$			**0.067** (0.0515)	**0.035** (0.0523)	**0.044** (0.059)	**0.045** (0.055)	**0.026** (0.0393)	**-0.045** (0.162)	**0.1186** (0.0974)
Liability Dollarization $_{t-1}$ (1)	**0.022** (0.017)	**0.025** (0.0189)		**0.025** (0.0291)	**0.031** (0.0298)	**0.023** (0.030)	**0.0312** (0.0276)		**0.029** (0.0346)
Effectiveness of Government $_{t}$		**-0.002** (0.0182)	**0.007** (0.0192)		**0.005** (0.0179)	**0.0046** (0.0215)	**0.003** (0.0139)	**-0.070** (0.0401)*	**0.0146** (0.0247)
Ln GDP per capita $_{t-1}$		**-0.006** (0.0086)	**0.005** (0.0125)	**0.005** (0.0111)		**0.003** (0.0135)	**0.010** (0.0099)	**0.082** (0.0444)*	**-0.008** (0.0138)
Liability Dollarization $_{t-1}$ (2)								**-0.059** (0.0944)	
Exchange Rate Rigidity Index $_{t-1}$									**0.007** (0.0113)
FDI/GDP $_{t-1}$									**-0.0009** (0.0019)
Ln Reserves in Months of Imports $_{t-1}$									**0.0008** (0.0033)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**-0.0013** (0.014)	**0.061** (0.0758)	**0.0007** (0.1076)	**-0.0005** (0.1033)	**0.014** (0.033)	**-0.004** (0.0965)	**-0.081** (0.0788)	**-0.277** (0.3261)	**0.084** (0.1177)
Obs.	**1122**	**961**	**787**	**869**	**772**	**745**	**1235**	**219**	**599**
R^2	**0.0416**	**0.0500**	**0.0550**	**0.0512**	**0.0550**	**0.0573**	**0.0373**	**0.1903**	**0.0745**

Robust standard error to clustered heterogeneity reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Table A.5.6. Instrumental Variables Linear Regressions

	Dependent Variable: Sudden Stop 1								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Trade openness $_{t}$	**-0.066** (0.02)***	**-0.063** (0.02)**	**-0.100** (0.03)***	**-0.097** (0.032)**	**-0.088** (0.03)**	**-0.093** (0.057)**	**-0.060** (0.02)**	**-0.233** (0.101)**	**-0.133** (0.064)**
Current Account/ GDP $_{t-1}$	**-0.317** (0.10)***	**-0.323** (0.116)**	**-0.395** (0.1427)**	**-0.364** (0.123)**	**-0.361** (0.131)**	**-0.380** (0.145)**	**-0.230** (0.084)**	**-0.665** (0.290)**	**-0.475** (0.192)**
Foreign Debt/ GDP $_{t-1}$	**-0.006** (0.0182)	**-0.007** (0.0201)	**0.012** (0.024)	**0.008** (0.0222)	**0.004** (0.0223)	**0.007** (0.0239)		**0.108** (0.1408)	**-0.0002** (0.0255)
Short Term Debt/ Total Debt $_{t-1}$			**0.088** (0.0537)*	**0.065** (0.0559)	**0.082** (0.0687)	**0.071** (0.0595)	**0.025** (0.0399)	**-0.023** (0.1705)	**0.128** (0.1076)
Liability Dollarization $_{t-1}$ (1)	**0.027** (0.0169)	**0.029** (0.0190)		**0.015** (0.0274)	**0.024** (0.0313)	**0.016** (0.0315)	**0.028** (0.0284)		**0.028** (0.0334)
Effectiveness of Government $_{t}$		**-0.0061** (0.0187)	**0.007** (0.0194)		**0.011** (0.0192)	**0.007** (0.0221)	**0.007** (0.0148)	**-0.072** (0.041)*	**0.021** (0.0255)
Ln GDP per capita $_{t-1}$		**-0.004** (0.0088)	**0.0112** (0.0135)	**0.015** (0.0126)		**0.009** (0.0146)	**0.014** (0.0110)	**0.086** (0.0443)	**-0.005** (0.0157)
Liability Dollarization $_{t-1}$ (2)								**-0.073** (0.1082)	
Exchange Rate Rigidity Index $_{t-1}$									**0.011** (0.0119)
FDI/GDP $_{t-1}$									**-0.0003** (0.0032)
Ln Reserves in Months of Imports $_{t-1}$									**-0.0014** (0.0036)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**0.0363** (0.027)	**0.085** (0.0791)	**0.049** (0.1178)	**0.0158** (0.1192)	**0.092** (0.0557)*	**-0.02** (0.1055)	**-0.063** (0.0842)	**-0.312** (0.337)	**0.055** (0.0911)
Obs.	**1040**	**914**	**747**	**800**	**731**	**705**	**1176**	**215**	**559**
R^2	**0.0421**	**0.0508**	**0.0548**	**0.0491**	**0.0546**	**0.0571**	**0.0337**	**0.1923**	**0.0769**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Table A.5.7. Instrumental Variables GLS Random-Effects Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trade openness $_{t}$	**-0.066** (0.026)**	**-0.069** (0.0344)**	**-0.100** (0.0387)**	**-0.105** (0.0423)**	**-0.088** (0.040)**	**-0.094** (0.0417)**	**-0.060** (0.0302)**	**-0.233** (0.138)*	**-0.105** (0.0437)**
Current Account/ GDP $_{t-1}$	**-0.317** (0.01)***	**-0.340** (0.1085)**	**-0.395** (0.129)**	**-0.382** (0.119)***	**-0.361** (0.1275)**	**-0.380** (0.1325)**	**-0.230** (0.0888)**	**-0.665** (0.3354)**	**-0.413** (0.142)**
Foreign Debt/ GDP $_{t-1}$	**-0.006** (0.0155)	**-0.003** (0.0188)	**0.012** (0.0223)	**0.012** (0.0223)	**0.004** (0.0219)	**0.007** (0.0235)		**0.108** (0.0945)	**0.008** (0.0235)
Short Term Debt/ Total Debt $_{t-1}$			**0.088** (0.0632)	**0.066** (0.0633)	**0.082** (0.0647)	**0.071** (0.0692)	**0.025** (0.0486)	**-0.023** (0.1807)	**0.063** (0.0704)
Liability Dollarization $_{t-1}$ (1)	**0.027** (0.015)*	**0.029** (0.0168)*		**0.014** (0.0234)	**0.024** (0.0247)	**0.016** (0.0251)	**0.028** (0.0192)		**0.015** (0.0251)
Effectiveness of Government $_{t}$		**-0.008** (0.015)	**0.007** (0.0172)		**0.011** (0.0166)	**0.007** (0.0186)	**0.007** (0.0123)	**-0.072** (0.0417)*	**0.006** (0.0187)
Ln GDP per capita $_{t-1}$		**-0.003** (0.0094)	**0.011** (0.0141)	**0.0167** (0.0141)		**0.009** (0.0148)	**0.014** (0.0102)	**0.086** (0.0468)*	**0.009** (0.0148)
Liability Dollarization $_{t-1}$ (2)								**-0.073** (0.0875)	
Exchange Rate Rigidity Index $_{t-1}$									**0.011** (0.013)
FDI/GDP $_{t-1}$									**0.0007** (0.0033)
Ln Reserves in Months of Imports $_{t-1}$									**0.003** (0.0030)
Regional Dummies?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Year Fixed-Effects?	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Constant	**0.024** (0.0999)	**0.078** (0.1274)	**0.050** (0.1701)	**-0.029** (0.1505)	**0.092** (0.1440)	**0.064** (0.1748)	**-0.083** (0.1124)	**-0.312** (0.338)	**0.001** (0.1786)
Obs.	**1040**	**914**	**747**	**800**	**731**	**705**	**1176**	**215**	**705**
R^2	**0.0435**	**0.0503**	**0.0564**	**0.0499**	**0.0557**	**0.0583**	**0.0345**	**0.1931**	**0.0576**

Robust standard errors reported in parenthesis.
*** Statistically Significant at 1%
** Statistically Significant at 5%
* Statistically Significant at 10%

Filename: 618 Edited.doc
Directory: \\ressrv02\publications\All-pprs\Green\Publishd\618
Template: C:\Program Files\Microsoft Office\Templates\Normal.dot
Title: Broadly speaking, there are two opposing views on the relationship between a country's openness and whether it is prone to the "sudden stops" in capital flows that often lead to crises
Subject:
Author: j
Keywords:
Comments:
Creation Date: 11/5/2007 10:06 AM
Change Number: 4
Last Saved On: 11/5/2007 11:33 AM
Last Saved By: RitaF
Total Editing Time: 5 Minutes
Last Printed On: 11/5/2007 11:33 AM
As of Last Complete Printing
Number of Pages: 58
Number of Words: 16,146 (approx.)
Number of Characters: 88,805 (approx.)