International Gross Capital Flows: New Uses of Balance of Payments Data and Application to Financial Crises

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Abstract

Most studies of international financial openness and crises link economic performance to either the net inflow of capital or the gross inflow (outflow) defined as the change in foreign (domestic) holdings of domestic (foreign) assets over a period. In this paper we decompose the net inflow into four rather than two components. We show that the four-way decomposition provides a better understanding of six recent financial crises and predicts sudden stops better than a standard two-way decomposition. We conclude that four-way decompositions can be more informative than either the net capital inflow or two-way decompositions of the net inflow.

Keywords: Capital Flows, Financial Integration, External Crises, Balance of Payments Crises

JEL: F21, F32, F36, G15
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1. Introduction

With a supportive institutional framework, international capital flows and financial openness have the potential to advance economic growth, stability, and development. For instance, they can promote investment and financial development (Baldwin and Martin 1999, Chinn and Ito 2006) or even jump-start economic development (Murphy et al 1989). When the institutional framework is weak, however, international capital flows and financial openness can lead to bubbles and financial crises (Prasad et al. 2003).

A number of papers explore the economics of capital flows. However, most empirical (Burnside et al. 2004, Bordo et al. 2010) as well as theoretical papers - including business cycle and growth studies (Barro et al. 1992, Aghion et al. 2004) as well as financial crisis models (Calvo 1998, Dooley 2000) – have focused on the net capital inflow. A smaller empirical literature, which we discuss below, distinguishes gross inflows and outflows of capital.¹ In this paper, however, we argue that a focus on either net flows or its component gross in- and outflows may be unnecessarily restrictive.

In order to express our departure from previous work, we note that the standard definition of the net capital inflow (NI) is \( NI = \Delta L - \Delta A \) where \( \Delta L\) (\( \Delta A \)) is the increase in foreign (domestic) holdings of domestic (foreign) assets in the balance of payments.

¹There may be several reasons to study gross capital flows. For one thing, if only net inflows mattered, then it is unclear why gross flows are many times larger. Inflowing capital may affect a country’s output composition, technology or institutions differently from outflowing capital (Baldwin and Martin 1999, Abiad et al. 2008). In- and outflows may also differ according to risk, returns, and contractual lending terms (Mody and Murshid 2005), and the liquidity and information sets of investors (Rothenberg and Warnock forthcoming, Tille and van Wincoop 2008).
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(BoP) over the period. The gross inflow (outflow) is \( \Delta L \ (\Delta A) \). Although this definition seems intuitive, a sizable share of the BoP recorded changes in assets holdings (for various countries, years and asset categories), however, are actually negative. A negative change in foreign (domestic) holdings of domestic (foreign) assets represents disinvestment in the domestic (foreign) economy. When the standard definition of the inflow (outflow), \( \Delta L \ (\Delta A) \) simply adds the negative and positive changes across asset categories in the BoP – the categories are FDI, portfolio, and other capital flows - it fails to distinguish a fall in new foreign investment from a corresponding disinvestment. Since many countries face imperfections in financial markets, the implicit assumption that economy-wide foreign investment and disinvestment are perfect substitutes is unlikely to be correct. Intuitively, disinvestment is the disruption of an existing credit relationship, and if collateral or information is relationship-specific, it may be difficult for a borrower to find a new domestic or foreign lender despite a high social return to lending (Bernanke 1983, Caballero and Krishnamurthy 2001). Liquidity problems of industries hit by disinvestment shocks may spread via backward and forward linkages. For instance, Hendricks and Singhal (2005) find that supply-chain disruptions for US firms lead to cumulative abnormal stock market returns of -40% over a three year period starting one year before the disruption announcement.

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2 See for example Ito (1999), Caballero et al. (2004), Alfaro et al. (2005), Faucette et al. (2005), Prasad and Wei (2005), Rothenberg and Warnock (forthcoming), and Tille and van Wincoop (2008).

3 In our dataset, about 25% of recorded asset changes and more than 10% of liability changes are negative.

4 Foreign disinvestments may also warn future investors to stay away or cause a fire-sale of assets exacerbating initial liquidity problems. Even if some domestic agents increase foreign credit access at the
Given the potential asymmetries between foreign investment and disinvestment, we extract a disinvestment measure from the balance of payments using the identity

\[ NI_4 = L^* - L - A^+ + A^- , \]  

\( L^* \geq 0 \): positive liability changes/inflowing foreign investment  
\( L \geq 0 \): absolute value of negative liability changes/outflowing foreign disinvestment  
\( A^+ \geq 0 \): positive asset changes/outflowing domestic investment  
\( A^- \geq 0 \): absolute value of negative asset changes/inflowing domestic disinvestment.

Equation (1) identifies four sources of variation in a country’s net capital inflow. In contrast, the two-way decompositions used in previous work only considers variations in the “net gross” inflow \( \Delta L = (L^* - L^-) \) and the “net gross” outflow \( \Delta A = (A^+ - A^-) \). Thus, the standard decomposition fails to measure investment separately from disinvestment and treats the two as perfect substitutes. We show below that the four-way decomposition provides a better explanation of six recent financial crises and predicts sudden stops empirically better than the standard decomposition. For instance, the standard methodology suggests that recent crises in Indonesia, Mexico, and South Korea largely reflected declining gross capital inflows. Our more precise method shows that these crises were mainly due to foreign disinvestment. We further show that that in South Korea there was a sizable domestic capital outflow accompanied by domestic capital repatriation during the crisis. We similarly identify a large amount of capital repatriation to the US and UK during the global crisis of 2008-9.

same time others lose it, leaving aggregate foreign lending unchanged, credit-unconstrained agents may be unwilling to lend to constrained agents (Caballero and Krishnamurthy 2001).
We believe that the four-way decomposition of net capital inflows in equation (1) can be important for policy makers. First, it can help distinguish the output effects of international investments from those of disinvestments. For instance, if foreign disinvestments \([L^-]\) decrease output more than domestic capital outflows \([A^+]\) during financial crises (Janus and Riera-Crichton 2010), then the benefits of capital controls may outweigh the costs for the former but not the latter.\(^5\) If domestic residents tend to be well-informed, and their capital promotes output growth more than asset bubbles, then it may be better to encourage inflows from capital repatriation \([A^-]\) than foreign inflows \([L^+]\). Second, the four-way decomposition can reveal whether policies needed to retain existing investors and attract new investors are different. Third, as noted it can help policy markers predict financial crises. Fourth, by distinguishing four rather than two types of capital flows, and correctly classifying disinvestments as outflows rather than negative inflows, it can help policy-makers design and monitor effectiveness of capital controls.

The paper belongs to the literature linking international capital flows to economic outcomes, such as growth and financial crises. While the literature has focused on net capital flows (see Obstfeld 2009 for a survey), several recent papers link gross capital flows to financial crises. Broner et al. (2011) show that gross capital flows are large and volatile compared to net flows, as well as procyclical in the sense of retrenching during crises. Rothenberg and Warnock (forthcoming) find that roughly half of the sudden stops in their sample reflect a rise in capital outflows or “sudden flight” more than a fall in inflows or a “true sudden stop” (Faucette et al. 2005). Using different definitions, Cowan

\(^5\) Conversely, controls on domestic outflows may be justified if they are the main driver of fluctuations in the net capital inflow (Rothenberg and Warnock forthcoming).
et al. (2008) find that outflow surges account for eighteen of one hundred sudden stops in their sample, while inflow declines account for fifty-seven. Forbes and Warnock (forthcoming) study episodes of “surge,” “stop,” “flight,” and “retrenchment” in capital flows, defined, respectively, as sharply increasing and decreasing inflows and sharply increasing and decreasing outflows. Our key departure from these papers is that we study a four-way rather than two-way decomposition of net capital flows.

In the remainder of the paper, Section 2 applies the four-way decomposition (1) to explain six recent financial crises. Section 3 applies it to sudden stop prediction and Section 4 concludes. Most variable definitions and data sources are in the appendix.

2. Explaining Six Recent Financial Crises

In this section we study gross private international capital flows during six recent financial crises: South Korea and Indonesia in 1997, Mexico in 1994, Argentina in 2002, and the US and UK during the Great Recession of 2008-9.6

In Figure 1, the thick lines mark the balance of payments crises suffered by Indonesia and South Korea in 1997-8, as identified in Kaminsky and Reinhart (1999). According to the standard two-way net inflow decomposition, the proximate cause of both South Korea’s and Indonesia’s balance of payments crisis was a sharp decline in gross capital inflows from positive to highly negative levels. Although a negative total inflow implies some degree of disinvestment, the size of the disinvestment is not clear. In

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6 We focus on private capital flows rather than official flows because the former are more important for most countries and may have different dynamics than official flows. The data source is described below.
contrast, our four-way decomposition estimates the foreign disinvestment more precisely (the sharp spike in private outflows from liabilities \([L^-]\) in the upper panels). Interestingly, between the second quarter of 1997 and the time the crisis hit in the fourth quarter, there was almost no change in foreign inflows to Indonesia (private inflows from liabilities\([L^+]\)) and only a moderate fall in foreign inflows to South Korea. The four-way decomposition therefore establishes, in a firmer and more precise manner than the standard two-way decomposition, that the proximate cause of both crises was investment reversals. Another novel finding is that we observe both a rise in South Korean capital outflows (private outflows from assets \([A^+]\)) and repatriation of capital by South Koreans (private inflows from assets \([A^-]\)). One possibility is that South Korean investors repatriated funds from abroad to buy or support projects abandoned by foreign investors. Thus, South Korean capital may have put a floor under asset prices.

Next, using the left half of Figure 2 we study Mexico’s balance of payments crisis in 1994-95 (again as defined in Kaminsky and Reinhart (1999)). As for the Asian economies, the standard decomposition suggests that Mexico’s loss of capital was entirely due to a fall in gross inflows. However, it remains unclear how much reflected disinvestment as opposed to declining new investment. The four-way decomposition shows that after an early sharp decline inflows actually remained substantial and stable in the four quarters leading up to the crisis. As with the Asian crises, therefore, Mexico’s balance of payments crisis was associated with foreign disinvestment more than a fall in new foreign investment.
The right side of Figure 3 shows capital flows surrounding Argentina’s current account reversal, banking and debt crisis in the first quarter of 2002. In this case, while the two-way decomposition shows a declining capital inflow leading up to the crisis, the four-way decomposition shows that foreign investment in Argentina (private inflows from liabilities) actually increased in the two quarters preceding the crisis. Thus, the fall in foreign acquisitions of Argentinean assets is more than fully explained by foreign disinvestment. Moreover, as in South Korea, both foreign disinvestment (private outflows from liabilities) and Argentinean capital repatriation (private inflows from assets) rose preceding the crisis. Similarly to South Koreans, therefore, Argentineans may have purchased domestic assets from foreigners. Finally we note that, comparing the spikes in outflows from assets with those of outflows from liabilities, the former appear to lead the latter. This may suggest that domestic investors left Argentina before foreign investors. Based on data from financial markets, Frankel and Schmukler (1996) similarly find that domestic investor flight Granger-caused foreign flight during Mexico’s 1994-95 crisis and conclude that domestic investors may have seen the crisis coming earlier. Understanding any information asymmetries and causal relations between foreign and domestic investor behavior may be important to understand and predict financial crises.

Finally, in Figure 4, we focus on the United States and United Kingdom during the Great Recession. According to the two-way decomposition, both capital inflows to the US and outflows fell sharply before the crisis. Once the crisis began, inflows were

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7Since Argentina’s crisis and the Great Recession years we study in Figure 4 are not included in Kaminsky and Reinhart (1999), we get the crisis quarters from Janus and Riera-Crichton (2010). Each crisis quarter features a rise in the current account-to-GDP ratio of more than twice the country-specific standard deviation of that ratio, as well as an annual three percentage point rise in the current account-to-GDP ratio.
fairly stable, but there was a sizable increase in outflows. In contrast, but more consistent with the anecdotal evidence, the four-way decomposition shows a large increase in both foreign disinvestment from the US (outflows from liabilities) and US repatriation of capital (inflows from assets). Thus, as foreign investors disengaged from the US, US investors disengaged from abroad. The standard two-way decomposition fails to capture the size of both foreign flight from the US (the standard inflows measure only goes slightly negative) and US disinvestment from abroad. Nor does it reveal that only a small part of the rise in US holdings of foreign assets after the crisis came from US residents purchasing foreign assets. Rather, as shown by the four-way decomposition, it came from falling US repatriation of capital (inflows from assets). For the UK, similarly, the two-way decomposition underestimates both foreign investor flight and capital repatriation.

3. Predicting Sudden Stops

In this section, we study the ability of a four-way decomposition of net capital inflows to predict financial crises in the form of sudden stops. Following Hutchison and Noy (2006) we define a sudden stop as the simultaneous occurrence of a currency crisis and a current account reversal. Calvo (1998) argues that the output loss from a current account reversal may be larger when accompanied by a real depreciation and Hutchison and Noy (2006) provide supporting evidence. For robustness, we use two measures of current account reversals: a rise in the current account-to-GDP ratio of more than twice the country-specific standard deviation of that ratio (ST1); and a rise of three percentage points or more in the current account-to-GDP ratio compared to the same quarter the previous year.
We define a currency crisis as a departure of two standard deviations or more in the level of exchange market pressure (Eichengreen et al. 1996), formulated as follows for country $i$ and time $t$: $EMP_{it} = \frac{\% \Delta R_{it}}{\sigma^2_{\% \Delta R}} + \frac{\% \Delta E_{it}}{\sigma^2_{\% \Delta E}}$. In this expression, $\% \Delta R_{it}$ is the percent change in official reserves from last period, $\% \Delta E_{it}$ stands for the percent change in the real exchange rate, and $\sigma^2_{\% \Delta R}$ and $\sigma^2_{\% \Delta E}$ are the respective country-specific variances of the percent change over the sample years.$^9$

Due to the binary nature of the dependent variables, we estimate a logit model. The state transition matrices presented in Table 1 uncover a sizeable persistence in the two crisis dummies and undergoing financial turmoil one quarter may affect the probability of turmoil the next quarter. Thus, we control for lagged crisis incidence.

The estimated crisis probability for each observation, denoted $\hat{p}_i$, is a continuous variable, while the dependent variable is binary. We, therefore, follow the large body of literature on Early Warning Systems in defining a threshold $C$ as follows: If $\hat{p}_i \geq C$, then, the model is said to predict a crisis, and otherwise, it does not. The threshold is usually chosen to minimize the noise-to-signal ratio, i.e. the ratio of incorrectly to correctly predicted crises (Berg and Patillo 1999): $NSR = FP(C)/TP(C)$, where $FP$ and

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$^8$ The incidence of the two types of sudden stops in the data is available on request.

$^9$ While Hutchison and Noy (2006) also use real exchange rates, Eichengreen et al. (1996) use nominal rates. The latter also include nominal interest rate deviations in the EMP index, but most of the subsequent literature has focused on reserve and exchange rate changes due to data limitations.
TP denote the number of false and true positive predictions. For generality we present the NSRs generated by the capital flow decompositions for all thresholds $C \in (0,1)$.\(^{10}\)

Our regressions use quarterly balance of payments data from the IMF’s International Financial Statistics (IFS). It includes 43 non-OECD economies, most of which are emerging markets, as well as Mexico and South Korea.\(^{11}\) It spans 1970 to 2009, although it is limited before the mid 1980s. Table 2 shows the summary statistics. Apart from gross capital flows, we control for the lags of output growth, the current account, the stock of international reserves, domestic credit growth, a dummy for hyperinflation, and relative export growth (the growth of the exports-imports ratio).\(^{12}\)

Columns (1) and (3) in Table 3 show the results for the four-way decomposition of capital flows. Columns (2) and (4) show the results for the two-way decomposition. A Wald test after each of regressions (1) and (3) rejects at the 99% confidence level that the coefficient on inflows from liabilities equals minus the coefficient on outflows from liabilities. Thus, the coefficient on inflows using the standard decomposition seems to reflect the average of the heterogeneous effects of a rise in new foreign investment and a fall in foreign investment reversals.\(^{13}\) In Figure 4 we show our method’s relative ability

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\(^{10}\) The working paper shows that using other measures to compare Early Warning Systems gives similar results. Candelon et al (2010) and Granger and Machina (2006) present a broader discussion of forecasting.

\(^{11}\) We drop the Bahamas, Bahrain, Panama and Tonga due to their large capital flows-to-GDP ratios.

\(^{12}\) These controls follow the literature on Early Warning Systems (Berg and Patillo 1999, Kaminsky and Reinhart 1999, Kumar et al. 2003, Candelon et al. 2010).

\(^{13}\) The qualitative results are not sensitive to omitting the lagged dependent variable or adding country fixed effects; estimating a complementary log-log, linear or probit model; or controlling for fiscal expenditures, economic or financial risk, terms of trade, financial development or trade openness. We are also aware that,
to predict sudden stops as measured by the NSR. Using our first sudden stop measure, the results in the upper panel show that the four-way decomposition of net inflows neither helps nor hinders crisis prediction.\textsuperscript{14} In contrast, the results for the second sudden stop measure in the lower panel strongly favor four-way decomposition: the NSR is substantially lower than for the two-way decomposition for almost all crisis thresholds.

4. Conclusion

Most macroeconomic studies of international capital flows focus on either net inflows or gross inflows (outflows) computed as the increase in foreign (domestic) holdings of domestic (foreign) assets in the balance of payments. In this paper, however, we show that decomposing net inflows into four rather than two gross flow components can help to explain six recent financial crises and predict sudden stops empirically. On this basis we believe that four-way decompositions can increase the ability of policy-makers to monitor and manage international capital flows.

\textsuperscript{14} One reason the NSRs are similar using our first sudden stop measure may be the relatively few crisis in the data. For instance, with 20 false and 35 true positives, one falsely predicted crisis changes the NSR by \((21-20)/35=0.029\) (Candelon et al. 2010). The four-way decomposition does do slightly better at predicting true positives, however. This is consistent with outflows from liabilities being the only significant gross flow in the first two columns in Table 3, and may be important if the value of preparing for a crisis exceeds the value of preparing needlessly (so true positives are more valuable than false positives).
References


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Appendix: Variables, Data Sources, Figures and Tables

Real GDP Growth: Defined as the as the quarter-on-quarter percentage change in real $US GDP, Ln(Y(t))-lnY(t-4)). The main source is the IMF’s International Financial Statistics (IFS) dataset, from which we also draw GDP deflators. We first transform nominal to real GDP, then convert it to US$ using the nominal exchange rate in IFS, and then compute the growth rate. Other sources for real GDP are OECD Source, Economist Intelligence Unit (EIU), DataStream (DS) and the CEIC Data Company Ltd. (CEIC).

Total Gross Capital Flows: Total gross flows are calculated adding up the absolute value of all liability increases and decreases plus total asset increases and decreases from the capital and financial balance of each country.

Private Outflows from Liabilities (POfL): Defined as the absolute value of all decreases in foreign liabilities from private domestic residents in the financial and capital accounts.

Private Inflows from Liabilities (PIfL): Defined as the absolute value of all increases in foreign liabilities from private domestic residents in the financial and capital accounts.

Private Outflows from Assets (POfA): Defined as the absolute value of all increases in foreign assets from private domestic residents in the financial and capital accounts.

Private Inflows from Assets (PIfA): Defined as the absolute value of all decreases in foreign assets from private domestic residents in the financial and capital accounts.

Net Inflows: Defined as the current account deficit minus the increase in international reserves. The main source for balance of payments data is the IMF’s Balance of Payments Statistics (BOPS). Data for Taiwan and Switzerland was obtained from CEIC.
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**Domestic Credit**: defined Stock of domestic credit is measured as bank lending to public and private sectors, plus bank lending in domestic currency overseas (Line 32 in IFS). The Main source is IFS but we also use data from EIU, DS and CEIC.

**Stock of Reserves**: Defined as the total stock of international reserves minus gold. Sources are IFS, DS and EIU.

**Inflation**: Domestic CPI Inflation. Main sources are IFS, DS, EIU and CEIC. Hyperinflation is inflation exceeding 100% per quarter.

**Relative Export Growth**: The growth rate of the ratio (export/imports) in current US dollars with export and import data extracted from IFS, DS, EIU and CEIC.

**Real Effective Exchange Rate (REER)**: The real effective exchange rate index represents a nominal effective exchange rate index adjusted for relative movements in national price or cost indicators of the home country,

\[
REER = \Pi_i [(e_i/e)(P/P_i)]^{w_i}
\]

Where  
- $e$: Exchange rate of the subject currency against the US dollar (US dollars per rupee in index form);  
- $e_i$: Exchange rates of currency $i$ against the US dollar (US dollars per currency $i$ in index form);  
- $w_i$: Weights attached to the country/ currency $i$ in the index;  
- $P$: Consumer Price Index (CPI) of Subject country and $P_i$ is the Consumer price index of country $i$. An Increase in REER corresponds to a Real Domestic Appreciation. Data belongs to the IFS dataset, OECD and the Broad REER calculated by JP Morgan and provided through Datastream.
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Figure 1: Gross Capital Flows (percent of GDP) during the Asian Crisis (1997-98)

*Horizontal lines represent start and end of financial turmoil. Gross flows are deflated by Nominal GDP.
Figure 2: Gross Capital Flows (percent of GDP) during financial turmoil in Latin America (Argentina 2002, Mexico 1995)

*Horizontal lines represent start and end of financial turmoil. Gross flows are deflated by Nominal GDP.*
Figure 3: Gross Capital Flows (percent of GDP) during the Great Recession (United States and United Kingdom 2008)

*Horizontal lines represent start and end of financial turmoil. Gross flows are deflated by Nominal GDP.*
Figure 4: Noise-to-Signal Ratios (NSR) for Logit Models of Sudden Stops (Type 1 in Upper Panel, Type 2 in Lower Panel)
Table 1: Transition Matrices for Sudden Stops

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>Total</th>
<th></th>
<th>0</th>
<th>1</th>
<th>Total</th>
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<tbody>
<tr>
<td>ST 1</td>
<td></td>
<td></td>
<td></td>
<td>ST 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 %</td>
<td>98.84</td>
<td>1.16</td>
<td>100</td>
<td>0 %</td>
<td>97.91</td>
<td>2.09</td>
<td>100</td>
</tr>
<tr>
<td>1 %</td>
<td>51</td>
<td>56</td>
<td>107</td>
<td>1</td>
<td>91</td>
<td>145</td>
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<td>Total</td>
<td>4,780</td>
<td>245</td>
<td>5,025</td>
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Notes: ST1 is a sudden stop defined as a currency crisis along with a rise in the current account-to-GDP ratio of more than twice the country-specific standard deviation of that ratio; ST2 is a sudden stop defined as a currency crisis along with a quarter-to-quarter rise of three percentage points or more in the current account-to-GDP ratio.

Table 2: Summary Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
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</thead>
<tbody>
<tr>
<td>Standard Private Gross Inflows*</td>
<td>5429</td>
<td>0.099943</td>
<td>0.241149</td>
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<td>Standard Private Gross Outflows*</td>
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<td>Relative Export Growth</td>
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<td>246.7352</td>
<td>-936.756</td>
<td>18079.07</td>
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</table>

Notes: *Variables are deflated by GDP. [Private] Outflows from Liabilities, Outflows from Assets, Inflows from Liabilities and Inflows from Assets correspond to, respectively, $L^-$, $A^+$, $L^+$, and $A^-$ in equation (1).

Standard Private Gross Inflows and Outflows equal, respectively, $(L^+ - L^-)$ and $(A^+ - A^-)$.
Table 3: Sudden Stops Prediction Using Four-and Two-way Decompositions of Net Capital Inflows into Gross Flows

<table>
<thead>
<tr>
<th></th>
<th>ST1 FOUR-WAY</th>
<th>ST1 TWO-WAY</th>
<th>ST2 FOUR-WAY</th>
<th>ST2 TWO-WAY</th>
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<td>Crisis (t-1)</td>
<td>4.293</td>
<td>4.365</td>
<td>3.635</td>
<td>3.704</td>
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<tr>
<td></td>
<td>[0.421]**</td>
<td>[0.516]**</td>
<td>[0.312]**</td>
<td>[0.299]**</td>
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<td>Private Outflows from Liabilities (t-1)</td>
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<td>9.598</td>
<td>2.469</td>
<td>[1.985]</td>
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<td></td>
<td>[4.126]**</td>
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<td></td>
</tr>
<tr>
<td>Private Outflows from Assets (t-1)</td>
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<td></td>
<td>[4.713]</td>
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<tr>
<td>Private Inflows from Liabilities (t-1)</td>
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<td></td>
<td>[3.638]</td>
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<td>Private Inflows from Assets (t-1)</td>
<td>-1.133</td>
<td>-7.184</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[5.331]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Private Gross Inflows (t-1)</td>
<td>-4.946</td>
<td>-3.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[3.131]</td>
<td></td>
<td>[1.687]**</td>
<td></td>
</tr>
<tr>
<td>Standard Private Gross Outflows (t-1)</td>
<td>-1.483</td>
<td>4.867</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[4.221]</td>
<td></td>
<td>[1.738]**</td>
<td></td>
</tr>
<tr>
<td>Output Growth (t-1)</td>
<td>-0.793</td>
<td>-0.93</td>
<td>-1.046</td>
<td>-1.159</td>
</tr>
<tr>
<td></td>
<td>[0.440]*</td>
<td>[0.480]*</td>
<td>[0.370]**</td>
<td>[0.365]**</td>
</tr>
<tr>
<td>Current Account (t-1)</td>
<td>-5.328</td>
<td>-6.716</td>
<td>-3.321</td>
<td>-4.677</td>
</tr>
<tr>
<td></td>
<td>[3.051]*</td>
<td>[3.245]**</td>
<td>[2.135]</td>
<td>[2.094]**</td>
</tr>
<tr>
<td>Stock of Reserves (t-1)</td>
<td>-1.449</td>
<td>-0.973</td>
<td>-0.236</td>
<td>-0.071</td>
</tr>
<tr>
<td></td>
<td>[0.686]**</td>
<td>[0.635]</td>
<td>[0.286]</td>
<td>[0.256]</td>
</tr>
<tr>
<td>Domestic Credit Growth (t-1)</td>
<td>1.302</td>
<td>1.276</td>
<td>-0.336</td>
<td>-0.257</td>
</tr>
<tr>
<td></td>
<td>[0.727]*</td>
<td>[0.725]*</td>
<td>[0.519]</td>
<td>[0.515]</td>
</tr>
<tr>
<td>Hyperinflation (t-1)</td>
<td>-0.399</td>
<td>-0.53</td>
<td>-0.073</td>
<td>-0.133</td>
</tr>
<tr>
<td></td>
<td>[0.700]</td>
<td>[0.698]</td>
<td>[0.621]</td>
<td>[0.623]</td>
</tr>
<tr>
<td>Relative Export Growth (t-1)</td>
<td>-0.109</td>
<td>-0.151</td>
<td>-0.081</td>
<td>-0.112</td>
</tr>
<tr>
<td></td>
<td>[0.260]</td>
<td>[0.262]</td>
<td>[0.165]</td>
<td>[0.164]</td>
</tr>
<tr>
<td>Observations</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
<td>2450</td>
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<td>Number of countries</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td>43</td>
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<tr>
<td>Pseudo R-Squared</td>
<td>0.3639</td>
<td>0.3584</td>
<td>0.3332</td>
<td>0.3192</td>
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<tr>
<td>Log Likelihood Full Model</td>
<td>-172.241</td>
<td>-173.719</td>
<td>-333.509</td>
<td>-340.486</td>
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<tr>
<td>Log Likelihood Only Constant</td>
<td>-270.757</td>
<td>-270.757</td>
<td>-500.137</td>
<td>-500.137</td>
</tr>
</tbody>
</table>

Notes: Standard errors in brackets. *,**,*** significant at 10%, 5% and 1%. All gross capital flows, the current account and the stock of reserves are deflated by GDP. [Private] Outflows from Liabilities Outflows from Assets, Inflows from Liabilities and Inflows from Assets correspond to, respectively, $L^-$, $A^+$, $L^-$, and $A^+$ in equation (1). ST1 is a sudden stop defined as a currency crisis along with a rise in the current account-to-GDP ratio of more than twice the country-specific standard deviation of that ratio; ST2 is a sudden stop defined as a currency crisis along with a quarter-to-quarter rise of three percentage points or more in the current account-to-GDP ratio.