The Output Effects of Gross Foreign Investment Reversals

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Abstract

While the sudden stop literature has related current account reversals to output losses, in this paper we document a novel and large negative output effect of *gross foreign investment reversals* (GIR) measured by negative quarterly changes in a country's external liabilities. The result is robust to controlling for past growth, the current account, net and gross capital flows and external financial crises, as well as to using instrumental variables techniques. GIR are large during financial crises and have direct output effects on OECD countries. In contrast, they harm emerging markets by increasing the output costs of external financial crises. In fact, current account and partly sudden stop crises which are not accompanied by GIR tend to have insignificant or even positive output effects. Finally, financial development seems to buffer emerging markets against the negative output effects of GIR during external financial crises.

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1. Introduction

International capital flows may help consumption smoothing as well as growth by raising investment or improving technology, financial institutions or policy in the recipient country (Baldwin and Martin 1999, Eichengreen 2001, Chinn and Ito 2006, Klein and Olivei 2008). In the presence of endogenous growth or multiple equilibriums, even small capital flows can have permanent effects (Murphy et al 1989, Sachs 2005). Nonetheless, the merits of capital mobility remain debated. For example, loans can be used for unsustainable consumption booms (Calvo et al. 1996) and foreign capital's main contribution may be investment, while long-term growth depends on geography or overall institutions (Easterly 2002, Gourinchas and Jeanne 2006). Financial openness may also promote currency, banking or current account crises (Prasad et al 2003, Bordo and Meissner 2010a,b).

This paper contributes to the debate on capital flows by studying the output effects of *gross foreign investment reversals* (GIR), that is, foreign disinvestment. We, thus, depart both from the sudden stop literature, which is focused on *net* capital inflow reversals, and from the literature on financial openness as measured by total gross inflows plus outflows (see Section 2). Using a quarterly global panel dataset, our main finding is a large and robust negative growth effect of GIR measured as negative changes in a country's external liabilities. The result is robust to controlling for past growth, the current account, net and gross capital flows and external financial crises (we specifically look at currency crisis, current account reversals and sudden stop episodes) as well as to using instrumental variables techniques. GIR tend to be large during financial crises and have a direct output effect on OECD countries. In contrast, they harm emerging markets indirectly by increasing the output costs of financial crises. In fact, challenging the sudden stop literature current account and partly sudden stop crises which are not accompanied by GIR tend to have insignificant or even positive output effects. Finally, financial development seems to buffer emerging markets against the negative output effects of GIR during crises. We conclude that the costs of volatile international capital flows may relate to gross as

well as net capital flows and that policies to limit GIR, or the damage they cause, may be useful beyond their effect on the current account and sudden stop risk.[2]

In the remainder of the paper, Section 2 reviews the literature on sudden stops and other capital flows. Section 3 introduces our methodology and data. Section 4 presents the results and some robustness checks. Section 5 considers causal mechanisms linking gross foreign investment reversals to output losses. Section 6 concludes the paper. All figures and tables are in the appendix.

2. The Output Effects of Foreign Investment Reversals

There is an extensive literature on both the causes of sudden stops - measured partly or fully by a sharp rise in the current account (Eichengreen et al. 1995, Sachs et al. 1996, Kaminsky and Reinhart 1999) – and the output effects of sudden stops (Hutchison and Noy 2006, Bordo et al. 2010a,b). Recent micro-level evidence also suggests that poor households may suffer disproportionally (Fallon and Lucas 2002, Chen and Ravallion 2009). From a theoretical perspective, Caballero and Krishnamurthy (2001, 2002) illustrate how the adverse effects of a declining capital inflow can be exacerbated as imperfections in the domestic credit market prevent liquid firms from lending to illiquid ones. Among others, Krugman & Taylor (1978) and Van Wijnbergen (1985) show how currency devaluations, often associated with current account reversals, can be contractionary (Agenor and Montiel 1999, Chapter 8). One causal channel, which has been emphasized since a series of crises in the 1990s, is that devaluations raise the value of foreign currency-denominated debt; thereby constraining a country's future borrowing or making it illiquid or insolvent, particularly when debt is short term (Cespedes et al. 2000, Galindo et al. 2003). Alternatively, banking and debt crises, which are also associated with sudden stops, can prevent new lending and cause asset markets to crash as borrowers scramble for liquidity (Kaminsky and Reinhart 1999, Hutchison and Noy 2005). An initial credit crunch

[2] Two options may be a tax on (foreign) capital outflows and asset price guarantees, although the former may discourage inflows and the latter cause moral hazard (Chinn and Kletzer 2000, Burnside et al. 2004, Durdu and Mendoza 2006).

can start a vicious cycle of aggregate demand, asset price, credit and aggregate supply declines (Shleifer and Vishny 1992, Bernanke et al. 1996, Chang and Velasco 1998, Mendoza 2001).

Although a common interpretation of a sudden stop is that foreign investors withdraw from the crisis country – suggesting that international capital 'makes or breaks' the economy –, Rothenberg and Warnock (2006) actually find that approximately half of the sudden stops in their sample are due to a rise in capital outflows (measured by the change in foreign assets in the balance of payments) rather than a fall in inflows (the change in foreign liabilities). While we instead focus on the role of foreign investment *reversals* (all *negative* changes in foreign liabilities), we agree that studying the gross flows underlying a given net flow is important. In particular, since gross capital in- and outflows are typically (a) large compared to net capital flows and (b) imperfect substitutes for each other, it is unlikely that their role can be summarized by the net flow. To illustrate, two-way capital flows can promote diversification and economic growth (Obstfeld 1994), and gross inflows of capital may have different effects on a country's investment and output pattern, technology or institutions than the outgoing capital it replaces (Baldwin and Martin 1999). Moreover, the lending terms and investor information associated with in-and outflows may be different (Rothenberg and Warnock 2006, Tille and van Wincoop 2008). For example, there is substantial evidence that portfolio capital inflows may be footloose or 'hot money' (Sarno and Taylor 1999, Chari and Kehoe 2003). Aguiar and Gopinath (2005) and Acharya et al. (2009a) find that, during crises, firms may be sold to foreign rather than domestic investors since the former are not credit constrained. There is a also a large empirical literature suggesting that gross capital flows may be linked to financial crises and the volatility and growth rate of output after controlling for the net flow of capital (Eichengreen 2001, Obstfeld 2009).

3. Methodology and Data

Our main goal is to study the effects of GIR on output. For this purpose we use a global quarterly panel dataset spanning 1970-2009 with most countries reporting statistics from the mid 1980s[3].

[3] Unless explained below, all variables and data sources are described in the appendix.

However, several potential endogeneity issues force us to depart from standard least squares dummy variable regression. These issues and our proposed solutions are summarized as follows.

Contemporaneous Endogenity

While we wish to show that GIR cause output declines, they could potentially also *respond* to output declines. In order to avoid contemporaneous reverse causality, we lag all our right hand side variables one period.

Consistent and Efficient Estimators for a Dynamic Panel Model

Economic growth has a strong autoregressive component and it is well known that least squares dummy variable (LSDV) estimates for dynamic panels suffer from bias due to endogeneity among the independent variables (Nickell 1981). In our paper, the risk comes from potential interactions between the country-specific effect and the dynamic term, which is the lagged dependent variable on the right hand side of the regression. To address this problem, we follow recent work on international finance and development (Hutchison and Noy 2006) based on Hausman and Taylor (1981). Specifically, our regressions fit panel data random effects models in which some of the covariates are correlated with the unobserved individual level random effect. The estimators, originally proposed by Hausman & Taylor (1981) and Amemiya & MaCurdy (1986), are based on instrumental variables and allow us to distinguish country-specific observed time invariant characteristics (which standard fixed-effect models do not allow) while efficiently addressing the bias resulting from fixed effects estimation. The Hausman-Taylor methodology is further explained in the appendix and Greene (2002) derives the estimators in detail. Altogether, we estimate the following model:

$$\Delta \ln y_{it} = \delta_1 \Delta \ln y_{i(t-1)} + \delta_2 GIR_{it} + \beta_1^{'} \vec{x}_{i1(t-1)} + \beta_2^{'} \vec{x}_{i2(t-1)} + \alpha z_i + \mu_i + \varepsilon_{it}. \qquad (1)$$

In the above specification, $\Delta \ln y_{it} = \ln y_{it} - \ln y_{i(t-4)}$ represents country i's growth rate of GDP in real US dollar terms between periods t and t-4. We use a four-period lag to control for seasonal effects on growth. On the right hand side, the dynamic term $\Delta \ln y_{it-1}$, captures the first order autoregressive component of output growth, and the vectors $\vec{x}_{it-1}$ and $\vec{x}_{2i(t-1)}$ contain lagged time-

variant control variables which are correlated and uncorrelated with the country random effect μ_i respectively. The vector $\vec{z}_i$ contains all time-invariant effects and ε_{it} is an i.i.d. error term. Finally, we measure GIR for country i and period t as the sum of any declines in the country's external liabilities recorded in the quarterly balance of payments: $GIR_{it} = \sum_k Max\{0, \Delta L_{ikt}\}$, where ΔL_{ikt} is the country's change in external liabilities of type k deflated by nominal GDP. Specifically, the balance of payment data allow us to distinguish k=portfolio, FDI and other capital flows. The last of these categories includes foreign loans, foreign currency, trade credits and other foreign investments. Among the control variables, we include the change in fiscal expenditures and the terms of trade, inflation, trade openness, international reserves, total gross capital flows and the current account. We further control for real exchange rate appreciation and domestic credit growth as these may precede financial crises (Prasad et al. 2003).

The use of Hausman-Taylor estimators in our model requires specifying a set of exogenous as well as endogenous covariates. We assume that the dynamic AR(1) component of growth, all gross capital flows (including GIR), the current account balance, the change in international reserves and all crisis dummies are endogenous. Conversely, the remaining controls, including lags of domestic credit growth, increase in fiscal expenditures, real appreciation, inflation and its square, trade openness and percent change in the terms of trade are assumed exogenous.[4] Finally, we include regional and non-emerging-OECD country dummies as time-invariant exogenous covariates. Our dataset covers a period ending in the fourth quarter of 2009 and starting as early as 1970, although most countries start reporting data in the mid '80s. Tables 1-3 present the countries included in our sample and summary statistics.

Endogeneity due to Forward Looking Behavior

Reinforcing the problem of contemporaneous endogeneity, if we believe that investors are forward looking, then, forecasted output declines may affect GIR in the preceding period. This would again create a reverse causality problem. To address this issue, we also estimate the model using an instrumental variable (IV) approach. Our preferred instrument for GIR is the trade-

[4] The choice of endogenous variables is somewhat arbitrary and could lead to overidentification problems. For robustness we run the same regression declaring all variables endogenous. This does not affect our main results.

weighted size of GIRs suffered by a country's trading partners in the current period. On the one hand, it seems unlikely that predicted future declines in a country's output would lead to gross foreign investment reversals in its trading partners. On the other hand, through a contagion mechanism reversals may spread across interlinked economies.[5]

Endogeneity between GIR and Financial Crises

Another potential source of endogeneity in our basic regression is the fact that the occurrence of different financial crises may depend on the covariates included in the original model. In order to address this issue, we further use a "treatment effects" model to estimate our output equation jointly with a probit regression on the crisis dummy.[6]

Other Econometric Issues

Compared to the Hausman-Taylor approach, a potentially more efficient General Methods of Moments (GMM) procedure for dynamic panels is available through the Arellano and Bond estimator (Arellano and Bond 1991, 1998). This procedure is usually employed in estimation of panels with a large number of individuals and short time-series. For our quarterly dataset, however, where on average we deal with 80 quarters per country, and a number of time periods exceeding the number of countries, this procedure becomes unfeasible. A second issue relates to our use of quarterly data. While we believe that using such relatively high-frequency data enhances our understanding of short-term macroeconomic dynamics, it could also introduce some noise. To address this concern, we estimated all our equations using an annual dataset as well and found that the main results are unchanged. Finally, we acknowledge that using four lags to compute output growth adds to the model's autoregressive component. However, redefining growth as the change in log output across adjacent quarters also yields similar results.[7]

[5] In principle HT estimation can also correct for reverse causality because it instruments the right hand side variables with lagged levels and differences. However, we prefer to also employ an explicit instrumentation strategy.

[6] See Edwards (2004) and Rancière et al. (2006) for similar use of treatment models.

[7] The estimates using annual data and growth across adjacent quarters as the dependent variable are available upon request.

Gross Capital Flows

The standard measure of gross international capital flows used in the literature (Rothenberg and Warnock 2006, Ito 1999, Alfaro et al. 2004, Tille and van Wincoop 2008, Prasad and Wei 2005) corresponds to the sum of foreign asset and liability changes in a country's balance of payments over a given period. Thus, asset (liability) changes are summed to give the gross outflow (inflow). However, since balance of payments data actually show many negative asset as well as liability changes, we depart from the literature by treating negative asset changes as inflows and negative liability changes as outflows. We, therefore, distinguish between the following four components of the total gross flow: outflows from assets, inflows from assets, inflows from liabilities and outflows from liabilities. We further exclude official capital flows since they are likely to behave differently from private flows and tend to be relatively small. Our primary interest is the economic growth effect of private outflows from liabilities, which is our measure of GIR.

Currency Crises and Sudden Stops

As discussed in more detail in Section 5, we suspect that the output effects of GIR may be stronger during financial crises. In order to test this hypothesis, we interact our measure of GIR with several financial crisis dummies in the growth regressions. Specifically, we pay attention to currency crises; current account reversals; and sudden stop crises defined, following Hutchison and Noy (2006), as the simultaneous occurrence of a currency crisis and a current account reversal. Calvo (1998) shows 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 this idea. For robustness, we use two measures of current account reversals; first, a rise in the current account-to-GDP ratio of more than twice the country-specific standard deviation of that ratio, and second, an increase of three percentage points or more in the current account-to-GDP ratio compared to the same quarter the previous year.[8] By currency crisis we understand a departure of two standard deviations or more in the level of exchange market pressure (Eichengreen et al. 1996), formulated as follows for each country i and time period

[8] Hutchison and Noy (2006) and Milesi-Ferretti and Razin (1998) use a measure similar to our second definition.

$t: EMP_{it} = \frac{\%\Delta R_{it}}{\sigma^2_{i\%\Delta R}} + \frac{\%\Delta E_{it}}{\sigma^2_{i\%\Delta E}}$. 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 $\sigma^2_{i\%\Delta R}$ and $\sigma^2_{i\%\Delta E}$ are the respective country-specific variances of the percent change over the sample years. Unlike Eichengreen et al. (1996), but following Hutchison and Noy (2006), we use the real rather than the nominal exchange rate because we are interested in real shocks. Eichengreen et al. 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. Similarly, we center on reserves and exchange rates in order to maximize data availability. In sum, we have one measure of currency crises, two measures of current account reversals and two measures of sudden stops. The incidence of each of the five types of crisis in the data is available in the working paper version.

4. Results

This section presents our main empirical results: GIR are negatively associated with output growth, larger during financial crises and strongly exacerbate the negative output effects of crises. Current account and partly sudden stop crises which are not accompanied by GIR actually tend to have insignificant or even positive output effects. Lastly, financial development can work as a buffer against GIR. These results are robust to controlling for the current account, net and gross capital flows, external financial crises and a variety of other factors. They are also robust to panel instrumental variable (IV) approaches and LSDV estimation.[9]

We begin by showing, in Table 5, that total gross capital flows are related to growth after controlling for the current account or the net inflow of capital. One standard deviation rise in the ratio of total gross flows to nominal GDP is associated with about 0.5 percentage point growth decline.[10] The findings for our control variables are consistent with those in the literature, thus,

[9] The IV estimates are shown below, while the LSDV estimates are available upon request.

[10] The literature has not reached a consensus regarding the link between gross capital flows and the level or growth rate of GDP (Obstfeld 2009). Rancière et al. (2006) find that financial liberalization harms output via increased

we omit a detailed discussion.[11] Next, in Table 6, we decompose the private gross capital flow into the four components introduced above and control for official gross flows and the change in reserves (a linear combination of which gives the current account, so we omit the latter). Strikingly, the only statistically significant private gross flow variable is private outflows from liabilities or GIR. In response to these results, in Table 7, we estimate equation (1) with only GIR on the right hand side, although we do control for the total gross and net capital flows. The GIR coefficient remains negative and highly significant. One standard deviation (.108) rise in GIR is associated with 0.5-0.9 percentage points fall in growth in the same quarter the following year.

Next, we explore whether GIR may be more harmful during tumultuous times.[12] Our first approach graphs the output performance of all the economies in our sample around crises periods. In Figures 2-6, we divide our sample among economies that suffer financial turmoil with large reversals in foreign liabilities[13] and those without large reversals. Robust to all four types of financial crises, the graphs show a large and persistent decrease in output growth for economies undergoing reversals and close to flat output performance among economies without reversals. We confirm these results econometrically in Table 8, where we interact GIR with our five financial crisis measures. As in the graphs, the results support that GIR strongly exacerbate the negative output effects of crises. In the full sample, one standard deviation rise in reversals

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propensity for financial crises, but raises long-term growth, while Calvo et al. (1996) and Fratzscher and Bussière (2004) argue that liberalization can lead to unsustainable booms ending in financial crises.

[11] Among the control variables, the negative sign on net capital inflows, and the positive sign on the current account in Table 5 are consistent with recent evidence that capital exporters grow faster than importers. For example, Aizenman et al. (2007, p.684) explain "There is no evidence of a ''growth bonus'' associated with increasing the financing share of foreign saving. The evidence suggests just the opposite: throughout the 1990s, countries with higher self-financing ratios grew significantly faster than countries with low self-financing ratios." See also Gourinchas and Jeanne (2007). Regarding the negative sign on domestic credit growth, while a high credit *level* may imply financial development and raise growth (King and Levine 1993), a high credit *growth rate* may indicate an unsustainable economy. For example, Frankel and Rose (1996) find that domestic credit growth is associated with currency crashes (Calvo et al. 1996). The positive sign on the change in reserves may reflect that reserves provide liquidity insurance or support undervalued currencies (Aizenman and Lee 2007).

[12] Tables 8-11 and 13-14 summarize the coefficients on our variables of interest from regressions run with all the controls displayed in the previous tables. The complete tables are available on request.

[13] We define "large" reversals as those higher than 1 standard deviation in the original series.

increases output loss due to a currency crisis by 3.7 percentage points. GIR also raises the loss due to current account and sudden stop crises, as identified by our first measures of these, by 1.7 and a full 15.8 percentage points, respectively. The corresponding results for our other measures of current account and sudden stop crises are 0.9 and 2.6 percentage points. We also note, as shown in Table 4 and Figure 1, that both the mean and the volatility of GIR tend to be larger during crises. Thus, combining Tables 4 and 8, one crisis-specific standard deviation rise in reversals exacerbates output loss due to a currency crisis by 10 percentage points. The corresponding rise in output loss due to a current account (sudden stop) crisis as defined by our first measure is 2.5 (10.4) percentage points. It is also worth noting that, not surprisingly, the rise in output loss due to reversals in crisis times is largest during sudden stops – when currency and current account crises occur simultaneously - compared to when these crises occur on their own. Finally, despite the emphasis on net capital flows in the sudden stop literature we find that once we control for the interaction of GIR with the crisis dummies there is no significant output effect of current account reversals by either of our two measures. In other words, current account reversals seem to only be harmful when they coincide with investment reversals. A slowdown in capital inflows without an outright reversal of past inflows has no clear output effect.

The remaining coefficients in Table 8 represent results from interacting GIR with crisis dummies by region. The interaction between crises and GIR turns out to be dramatically larger for non-OECD compared to OECD economies. For example, using our first measures of current account and sudden stop crises, the non-OECD estimates are more than twice as large for currency and sudden stop crises and more than three times larger for current account crises. In other words, compared to OECD economies, non-OECD output seems much more vulnerable to GIR during external financial crises. While Latin America stands out as particularly vulnerable, the contrast is also apparent for the other regions. As in the pooled sample, current account crises unaccompanied by GIR have no significant negative effects. In fact, four of the ten region-specific crisis coefficients are positive. The last rows of Table 8 show that the interactions between GIR and crises remain significant when we control for all three crises and interaction terms simultaneously in either the full or regional samples using our first measure of current account and sudden stop crises.[14] Finally, Table 9 reports estimates separately for FDI, portfolio

[14] However, the unreported results for our other measures of current account and sudden stop crises are insignificant.

and other foreign investment reversals in the balance of payments. While we focus on aggregate reversals in this paper we plan to study such GIR decompositions in future work.

The Role of Financial Development

We conjecture that one reason why GIR lead to output losses may be that entrepreneurs cannot access liquidity during crises. In that case domestic financial development may serve as a buffer during crises. In order to explore this empirically, we now create a triple interaction term between GIR, financial crises and domestic financial development measured by the ratio of money and quasi money (M2) to GDP. This changes equation (1) as follows:

$$\Delta \ln y_{it} = \delta_1 \Delta \ln y_{i(t-1)} + (\delta_2 + (\delta_3 + \delta_4 FD_{i(t-1)})C_{it}))\Delta L^{-}_{i(t-1)} + \delta_5 C_{it} + \beta' \vec{x}_{i(t-1)} + \alpha z_i + \mu_i + \varepsilon_{it} \quad (2),$$

where FD is the new financial development measure. The results are displayed in the first column of Table 10. As predicted, the interaction term has a positive and significant coefficient: countries with more developed financial markets seem to suffer less from GIR during crises. In the full sample, one standard deviation (1.9) increase in financial development decreases the adverse effect of GIR during crises (the size of the GIR*crisis coefficient) by 20.7-26.4 percentage points for four of the five crises categories and by even more (37.7 percentage points) for the last crisis category (sudden stops by our first measure). The region-specific estimates in Table 10 show further that financial development is mainly a buffer against the combination of GIR and crises in emerging markets. A plausible explanation is that financial development in the OECD region may be above a threshold required to withstand such shocks. On the other hand, just 0.5-1 standard deviation rise in financial development implies that GIR largely cease to exacerbate the negative output effects of crises in Latin America. Finally, like Table 8 Table 10 shows that current account reversals seem to only be harmful when accompanied by investment reversals. Moreover, unlike before it now appears that also sudden stops as defined by our first measure have insignificantly negative output effects unless accompanied by reversals.

Robustness Checks

Treatment Effects Model

We are aware that a potential source of endogeneity in our basic regression is the fact that the occurrence of different financial crises may depend on the covariates included in the original model. In order to address this issue, we use a "treatment effects" model[15] to jointly estimate our basic framework with a probit regression on the crisis dummy. Thus, we augment equation (4) with the following framework:

$$\Delta \ln y_{it} = \delta_1 \Delta \ln y_{i(t-1)} + (\delta_2 + (\delta_3 + \delta_4 FD_{i(t-1)})C_{it}))\Delta L^{-}_{i(t-1)} + \\ + \delta_5 C_{it} + \beta' \vec{x}_{i(t-1)} + \alpha z_i + \mu_i + \varepsilon_{it} \quad (3)$$

$$C_{it} = \begin{cases} 1, & \text{if } \widetilde{C}_{it} > 0 \\ 0, & \text{otherwise} \end{cases} \quad (4)$$

$$\widetilde{C}_{it} = \lambda v_{it} + \omega_{it} \quad . \quad (5)$$

To estimate the treatment equations (4)-(5), we use a panel probit model and turn to the literature to identify a set of commonly found significant covariates of the probability of external financial crises.[16] The selected covariates are output growth, private gross inflows and outflows, the current account balance, domestic credit growth, relative export growth,[17] the real effective appreciation of the currency and the stock of international reserves. The joint estimation of the system (3)-(5) is performed in two steps. Firstly, we extract the hazard from our panel probit using $H_{it} = \frac{f(\hat{C}_{it})}{1 - F(\hat{C}_{it})}$, where $\hat{C}_{it}$ are the estimated values of $\widetilde{C}_{it}$, f() is the probability density of a standard normal distribution, F() its cumulative probability function and 1-F() the basic survival function. Second, we estimate equation (5) using the HT estimators and including the hazard variable as an additional exogenous variable. Table 11 summarizes the results for the full

[15] See Edwards (2004) and Rancière et al. (2006) for use of treatment models in similar frameworks. Maddala (1983) explains the methodology in detail.

[16] See Frankel and Rose (1996), Eichengreen et al. (1996), Corsetti et al. (1998), Milesi-Ferretiand Razin (2000) and Edwards (2002) among others.

[17] Relative export growth is year-to-year growth of exports divided by growth of imports.

sample as well as regional results (see Table 12 for the coefficients from the two step regression). All the results are consistent with our previous findings: GIR have negative output effects on the global level, output loss is greatly exacerbated during financial crises in emerging markets, and the level of financial development in these economies helps alleviate the output loss. Finally, reinforcing our earlier results both current account and sudden stop crises have insignificant output effects unless accompanied by reversals.

Panel Instrumental Variables (IV) Approach

To the extent that investors anticipate future output declines, causality could potentially run from output declines to lagged GIR. In order to address this reverse causality concern, we now instrument each country's lagged GIR using contemporaneous reversals in its large trading partners in a fixed effects panel.[18] To avoid the risk of bias in dynamic panels with fixed effects discussed earlier (Nickell 1981), we do not include the autoregressive component of growth among the regressors. The estimates in Table 13 support the causal effect of GIR on output which we claimed earlier, as well as our finding that the effect is stronger during financial crises, although for brevity we do not distinguish between emerging markets and OECD countries. The first stage results show that the instruments are correlated with the endogenous variables: comparing the Kleibergen-Paap Rk Wald F statistic with the critical values in Stock and Yogo (2002) easily rejects at the five percent level that the true size of our five percent significance tests exceeds ten percent due to weak instruments. Regressing growth on GIR along with the instruments further supports that the instruments are not correlated with the dependent variable after controlling for investment reversals.[19] Table 14 shows that the buffer role of financial development is also robust.[20] Finally, the instrumented estimates for GIR and the interaction

[18]That is, while economic growth is measured at time (t), both GIR and trading partners' GIR are measured at (t-1).

[19] These results are available on request. Splitting the sample between emerging markets and OECD countries suggests, however, that while our instruments work well for emerging markets they do not work well for OECD countries alone.

[20] Stock and Yogo (2002) do not provide critical values for weak instrument testing with more than two endogenous regressors. Therefore we cannot formally test for weak instruments when interacting GIR with crises as well as financial development in Table 14. However, except in the case of current account reversals – where our instruments are probably weak - the first-stage F statistics in Table 14 do exceed ten, which is the rule of thumb for rejecting weak instruments proposed in Staiger and Stock (1997).

terms in Tables 13-14 are substantially larger than the corresponding HT estimates in Tables 9-10. The reasons are, first, that the IV equations do not include lagged growth on the right hand side. Including the lagged growth term provides potentially biased IV estimates which are on average roughly half as large as in Tables 13-14. Second, to the extent HT estimation does not fully control for causality from output declines to investment reversals our estimates in Tables 9-10 are downward biased. However, this downward bias would only underestimate, not overestimate, the quantitative and statistical significance of GIR on which the paper is focused.

5. Mechanisms

Our main empirical results include a large negative output effect of gross foreign investment reversals. Moreover, reversals greatly exacerbate the negative output effects of financial crises in emerging markets. In fact, net capital inflow declines unaccompanied by investment reversals have no clear output effects. Lastly financial development can buffer output against investment reversals. We now provide a simple investment model consistent with these findings.[21]

The economy has a continuum of projects in $[0,1]$. Each project requires a unit investment of foreign goods in period zero (Caballero and Krishnamurthy 2001) and has unknown quality r. The true quality is uniformly distributed on $[0,\bar{r}]$ and privately learned by investors in period one. A project of quality r returns r in period two if the macroeconomic fundamentals in period two are good. Otherwise, it returns $0 \le \phi r < r$. The fundamentals are learned by all agents in period one and are good with probability μ.

Since domestic agents have no international liquidity in period zero, all projects must be funded from abroad. This can happen either directly, as with FDI, or via foreign lending to domestic financial intermediaries, such as banks, who then pass the funds to domestic firms. For simplicity we do not distinguish these possibilities and assume that all loans are FDI. The opportunity cost of funds for foreign lenders is one in period zero. However, in period one with probability q this

[21] The appendix relates GIR to output losses in a portfolio model.

cost rises to $R > 1$. This risk can reflect an international liquidity shock due to contagion effects or rising interest rates in developed markets.

Finally, we assume two sets of domestic agents. The first is domestic "producers" who can invest a unit of funds in period zero and thereby produce goods which are complementary to the foreign projects in period two. In this case their return in period two is μr whenever a completed foreign project pays r. Alternatively they can invest in a sector unrelated to the foreign projects for a return of 1 or ϕ depending on fundamentals. The second set of domestic agents is "financers" who are liquid in period one. Specifically, each financier has liquid foreign assets of value w in period one and can borrow up to $(\lambda - 1)w > 0$ from other financiers. Since the total number of financiers exceeds λ, they could potentially buy all the projects for λw. Henceforth, following Caballero and Krishnamurthy (2001) we interpret a low value of λ as a low degree of financial development. If a domestic financier buys a project in period one then the project returns θr or $\theta\phi r$ in period two depending on fundamentals. We further assume that $\theta \in (0,1)$ because domestic financiers may manage projects less efficiently, be more risk averse in their management due to having less diversified portfolios, or be less productive for other reasons. After all, there is presumably a reason two-way capital flows occur empirically.[22]

The model's timing is the following. In period zero foreign lenders invest in the projects, which is profitable for $\bar{r}$ sufficiently large. Then domestic producers invest in complementary projects, which is profitable for μ large. At the beginning of period one three uncertainties are resolved. First, the foreign lenders learn their opportunity cost of funds between periods one and two. Second, each foreign lender learns the quality of her project. Third, both domestic and foreign agents learn the economy's fundamentals in period two. Given this information, each of the

[22] While a foreign productivity advantage is most obvious for FDI, it may also be true for foreign bank or portfolio lending. For instance, according to Dooley et al. (2004, p.6) "..international financial intermediation facilitates periphery growth because it channels domestic savings in the periphery through superior financial markets in the center" (Galindo et al. 2005, Caballero and Farhi 2008) and international banking services are a major source of global trade and investment.

foreign lenders decides to either complete her project or, alternatively, liquidate or sell the project. We assume that liquidating pays l and that the parameters satisfy $Rl > \bar{r} >> 1 > l > \phi\bar{r} > 0$. This implies that lenders would rather liquidate than complete a project when their opportunity cost of funds is high. Moreover, when fundamentals are bad it is always better to liquidate than complete.

Equilibrium

There are four possible outcomes for capital flows and second period output.

Finally, despite the emphasis on net capital flows in the sudden stop literature we find that once we control for the interaction of GIR with current account and sudden stop crises there is no residual effect of these crisis dummies. In other words, current account and sudden stop crises seem to only be harmful when they coincide with investment reversals. A slowdown in capital inflows without an outright reversal of past inflows has no clear output effect.

Case 1: *Fundamentals are good and there is no foreign liquidity shock.* In this case the foreign lenders complete all projects with return $r \geq l$ and liquidate the rest. There is therefore a gross foreign investment reversal of $\int_{r=0}^{r=l} (1/\bar{r})dr = l/\bar{r}$. Correspondingly, the balance of payments will show foreign acquisitions of domestic assets equal to $-l/\bar{r}$. It follows that output in period two is $(1+\mu)\int_{r=l}^{\bar{r}} r(1/\bar{r})dr = (1+\mu)(\bar{r}^2 - l^2)/2\bar{r} \equiv y_1$. Finally, notice that the reason foreign lenders cannot sell the projects to domestic financiers is that, at any price per project x, only projects with $r \leq x$ would be sold and there would be a lemons market: the expected project value would be $E[\theta r | r \leq x] = \int_{r=0}^{x} r(1/\bar{r})dr \Big/ \int_{r=0}^{x} (1/\bar{r})dr = \theta x/2 < x$.

Case 2: *Fundamentals are good, there is a foreign liquidity shock and* $\theta R \geq 2, \lambda w \geq l$. In this case, at a market price of x in period one, any project with either $r \leq x$ or $r/R \leq x$ is offered for sale. The expected project value for domestic financiers is therefore

$E[\theta r | r \le xR] = \int_{r=0}^{xR} r(1/\bar{r})dr \Big/ \int_{r=0}^{xR} (1/\bar{r})dr = \theta xR/2 \ge x$ since $\theta R \ge 2$. Thus the financiers would like to buy the projects. Since further $\lambda w \ge l$ they can persuade the foreign agents to sell rather than liquidate. Once they discover the true project qualities they eliminate the bad projects, implying the ones for which $\theta r < l$, and output in period two is $(1+\mu)\int_{r=l/\theta}^{\bar{r}} \theta r(1/\bar{r})dr$ $= (1+\mu)\theta(\bar{r}^2 - (l/\theta)^2)/2\bar{r} \equiv y_2 < y_1$. In addition there is a gross foreign investment reversal in period one equal to what the projects sell for, which is $\min\{\lambda w, \theta\bar{r}/2\}$, where the second term is the maximum willingness to pay of domestic financiers. However, notice that there is no *net* capital inflow decline in period one: the economy's gross capital outflow is matched by a corresponding inflow as financiers draw down their foreign assets to pay for the projects.

Case 3: *Fundamentals are good, there is a foreign liquidity shock and* $\theta R < 2$ *or* $\lambda w < l$. In this case since either $\theta R < 2$, and therefore domestics refuse to buy the projects, or $\lambda w < l$ and they cannot buy them, all projects are liquidated. Thus there is a gross foreign investment reversal of l and a negative net capital inflow $-l$ preceding a zero output level in period two.

Case 4: *Fundamentals are bad.* In this case since $l > \phi\theta\bar{r} > \phi\bar{r}$ both domestic and foreign agents will liquidate all the projects. As in Case 3 a gross foreign investment reversal of l and a negative net capital inflow of l precede zero output in period two.

The four cases are summarized in Table 15. Comparing across them shows, first, that the low output in Cases 3 and 4 is preceded by a large net inflow reversal (a net outflow equal to l). This is consistent with a sudden stop or current account crisis. In contrast, Case 2 does not entail a net outflow in period one and Case 1 involves at most a moderate net outflow since $l/\bar{r} << l \Leftrightarrow \bar{r} >> 1$. Thus external financial crises which coincide with investment reversals are linked to output losses as we found empirically. Second, like we controlled for crises in the paper's empirical section one can "control" theoretically for crises by only comparing Case 1 and Case 2 reversals in the model, that is, reversals in "normal" times. This shows that the larger investment reversal in Case 2 (again since $l >> l/\bar{r}$) is associated with lower output to the extent

domestic financiers' productivity θ is below that of foreign investors. This fits our finding in Table 8 that at least in OECD countries gross investment reversals are negatively related to output even outside crisis episodes. However, also consistent with our findings the output effect is more moderate than during crises.

Third, a key factor deciding the output effect of a foreign liquidity shock is financial development λ: under good fundamentals but with financial development low enough that $\lambda w < 1$, a foreign liquidity shock implies Case 3 and therefore a large output decline. If instead financial development is high, and the lemons problem is avoided, then the result is Case 2 and moderate output. This is consistent with our finding that financial development (a large value of λ) buffers countries against foreign investment reversals.[23] Alternatively, it could explain why reversals have more negative output effects during crises: financial crises typically imply a credit crunch and therefore a fall in λ. Fourth, notice that while the output lost in Cases 2 and 3 is due to a foreign liquidity shock, which supports the causal direction we emphasize in the paper's empirical section, Case 4 allows a domestic productivity shock to cause investment reversals. We believe that both causal directions can be important in practice. Finally, notice that a crisis with foreign investment reversal in Cases 3 and 4 is actually worse than if the foreign capital had never entered in period zero (e.g. if we allowed for a foreign liquidity shock already in period one): if foreign capital had never entered then domestic producers would not have sunk investment in producing goods complementary to the foreign projects and would have received 1 or ϕ depending on fundamentals. This would also have been the economy's output level. Thus, crises accompanied by foreign investment reversals may be much worse than crises unaccompanied by reversals. This can explain why the interaction between reversals and crises in Tables 9-15 is so large even though we include crisis dummies and why the crisis dummies tend to be insignificant.

[23] Alternatively, financial development may help domestic financiers screen projects, which again makes Case 2 more likely compared to Case 3.

6. Conclusion

In this paper, we have identified a large and robust negative output effect of gross foreign investment reversals as measured by negative quarterly changes in a country's external liabilities. Due to our focus on this particular type of gross capital flow, rather than a country's *net* inflow of capital, the paper contrasts with the majority of studies in the sudden stop literature. Foreign investment reversals tend to be larger during external financial crises and to greatly exacerbate the negative output effects of crises in emerging markets. The rise in output loss due to reversals in crisis times is largest during sudden stops – when currency and current account crises occur simultaneously - compared to when these crises occur on their own. Further, we find that financial development helps to mitigate the negative effect of reversals during crises in emerging markets. Finally, we have discussed some possible mechanisms linking gross foreign investment reversals to output losses in a simple model of capital flows and external financial crises. We conclude that the harmful effects of financial crises may relate to gross as well as net capital flows and that policies to limit gross foreign investment reversals, or the damage they cause, may be useful beyond their effect on the current account and sudden stop risk.

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Appendix

A1: Consistent and efficient estimators for a dynamic panel model

In the main paper we use a model of the form[24]:

$$y_{it} = y_{i(t-1)}\beta_1 + x'_{1i(t-1)}\beta_2 + x'_{2i(t-1)}\beta_3 + z'_i\alpha + \varepsilon_{it} + \mu_i, \qquad \text{(a1)}$$

where $y_{i(t-1)}$ is the dynamic term, $x_{1i(t-1)}$ represents a subset of lagged time-varying covariates correlated with the random effect μ_i and $x_{2i(t-1)}$ represents another subset of time-varying covariates uncorrelated with μ_i. Finally, $z'_i\alpha$ represents a time-invariant covariate uncorrelated with μ_i and ε_{it} is an i.i.d. error term.

The HT estimation strategy involves an instrumental variable estimator using information provided by the model. The instruments can be extracted from the group mean deviations in the following formulation:

$$y_{it} - \bar{y}_i = (y_{i(t-1)} - \bar{y}_i)\beta_1 + (x_{1i(t-1)} - \bar{x}_{1i})'\beta_2 + (x_{2it} - \bar{x}_{2i})'\beta_3 + \varepsilon_{it} - \bar{\varepsilon}_i. \qquad \text{(a2)}$$

The following three steps in HT ensure finding consistent and efficient estimators of $\boldsymbol{\beta} = (\beta_1, \beta_2, \beta_3)$ and $\boldsymbol{\alpha}$; Firstly, we obtain the LSDV estimators of $\boldsymbol{\beta}$ from equation (a2). The residual variance is a consistent estimator of σ_ε^2. In the second step, the stacked group means of the residuals from equation (a2) are used as the dependent variable in an instrumental variable (IV) regression on $\mathbf{z}$ using $x_{2i(t-1)}$ as instruments. This provides a consistent estimator of $\boldsymbol{\alpha}$. The residual variance in this regression is a consistent estimator of $\sigma^{*2} = \sigma_\mu^2 + \sigma_\varepsilon^2 / T$,where T is the total number of periods. Using the estimator σ_ε^2 found above, we can solve for σ_μ^2. In the third step, we use the previously found consistent estimators for the residual variances to give the structure to feasible generalized least squares (FGLS) estimation of the model. The weight on the

[24] See Greene (2002) for a detailed textbook derivation of the HT estimators.

FGLS is formed using the estimate of $\theta = \sqrt{\frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_\mu^2 T}}$. In the final step, we estimate the efficient instrumental variable estimator of (a2) using the previously found θ as the weight to transform the variables of the model such as:

$$h_{it}^{'*} = h_{it}^{'} - (1-\theta)\bar{h}_i^{'} \quad \text{and} \quad y_{it}^{'*} = y_{it}^{'} - (1-\theta)\bar{y}_i^{'},$$

where $h'_{it} = (y_{i(t-1)}, x'_{1i(t-1)}, x'_{2it}, z'_i)$.

A2: Variable Definitions, Sources, Summary Statistics and Sample Countries

Real GDP Growth: Our output growth measure is based on the yearly percentage change of real \$US GDP (Y_i) for each country i = Ln(Y(t))-lnY(t-4)). The main source is IFS dataset where we use the deflator provided by the IMF to deflate the nominal value of domestic currency GDP for each country, then we transform that value in US\$ using the nominal exchange rate provided in IFS. Other sources used in the paper for real GDP are OECD Source, Economic Intelligence Unit (EIU), DataStream (DS) and CEIC.

Gross Capital Flows:

-Total Gross 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 (GIR):** 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: Net Inflows is defined as the current account deficit minus the increase in international reserves.

The main source for balance of payment data is BOPS from IMF. Data for Taiwan and Switzerland was obtained from CEIC.

Domestic Credit: 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.

Terms of Trade (TOT): Net barter terms of trade are the ratio of the export price index to the corresponding import price index measured relative to the base year 2000.

Sources:

-Constructed. We use export and import value data from IFS. We use two kinds of proxies for export/import price indices.

a. Indices for export and import prices compiled from survey data for wholesale prices or directly from the exporter or importer (called "direct pricing"). See IFS line 76.

b. Indices for Unit Value of Exports (see IFS line 74) and Unit Value of Imports (see IFS line 75) are Laspeyres, with weights derived from the data for transactions.

We use indices based on direct pricing when available since these are generally preferable to unit value indices, as problems of unit value bias are reduced.

-Other Sources: DS, OECD Source, CEIC, EIU

Stock of Reserves: 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.

Trade Openness (TO): Trade openness is the sum of merchandise exports and imports divided by twice the value of nominal GDP, all in current U.S. dollars. Data for Imports and Exports was extracted from IFS, DS, EIU and CEIC.

Effective Terms of Trade (EToT): EToT proxies the actual effects in changes in ToT into any economy. The extend of these effects is determined by the degree of trade openness the country is subject to so EToT is defined as ToT x To.

Fiscal Expenditure Growth: Corresponds to increases in Government Consumption Expenditure (IFS line 91f). Government Expenditures consists of expenditure incurred by general government on both individual-consumption goods and services and collective-consumption services. The main source is IFS, but we also use data from EIU and CEIC.

Real Effective Exchange Rates (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,

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

Where e: Exchange rate of the subject currency against the US dollar (US dollars per rupee in index form); ei: Exchange rates of currency i against the US dollar (US dollars per currency i in index form); wi: Weights attached to the country/ currency i in the index; P: Consumer Price Index (CPI) of Subject country and Pi 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 JP Morgan.

Table 1: Summary Statistics for main variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Real GDP Growth	6619	-0.00692	0.263732	-4.80024	0.89835
Nominal GDP	7149	289575.4	1211979	0	1.45E+07
Total Gross Flows*	6002	0.384016	0.64475	0.000131	9.464772
Private Gross Flows*	6002	0.331352	0.607028	0.000131	8.613255
Official Gross Flows*	6002	0.052664	0.105429	0	4.04051
Private Outflows from Liabilities*	6002	0.038064	0.108471	0	3.144324
Private Inflows from Liabilities*	6002	0.135573	0.256414	0	3.665354
Privates Outflows from Assets*	6002	0.119786	0.256911	0	3.490844
Privates Inflows from Assets*	6002	0.037929	0.111259	0	3.557817
Current Account Balance*	5982	-0.01117	0.068475	-0.75011	0.48014
Change in Reserves*	6013	0.012061	0.049542	-0.40083	0.497381
Net Inflows*	5946	-0.00429	0.131416	-3.37029	2.984862
Domestic Credit*	6893	2.703802	2.062014	-0.57654	16.40984
Fiscal Expenditure*	6698	0.172184	0.066823	0.001688	1
Real Effective Appreciation	9069	0.002076	0.114272	-1.44552	1.518268
Inflation	12571	0.582895	7.360953	-0.16327	356.813
Trade Openness	7070	0.310301	0.25767	0.00169	2.83045
Terms of Trade	6822	106.8887	31.16951	19.47883	515.51
Financial Liquidity	6382	2.260623	1.902989	0.003484	16.65117
Stock of International Reserves*	7054	0.479352	0.577143	0.001688	4.444882
Currency Crisis Dummy	8642	0.053807	0.22565	0	1
Current Account Reversal 1	5660	0.030212	0.171185	0	1
Current Account Reversal 2	5660	0.131095	0.337535	0	1
Sudden Stop 1	5109	0.022118	0.147081	0	1
Sudden Stop 2	5109	0.048542	0.214929	0	1

* Variables are deflated by Nominal GDP. Financial Liquidity is measured as the sum of money and quasi-money (M2) deflated by nominal GDP. Current Account Reversal 1 corresponds to positive jumps in the current account in excess of 2 standard deviations. Current Account Reversal 2 is a jump in excess of 3 percent of nominal GDP. Sudden Stop 1 and 2 occur when Currency Crisis coincides with, respectively, Current Account Reversals 1 and 2.

Table 2: List of Countries Used in the Regressions*

All Countries (75)

Argentina	Ecuador	Kyrgyz Republic	Russian Federation
Armenia	Estonia	Latvia	Singapore
Australia	Finland	Lithuania	Slovak Republic
Austria	France	Macedonia, FYR	Slovenia
Belarus	Georgia	Malaysia	South Africa
Belgium-Luxembourg	Germany	Mauritius	Spain
Bolivia	Greece	Mexico	Sri Lanka
Brazil	Guatemala	Morocco	Sweden
Bulgaria	Hungary	Netherlands	Switzerland
Cambodia	Iceland	New Zealand	Thailand
Canada	India	Norway	Turkey
Chile	Indonesia	Pakistan	Ukraine
Hong Kong	Ireland	Panama	United Kingdom
Colombia	Israel	Paraguay	United States
Costa Rica	Italy	Peru	Venezuela
Croatia	Japan	Philippines	Vietnam
Cyprus	Jordan	Poland	Taiwan
Czech Republic	Kazakhstan	Portugal	
Denmark	South Korea	Romania	

* Some countries are dropped in different specifications

Table 3: Country Groups

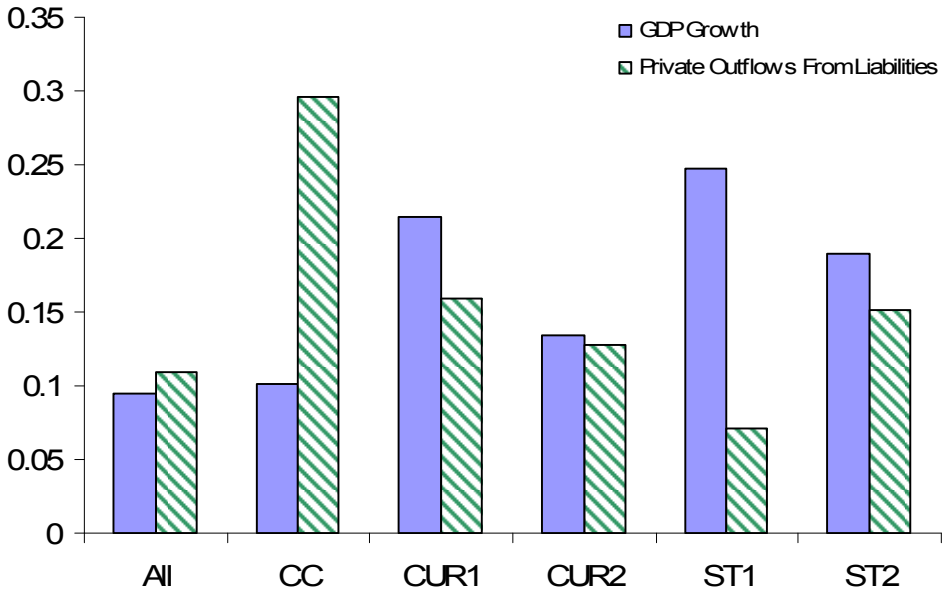
Emerging Markets*	Developed OECD	Latin America	Emerging Asia	East Europe
Argentina	Australia	Argentina	Hong Kong	Bulgaria
Brazil	Austria	Bolivia	India	Croatia
Chile	Belgium-Luxembourg	Brazil	Indonesia	Czech Republic
Hong Kong	Canada	Chile	South Korea	Estonia
Colombia	Denmark	Colombia	Malaysia	Hungary
Czech Republic	Finland	Costa Rica	Pakistan	Latvia
Hungary	France	Ecuador	Philippines	Lithuania
India	Germany	Mexico	Singapore	Poland
Indonesia	Greece	Peru	Thailand	Romania
Israel	Iceland	Venezuela	Taiwan	Russian Federation
South Korea	Ireland			Slovak Republic
Malaysia	Italy			Slovenia
Mexico	Japan			Ukraine
Philippines	Netherlands			
Russian Federation	New Zealand			
Singapore	Norway			
Slovak Republic	Portugal			
South Africa	Spain			
Thailand	Sweden			
Turkey	Switzerland			
Venezuela	United Kingdom			
Taiwan	United States			

* Emerging markets are selected from countries belonging to Standard and Poor's Emerging Market Index and IMF list of emerging markets.

Table 4: Mean and Standard Deviations of Output Growth, Gross Foreign Investment Reversals, Net Inflows and Total Gross Capital Flows in Full Sample and During Crises

	All		CC		CUR1		CUR2		ST1		ST2	
Variable	**Mean**	**Stdev**	**Mean**	**Stdev**	**Mean**	**Stdev**	**Mean**	**Stdev**	**Mean**	**Stdev**	**Mean**	**Stdev**
GDP Growth	0.037	0.095	0.006	0.102	0.003	0.214	0.029	0.134	-0.005	0.248	-0.008	0.189
GIR	0.039	0.109	0.089	0.296	0.069	0.159	0.06	0.128	0.058	0.071	0.08	0.151
Net Inflows	-0.004	0.131	0.043	0.219	-0.077	0.343	-0.073	0.251	-0.03	0.518	-0.035	0.382
Total Gross Flows	0.393	0.66	0.484	1.052	0.421	0.668	0.483	0.686	0.35	0.503	0.553	0.968
	Obs	6002	Obs	249	Obs	170	Obs	740	Obs	110	Obs	245

Figure 1: Volatility (*) of Output Growth and GIR in Full Sample and during Crises



(*)Volatility is measured as the pooled standard deviation for each series

A3: Results

Table 5: Hausmann-Taylor Estimates for Growth on Total Gross Flows

	1	2	3	4	5
	Growth	**Growth**	**Growth**	**Growth**	**Growth**
Growth (t-1)	0.817***	0.814***	0.813***	0.876***	0.878***
	[0.006]	[0.006]	[0.007]	[0.010]	[0.012]
Total Gross Flows (t-1)	-0.008***	-0.008***	-0.008***	-0.008**	-0.007**
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
Net Inflows (t-1)	-0.096***				
	[0.012]				
Current Account (t-1)		0.127***	0.141***	0.132***	0.153***
		[0.027]	[0.029]	[0.029]	[0.037]
Δ Int. Reserves (t-1)		0.288***	0.244***	0.217***	0.265***
		[0.029]	[0.031]	[0.031]	[0.038]
Currency Crisis (t-1)			-0.071***	-0.070***	-0.067***
			[0.007]	[0.007]	[0.007]
Δ Domestic Credit (t-1)			-0.040***	-0.035***	-0.036***
			[0.007]	[0.007]	[0.009]
Trade Openness (t-1)			0.015	0.007	-0.002
			[0.012]	[0.010]	[0.011]
Inflation (t-1)				0.034***	0.041***
				[0.003]	[0.005]
Inflation^2 (t-1)				-0.001***	-0.001***
				[0.000]	[0.000]
Δ Fiscal Expenditure (t-1)			-0.016	-0.016	-0.012
			[0.022]	[0.022]	[0.077]
Real Appreciation (t-1)			0.058***	-0.028	-0.032
			[0.018]	[0.020]	[0.024]
Δ Effective ToT (t-1)					0.020*
					[0.012]
Regional Dummy LA	-0.013*	-0.009	-0.009	-0.005	0.021**
	[0.007]	[0.007]	[0.011]	[0.009]	[0.010]
Regional Dummy EA	0	-0.004	-0.005	-0.001	0.020**
	[0.007]	[0.007]	[0.011]	[0.010]	[0.010]
Regional Dummy EE	0.009	0.008	0.006	0.007	0.039***
	[0.007]	[0.007]	[0.010]	[0.009]	[0.010]
OECD	0.009	0.011*	0.016*	0.017**	0.037***
	[0.006]	[0.006]	[0.009]	[0.008]	[0.008]
Observations	5592	5592	4764	4764	3957
Number of countries	75	75	64	64	51
R-squared	0.768	0.7709	0.7989	0.8032	0.8077

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables except Real Appreciation and Inflation are deflated by GDP. Inflation^2 represents the square values of inflation and is meant to capture non-linear effects of inflation such as during hyperinflation. We have also run all specifications using a dummy variable for hyperinflation and found similar results. R-squared values are taken from the LSDV regression corresponding to the first step of calculating the HT estimators. All regressions include quarter dummies to capture potential seasonal effects, coefficients are not reported.

Table 6: Growth on Individual Gross Flow Components

	1	2	3	4	5	6	7
	Growth	**Growth**	**Growth**	**Growth**	**Growth**	**Growth**	**Growth**
Growth (t-1)	0.811***	0.811***	0.810***	0.810***	0.811***	0.855***	0.880***
	[0.006]	[0.006]	[0.006]	[0.006]	[0.006]	[0.008]	[0.010]
Private Outflows from Liabilities (GIR) (t-1)	-0.062***	-0.065***	-0.067***	-0.065***	-0.067***	-0.058**	-0.047**
	[0.023]	[0.023]	[0.023]	[0.025]	[0.025]	[0.025]	[0.024]
Private Inflows from Liabilities (t-1)	-0.012	-0.01	-0.009	-0.002	-0.002	-0.002	-0.002
	[0.018]	[0.018]	[0.018]	[0.019]	[0.019]	[0.019]	[0.018]
Private Outflows from Assets (t-1)	0.018	0.01	0.009	0.01	0.008	0.01	0.009
	[0.018]	[0.018]	[0.018]	[0.019]	[0.020]	[0.019]	[0.019]
Private Inflows from Assets (t-1)	-0.005	-0.007	-0.006	0	0	0	-0.004
	[0.023]	[0.023]	[0.023]	[0.024]	[0.024]	[0.024]	[0.023]
Gross Official Flows (t-1)	-0.024	-0.023	-0.022	-0.051**	-0.050**	-0.057***	-0.058***
	[0.014]	[0.014]	[0.015]	[0.021]	[0.021]	[0.021]	[0.020]
Δ Int. Reserves (t-1)	0.300***	0.295***	0.285***	0.280***	0.289***	0.251***	0.233***
	[0.029]	[0.029]	[0.030]	[0.031]	[0.032]	[0.032]	[0.032]
Trade Openness (t-1)		0.015	0.007	0.011	0.013	0.002	0
		[0.009]	[0.012]	[0.014]	[0.014]	[0.014]	[0.014]
Stock of Reserves (t-1)			0.006	0.006	0.006	0.011*	0.010*
			[0.005]	[0.006]	[0.006]	[0.006]	[0.006]
Δ Domestic Credit (t-1)				-0.032***	-0.032***	-0.029***	-0.035***
				[0.006]	[0.006]	[0.006]	[0.006]
Δ Fiscal Expenditure (t-1)					-0.031	-0.034	-0.011
					[0.022]	[0.022]	[0.021]
Inflation (t-1)						0.035***	0.035***
						[0.003]	[0.003]
Inflation^2 (t-1)						-0.001***	-0.001***
						[0.000]	[0.000]
Real Appreciation (t-1)							-0.008
							[0.020]
Regional Dummy LA	-0.004	-0.002	-0.003	-0.005	-0.004	-0.003	-0.001
	[0.006]	[0.007]	[0.007]	[0.009]	[0.010]	[0.010]	[0.009]
Regional Dummy EA	0.004	0	-0.001	-0.005	-0.004	-0.004	-0.001
	[0.006]	[0.007]	[0.008]	[0.009]	[0.010]	[0.010]	[0.009]
Regional Dummy EE	0.008	0.005	0.005	0.003	0.004	0.002	0.004
	[0.006]	[0.007]	[0.007]	[0.008]	[0.009]	[0.009]	[0.009]
OECD	0.015***	0.016***	0.017***	0.017**	0.018**	0.020***	0.020***
	[0.005]	[0.005]	[0.006]	[0.007]	[0.008]	[0.008]	[0.007]
Observations	5641	5634	5633	5515	5337	5337	4925
Number of countries	76	76	76	75	75	75	68
R-squared	0.771	0.771	0.771	0.773	0.775	0.78	0.798

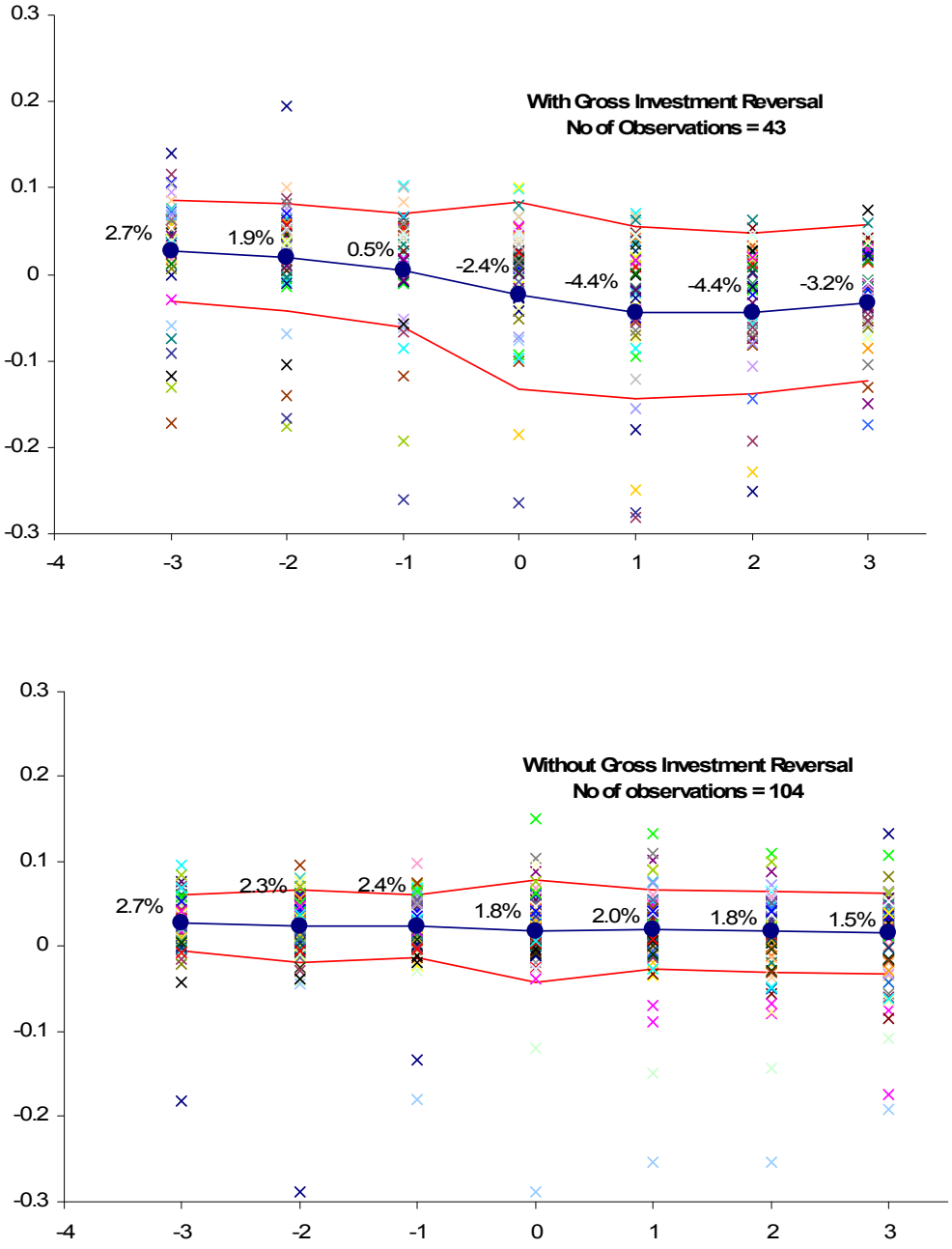
Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables except Real Appreciation and Inflation are deflated by GDP. Inflation^2 represents the square values of inflation and is meant to capture non-linear effects of inflation such as during hyperinflation. We have also run all specifications using a dummy variable for hyperinflation and found similar results. R-squared values are taken from the LSDV regression corresponding to the first step of calculating the HT estimators. All regressions include quarter dummies to capture potential seasonal effects, coefficients are not reported.

. **Table 7: Growth on Gross Foreign Investment Reversals**

	1	2	3	4	5
	Growth	**Growth**	**Growth**	**Growth**	**Growth**
Growth (t-1)	0.814***	0.812***	0.848***	0.864***	0.840***
	[0.006]	[0.006]	[0.007]	[0.010]	[0.012]
Total Gross Flows (t-1)	0.002	0.001	-0.002	-0.001	-0.002
	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]
GIR (t-1)	-0.082***	-0.075***	-0.055***	-0.056***	-0.046***
	[0.016]	[0.016]	[0.015]	[0.015]	[0.016]
Net Inflows (t-1)	-0.095***				
	[0.012]				
Current Account (t-1)		0.130***	0.148***	0.150***	0.169***
		[0.027]	[0.028]	[0.028]	[0.035]
Δ Int. Reserves (t-1)		0.277***	0.238***	0.227***	0.258***
		[0.029]	[0.031]	[0.031]	[0.037]
Currency Crisis (t-1)			-0.055***	-0.055***	-0.054***
			[0.007]	[0.007]	[0.007]
Sudden Stop (t-1)			-0.045***	-0.048***	-0.048***
			[0.010]	[0.010]	[0.011]
Δ Domestic Credit (t-1)			-0.041***	-0.041***	-0.040***
			[0.007]	[0.007]	[0.008]
Trade Openness (t-1)			0.01	0.007	-0.005
			[0.011]	[0.011]	[0.011]
Inflation (t-1)				0.022***	0.007
				[0.004]	[0.006]
Inflation^2 (t-1)				-0.001***	-0.000**
				[0.000]	[0.000]
Δ Fiscal Expenditure (t-1)			-0.009	-0.01	-0.002
			[0.021]	[0.021]	[0.073]
Real Appreciation (t-1)			0.014	-0.011	0.018
			[0.018]	[0.020]	[0.023]
Δ Effective ToT (t-1)					0.012
					[0.012]
Regional Dummy LA	-0.012*	-0.009	-0.012	-0.01	0.013
	[0.007]	[0.007]	[0.010]	[0.010]	[0.010]
Regional Dummy EA	0.001	-0.004	-0.007	-0.005	0.016
	[0.007]	[0.007]	[0.011]	[0.011]	[0.010]
Regional Dummy EE	0.009	0.009	0.004	0.005	0.036***
	[0.007]	[0.007]	[0.010]	[0.010]	[0.011]
OECD	0.009	0.010*	0.011	0.013	0.031***
	[0.006]	[0.006]	[0.009]	[0.008]	[0.008]
Observations	5592	5592	4686	4686	3899
Number of countries	75	75	64	64	51
R-Sqared	0.7691	0.7719	0.809	0.8106	0.8144

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables except Real Appreciation and Inflation are deflated by GDP. Inflation^2 represents the square values of inflation and is meant to capture non-linear effects of inflation such as during hyperinflation. We have also run all specifications using a dummy variable for hyperinflation and found similar results. R-squared values are taken from the LSDV regression corresponding to the first step of calculating the HT estimators. All regressions include quarter dummies to capture potential seasonal effects, coefficients are not reported.

Figure 2: Currency Crises



Each point represents output growth at the time of the crisis (time 0) or three quarters before and after the crisis. If the combined increase of private outflows from liabilities during the quarter preceding the crisis and the quarter of the crisis exceeds one standard deviation, we consider that the crisis is accompanied by a reversal of gross foreign investment.

Figure 3: Current Account Reversals (> 2 standard deviations increase in CU/GDP)

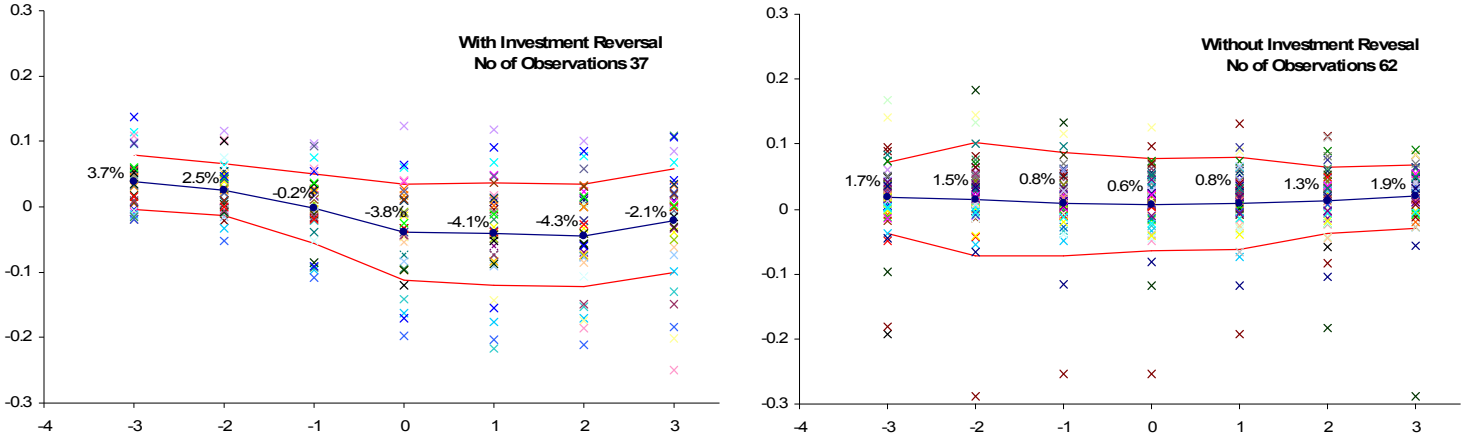
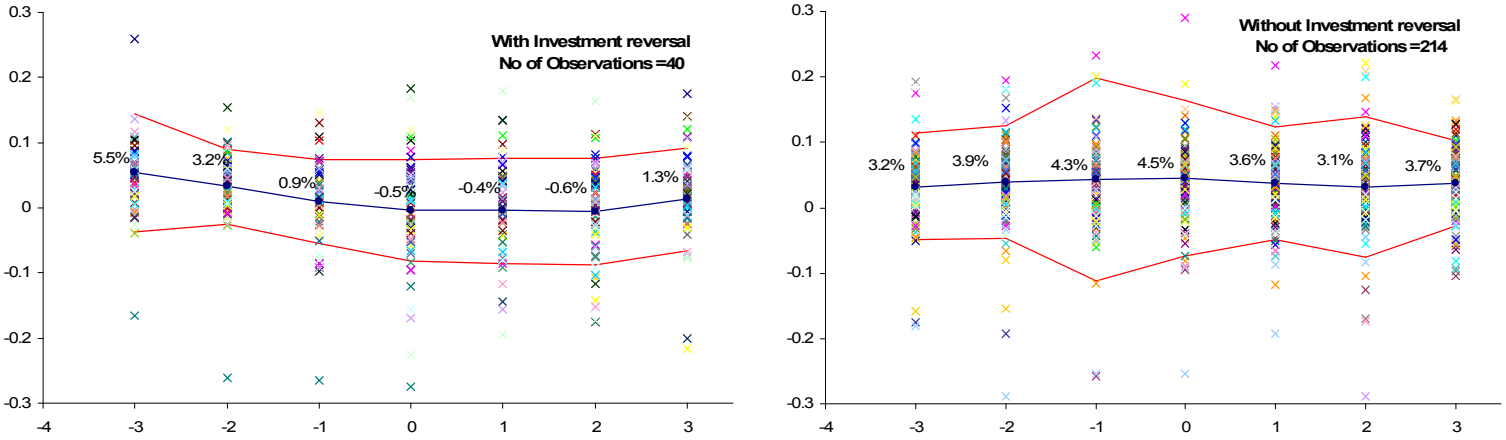


Figure 4: Current Account Reversals (> 3% increase in CU/GDP)



Each point represents output growth at the time of the crisis (time 0) or three quarters before and after the crisis. If the combined increase of private outflows from liabilities during the quarter preceding the crisis and the quarter of the crisis exceeds one standard deviation, we consider that the crisis is accompanied by a reversal of gross foreign investment.

Figure 5: Sudden Stops (> 2 standard deviations increase in CU/GDP)

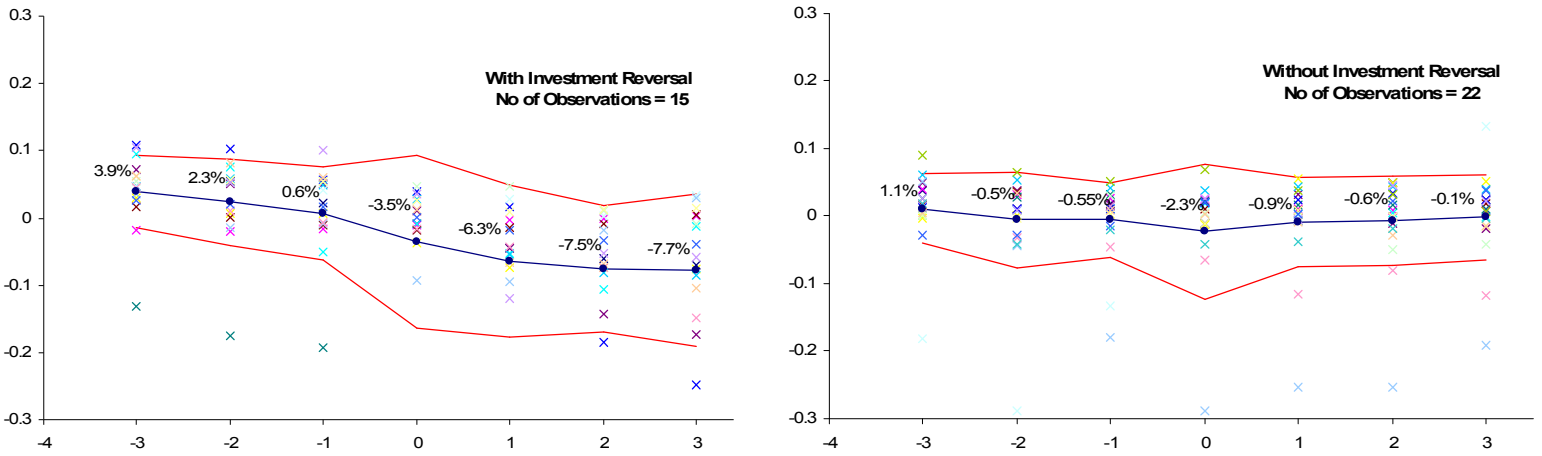
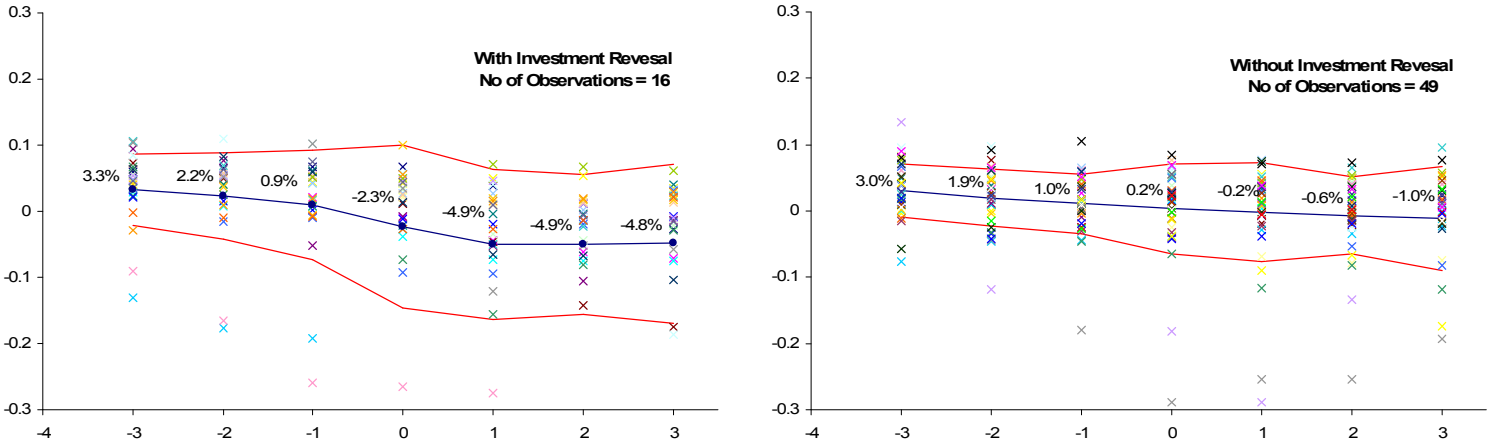


Figure 6: Sudden Stops (> 3% of GDP increase in CU/GDP)



Each point represents output growth at the time of the crisis (time 0) or three quarters before and after the crisis. If the combined increase of private outflows from liabilities during the quarter preceding the crisis and the quarter of the crisis exceeds one standard deviation, we consider that the crisis is accompanied by a reversal of gross foreign investment.

Table 8: Growth on Gross Foreign Investment Reversals, Crises and Interaction Terms

	All	EM	OECD	LA	EA	EE
Interaction in Individual Regression						
GIR	-0.026	0.056	-0.039***	-0.084	0.041	-0.052
GIR*Currency Crisis	-0.337***	-0.752***	-0.242***	-6.585***	-0.609***	-0.551*
Currency Crisis Dummy	-0.067***	-0.077***	-0.042***	-0.054	-0.107***	-0.127***
GIR	-0.047***	-0.032	-0.060***	-0.116	-0.041	0.001
GIR*CU Reversal 1	-0.160***	-0.893***	-0.049*	-4.171***	-0.662***	-0.374**
CU Reversal 1 Dummy	0.009	0.059***	-0.013	0.069**	0.095***	0.046*
GIR	-0.051***	-0.01	-0.062***	-0.174	-0.03	-0.012
GIR*CU Reversal 2	-0.079***	-0.238**	-0.02	-0.324	-0.139*	-0.219
CU Reversal 2 Dummy	0.000	0.006	-0.005	-0.013	0.014	0.015
GIR	-0.059***	-0.041	-0.067***	-0.347	-0.039	-0.181
GIR*Sudden Stop 1	-1.461***	-1.573***	-0.671***	-12.386***	-1.911***	-2.412***
Sudden Stop 1 Dummy	-0.035***	-0.035	-0.042***	0.116**	0.018	-0.104***
GIR	-0.048***	0.024	-0.058***	-0.273	0.008	-0.116
GIR*Sudden Stop 2	-0.244***	-0.569***	-0.156***	-1.23	-0.425***	-1.114***
Sudden Stop 2 Dummy	-0.039***	-0.046***	-0.023***	-0.067*	-0.036**	-0.02
All Interactions in the same Regression						
GIR	-0.01	0.067	-0.029**	-0.077	0.051	-0.033
GIR*Currency Crisis (t-1)	-0.281***	-0.443***	-0.248***	-5.341***	-0.326***	-0.775**
GIR*CUR (t-1)	-0.116***	-0.403**	-0.073**	-2.697***	-0.331***	-0.542*
GIR*ST (t-1)	-1.164***	-0.869***	-0.511**	-9.894***	-1.317***	-1.829***
Number of countries	64	22	22	10	10	12

. * significant at 10%; ** significant at 5%; *** significant at 1%. See the complete regressions in tables 10-11 in the working paper version appendix. EM refers to a selected group of emerging markets (see the appendix for the list of countries). OECD does not include Mexico and South Korea. LA refers to emerging markets in Latin America, EA to emerging economies in Asia and EE to emerging markets in Eastern Europe.

Table 9: Growth on GIR, Crises and Interaction Terms by Type of Financial Instrument

	All	EM	OECD	LA	EA	EE
	Growth	Growth	Growth	Growth	Growth	Growth
FDI Reversal	-0.002	0.131	-0.013	0.119	-0.251	0.385
PI Reversal	-0.108***	-0.24	-0.108***	0.802	-0.198*	-1.167**
OI Reversal	-0.035*	-0.001	-0.040***	-0.526	0.008	-0.133
FDI Reversal	0.097	0.274	0.064	0.366	0.055	0.368
FDI*Currency Crisis	-0.168*	1.155	-0.137**	-18.860**	3.027	1.312
PI Reversal	-0.048	0.028	-0.061**	0.907	0.003	-0.936*
PI*Currency Crisis	-0.559***	-4.099***	-0.392***	-25.926**	-4.306***	-2.698
OI Reversal	-0.024	0.035	-0.035**	-0.431	0.04	-0.119
OI*Currency Crisis	-0.384***	-0.319**	-0.306***	-1.781	-0.266**	-0.392
FDI Reversal	-0.018	0.145	-0.025	0.324	-0.153	0.252
FDI*CU Reversal 1	-0.544	-13.586***	0.054	-2.044	-16.796***	0.941
PI Reversal	-0.091**	-0.217	-0.081**	0.352	-0.216*	-0.023
PI*CU Reversal 1	-0.003	-2.961***	-0.106*	-2.999	-2.341**	-4.213*
OI Reversal	-0.042**	-0.015	-0.057***	-0.279	0.013	-0.033
OI*CU Reversal 1	-0.344***	-0.390**	0.312**	-5.954***	-0.188	-0.391
FDI Reversal	0.03	0.45	-0.002	0.695	-0.073	0.346
FDI*CU Reversal 2	-0.122	-0.48	-0.061	-2.869*	0.687	-1.966**
PI Reversal	-0.111**	-0.136	-0.107***	0.457	-0.147	-0.009
PI*CU Reversal 2	-0.022	-1.995***	-0.019	-2.755	-2.141***	-0.055
OI Reversal	-0.042*	-0.043	-0.056***	-0.437	0.032	-0.118
OI*CU Reversal 2	-0.097*	0.035	0.091	0.9	0.021	0.062
FDI Reversal	0.008	0.274	-0.013	-0.094	0.11	0.219
FDI*Sudden Stop 1	-4.399***	-4.334	-8.583	-10.167	7.396**	3.527
PI Reversal	-0.106***	-0.147	-0.113***	0.132	-0.159	-1.190**
PI*Sudden Stop 1	-1.519***	-1.667	-1.070**	-27.662***	-5.638***	-9.209
OI Reversal	-0.048**	-0.036	-0.053***	-0.527	-0.006	-0.205
OI*Sudden Stop 1	-1.163***	-1.241***	-0.275	-11.364***	-1.370***	-2.091***
FDI Reversal	0.106*	0.299	0.063	0.117	0.084	0.233
FDI*Sudden Stop 2	-0.197**	-2.163	-0.139**	-40.329***	-2.67	3.097
PI Reversal	-0.076**	-0.063	-0.079***	0.333	-0.113	-0.739
PI*Sudden Stop 2	-0.288***	-2.357***	-0.254***	-1.944	-2.631***	-6.542***
OI Reversal	-0.049**	-0.006	-0.058***	-0.646*	0.009	-0.177
OI*Sudden Stop 2	-0.422***	-0.23	-0.435**	7.085***	-0.123	-0.849**
Number of countries	64	22	22	10	10	12

Notes: FDI, PI and OI are, respectively, Foreign Direct Investment, Portfolio Inflow and Other Inflow Reversals in the Balance of Payments.

Table 10: The Role of Financial Development

	All	EM	OECD	LA	EA	EE
GIR	-0.026	0.094	-0.037***	-0.253	0.07	-0.012
IR*Currency Crisis	-0.552***	-2.014***	-0.271***	-26.905***	-1.233***	1.332
IR*Currency Crisis * FD	0.060***	0.369***	0.011	22.283***	0.180***	-1.029
Currency Crisis Dummy	-0.067***	-0.069***	-0.041***	-0.03	-0.106***	-0.122***
GIR	-0.044**	-0.058	-0.056***	-0.322	-0.081	0.013
IR * CU Reversal 1	-0.436***	-2.903***	0.087	-12.371***	-2.599***	-3.247***
IR * CU Reversal 1 * FD	0.060***	0.234***	-0.034	10.183***	0.202***	1.562***
CU Reversal 1 Dummy	0.009	0.056***	-0.019**	0.019	0.073***	0.04
GIR	-0.049***	0.007	-0.058***	-0.303	-0.006	0.007
IR * CU Reversal 2	-0.193***	-0.706***	0.079	-0.924	-0.627***	-2.008***
IR * CU Reversal 2 * FD	0.025**	0.062***	-0.029	0.585	0.058***	1.000***
CU Reversal 2 Dummy	0.00	0.008	-0.008	-0.018	0.013	0.01
GIR	-0.056***	-0.028	-0.064***	-0.549*	-0.042	-0.159
IR * Sudden Stop 1	-3.676***	-3.735***	-0.377	-23.844***	-3.030***	-10.343***
IR * Sudden Stop 1* FD	0.729***	0.731***	-0.256	9.231**	0.360***	4.168***
Sudden Stop 1 Dummy	-0.011	-0.008	-0.032**	0.255***	0.017	-0.036
GIR	-0.045***	0.078	-0.056***	-0.481*	0.034	-0.104
IR * Sudden Stop 2	-0.389***	-1.343***	0.532	-19.535***	-0.896***	-8.333***
IR * Sudden Stop 2 * FD	0.054*	0.186***	-0.356*	24.625***	0.109***	3.416***
Sudden Stop 2 Dummy	-0.042***	-0.041***	-0.009	-0.154***	-0.033**	0.001
Number of countries	64	22	22	10	10	12

Table 11: Treatment Effects Model

	All	EM	OECD	LA	EA	EE
GIR	-0.044***	0.023	-0.046***	-0.287	0.046	-0.146
IR*Currency Crisis	-0.313***	-1.222***	-0.188***	-22.770***	-1.130***	2.285
IR*Currency Crisis * FD	0.045**	0.305***	0.008	21.920***	0.261***	-0.571
GIR	-0.054***	-0.088	-0.062***	-0.307	-0.055	-0.018
IR * CU Reversal 1	-0.284***	-2.293***	0.269	-10.163***	-2.995***	-2.926***
IR * CU Reversal 1 * FD	0.049***	0.200***	-0.075	10.022***	0.223***	1.589***
GIR	-0.056***	-0.012	-0.063***	-0.331	0.011	-0.027
IR * CU Reversal 2	-0.153***	-0.677***	0.064	-0.136	-0.642***	-1.727***
IR * CU Reversal 2* FD	0.023**	0.064***	-0.026	0.382	0.059***	0.880***
GIR	-0.062***	-0.055	-0.062***	-0.490*	-0.043	-0.256**
IR * Sudden Stop 1* FD	-3.008***	-3.206***	0.234	-23.025***	-3.136***	-7.830***
IR * Sudden Stop 1* FD	0.652***	0.702***	-0.188	12.052**	0.482***	4.460***
GIR	-0.060***	-0.008	-0.062***	-0.534*	0.008	-0.252*
IR * Sudden Stop 2	-0.319***	-0.969***	0.234	-15.906***	-0.823***	-6.578***
IR * Sudden Stop 2* FD	0.078***	0.169***	-0.188	23.791***	0.135***	3.159***
Number of countries	64	22	22	10	10	12

* significant at 10%; ** significant at 5%; *** significant at 1%. See the complete regressions in tables 21-26 in the working paper version appendix. EM refers to a selected group of emerging markets (see the appendix for the list of countries). OECD does not include Mexico and South Korea. LA refers to emerging markets in Latin America, EA to emerging economies in Asia and EE to emerging markets in Eastern Europe.

Table 12: Treatment Effects Model: Full Estimates

	-1	-2	-3	-4	-5
	Growth	**growth3**	**growth3**	**growth3**	**growth3**
Growth (t-1)	0.858***	0.877***	0.875***	0.857***	0.870***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Total Gross Flows (t-1)	0.004	0.001	0.003	0.002	0.005
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
GIR (t-1)	-0.044***	-0.054***	-0.056***	-0.062***	-0.060***
	[0.016]	[0.017]	[0.017]	[0.016]	[0.017]
GIR *Crisist-1)	-0.313***	-0.284***	-0.153***	-3.008***	-0.319***
	[0.085]	[0.082]	[0.055]	[0.322]	[0.085]
GIR*CC* FD (t-1)	0.045**	0.049***	0.023**	0.652***	0.078***
	[0.021]	[0.016]	[0.010]	[0.100]	[0.028]
Current Account (t-1)	0.149***	0.135***	0.140***	0.166***	0.148***
	[0.030]	[0.029]	[0.030]	[0.029]	[0.030]
Δ Int. Reserves (t-1)	0.240***	0.260***	0.251***	0.225***	0.259***
	[0.032]	[0.031]	[0.032]	[0.032]	[0.032]
Crisis (t-1)	-0.055***	0.024***	0.004	0.017	0.002
	[0.007]	[0.009]	[0.005]	[0.013]	[0.009]
Δ Domestic Credit (t-1)	-0.035***	-0.048***	-0.049***	-0.046***	-0.047***
	[0.008]	[0.007]	[0.008]	[0.008]	[0.008]
Financial Development (t-1)	-0.001	0.001	0.001	0.001	0
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Inflation (t-1)	0.030***	0.021***	0.021***	0.019***	0.020***
	[0.003]	[0.004]	[0.004]	[0.004]	[0.004]
Inflation^2 (t-1)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Hazard	-0.048***	-0.033***	-0.007***	-0.043***	-0.041***
	[0.003]	[0.004]	[0.003]	[0.005]	[0.004]
Treatment (Probit)	**Currency Crisis**	**CU Reversal 1**	**CU Reversal 2**	**Sudden Stop 1**	**Sudden Stop 2**
Growth (t-1)	-0.470***	-0.845***	-1.120***	-1.168***	-1.681***
	[0.114]	[0.129]	[0.125]	[0.199]	[0.199]
Private Inflows (t-1)	-1.144***	-2.033***	-0.913***	-3.448***	-1.356***
	[0.413]	[0.563]	[0.324]	[1.072]	[0.469]
Private Outflows (t-1)	0.968**	1.975***	0.914***	1.882**	1.526***
	[0.388]	[0.515]	[0.318]	[0.940]	[0.444]
Current Account (t-1)	-2.633***	-0.969*	0.232	-4.346***	-0.919**
	[0.636]	[0.576]	[0.334]	[1.256]	[0.456]
Δ Domestic Credit (t-1)	0.332**			0.464**	0.282*
	[0.155]			[0.227]	[0.146]
Relative Export Growth (t-1)	0.001				
	[0.001]				
Real Appreciation (t-1)		-0.934***	-0.828***	-1.749***	-0.598
		[0.362]	[0.313]	[0.503]	[0.458]
Stock of Reserves (t-1)		-0.127	-0.015	-0.580**	-0.033
		[0.098]	[0.092]	[0.285]	[0.128]
Observations	4975	5000	5000	4760	4760
Number of countries	65	68	68	64	64

Standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All variables except Real Appreciation and Inflation are deflated by Nominal GDP. Inflation^2 represents the square values of inflation and is meant to capture non-linear effects of inflation such as during hyperinflation. We have also run all specifications using a dummy variable for hyperinflation and found similar results. R-squared values are taken from the LSDV regression corresponding to the first step of calculating the HT estimators. All regressions include quarter dummies to capture potential seasonal effects, coefficients are not reported. The hazard variable is obtained from the Probit model run over the treatment (in our case the crisis) variable.

Table 13: IV Estimates with Crisis Interaction Terms

Type of Crisis	Currency Crisis	CU Reversal 1	CU Reversal 2	Sudden Stop 1	Sudden Stop 2
Second Stage Regression	**Growth**	**Growth**	**Growth**	**Growth**	**Growth**
GIR (t-1)	-0.5109***	-0.7096***	-0.6717***	-0.6767***	-0.6391***
	[0.1266]	[0.1504]	[0.1427]	[0.1417]	[0.1323]
GIR * Crisis (t-1)	-1.9579***	-0.0875	-0.2965	-3.2257***	-1.4982***
	[0.6168]	[0.3874]	[0.3329]	[1.1099]	[0.4895]
Crisis Dummy (t-1)	-0.0588***	-0.0847***	-0.0481***	-0.0734*	-0.0875***
	[0.0158]	[0.0222]	[0.0110]	[0.0407]	[0.0255]
Adjusted R-squared	0.5269	0.5013	0.4997	0.5219	0.528
Underidentification test: Kleibergen-Paap Rk LM statistic	8.2719	18.2343	19.4216	22.0633	22.7905
Chi-sq P-val	0.004	0.000	0.000	0.000	0.000
Weak identification test: Kleibergen-Paap RkWald F statistic	16.5044	14.5047	14.6996	16.5425	16.3533
Stock-Yogo weak ID test critical values	**Maximal IV Size**	10%	7.03		
		15%	4.58		
		20%	3.95		
		25%	3.63		
First Stage Regression (A)	**GIR**	**GIR**	**GIR**	**GIR**	**GIR**
Instrument GIR (t-1)	0.989***	0.750***	0.761***	0.829***	0.832***
	[0.185]	[0.188]	[0.197]	[0.176]	[0.179]
Instrument GIR * Crisis (t-1)	-0.229	0.983	0.38	-0.123	-0.212
	[0.241]	[1.331]	[0.613]	[0.355]	[0.345]
R-squared Overall	0.397	0.387	0.385	0.378	0.382
First Stage Regression (B)	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**
Instrument GIR (t-1)	-0.012*	-0.079**	-0.109***	-0.010**	-0.031**
	[0.007]	[0.033]	[0.031]	[0.005]	[0.013]
Instrument GIR * Crisis (t-1)	1.612***	2.551	1.861**	1.048**	1.273**
	[0.341]	[1.901]	[0.831]	[0.495]	[0.590]
R-squared Overall	0.38	0.258	0.201	0.319	0.309
Observations	3930	3906	3906	3819	3819
Number of countries	47	49	49	47	47

Robust standard errors in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%
Covariates included in first and second stage regression (all in lags): Current Account, Change in the Stock of International Reserves, Total Gross Capital flows, Change in Domestic credit (all deflated by Nominal GDP), Inflation, Inflation squared, Real Appreciation, Trade Openness, Time Trend and Quarterly Dummies.

Table 14: IV Estimates with Crisis and Financial Development Interaction Terms

Type of Crisis	Currency Crisis	CU Reversal 1	CU Reversal 2	Sudden Stop 1	Sudden Stop 2
Second Stage Regression	**Growth**	**Growth**	**Growth**	**Growth**	**Growth**
GIR (t-1)	-0.4839***	-0.6760***	-0.6341***	-0.6237***	-0.5957***
	[0.1224]	[0.1488]	[0.1364]	[0.1375]	[0.1294]
GIR * Crisis (t-1)	-4.3625***	-1.9209	-1.1001**	-6.7989***	-2.7679***
	[1.2074]	[1.1725]	[0.4566]	[2.0750]	[0.8736]
GIR * Crisis * FD (t-1)	0.5920***	0.4392	0.1890**	1.4295***	0.2998*
	[0.2273]	[0.2837]	[0.0763]	[0.4741]	[0.1779]
Crisis Dummy (t-1)	-0.0471***	-0.1013***	-0.0445***	-0.0662	-0.0781**
	[0.0164]	[0.0327]	[0.0119]	[0.0554]	[0.0342]
Adjusted R-squared	0.5358	0.4963	0.5141	0.5358	0.5449
Underidentification test: Kleibergen-Paap Rk LM statistic	8.2691	5.6844	28.5304	21.661	23.6545
Chi-sq P-val	0.004	0.0171	0	0	0
Weak identification test: Kleibergen-Paap Rk Wald F statistic	10.9333	1.7477	3.8741	10.6527	10.7934
Stock-Yogo weak ID test critical values	**Maximal IV Size**	10%	NA		
First Stage Regression (A)	**GIR**	**GIR**	**GIR**	**GIR**	**GIR**
Instrument GIR (t-1)	0.982***	0.746***	0.749***	0.817***	0.817***
	[0.189]	[0.184]	[0.196]	[0.176]	[0.178]
Instrument GIR * Crisis (t-1)	0.355	2.312	0.222	-0.217	0.182
	[0.863]	[2.170]	[0.667]	[0.333]	[0.566]
Instrument GIR * Crisis * FD (t-1)	-0.208	-0.273	0.036	0.004	-0.184
	[0.310]	[0.326]	[0.157]	[0.170]	[0.225]
R-squared Overall	0.412	0.419	0.414	0.407	0.414
First Stage Regression (B)	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**	**GIR * Crisis**
Instrument GIR (t-1)	-0.012*	-0.063***	-0.106***	-0.008*	-0.022**
	[0.007]	[0.022]	[0.028]	[0.004]	[0.009]
Instrument GIR * Crisis (t-1)	0.601*	4.569	1.453	0.527	-0.051
	[0.318]	[3.153]	[1.052]	[0.410]	[0.624]
Instrument GIR * Crisis * FD (t-1)	0.303***	-0.413	0.1	0.22	0.476**
	[0.078]	[0.493]	[0.288]	[0.266]	[0.229]
R-squared Overall	0.445	0.28	0.187	0.37	0.406
First Stage Regression (C)	**GIR * Crisis* FD**	**GIR * Crisis* FD**	**GIR * Crisis* FD**	**GIR * Crisis* FD**	**GIR * Crisis* FD**
Instrument GIR (t-1)	-0.045*	-0.292***	-0.307***	-0.030*	-0.073**
	[0.026]	[0.105]	[0.114]	[0.016]	[0.034]
Instrument GIR * Crisis (t-1)	-4.370***	13.859	2.198	-0.878	-8.365***
	[1.285]	[12.808]	[3.238]	[0.992]	[1.538]
Instrument GIR * Crisis * FD (t-1)	3.358***	-0.676	0.627	1.619	5.043***
	[0.428]	[2.038]	[0.617]	[1.054]	[0.933]
R-squared Overall	0.712	0.174	0.092	0.345	0.574
Observations	3575	3559	3559	3472	3472
Number of countries	47	49	49	47	47

Robust standard errors in brackets.* significant at 10%; ** significant at 5%; *** significant at 1%
Covariates included in first and second stage regression (all in lags): Current Account, Change in the Stock of International Reserves, Total Gross Capital flows, Change in Domestic credit (all deflated by Nominal GDP), Inflation, Inflation squared, Real Appreciation, Trade Openness, Time Trend and Quarterly Dummies.

Table 15: Capital Flows and Output in the Theoretical Model

	Case 1	*Case 2*	*Case 3*	*Case 4*
Fundamentals	Good	Good	Good	Bad
Liquidity shock	No	Yes	Yes	Irrelevant
Domestic illiquidity or lemons mkt.	Irrelevant	No	Yes	Irrelevant
Output t=2	$\frac{(1+\mu)(\bar{r}^2 - l^2)}{2\bar{r}} \equiv y_1$	$\frac{(1+\mu)\theta(\bar{r}^2 - (l/\theta)^2)}{2\bar{r}} \equiv y_2 < y_1$	0	0
Net inflow t=0	1	1	1	1
Net outflow t=1	$(l/\bar{r}) << l$	0	l	l
Reversal t=1	$(l/\bar{r}) << l$	$\min\{\lambda w, \theta\bar{r}/2\} \geq l$	l	l

A4: An Alternative Mechanism behind Eq (1)

This section presents an alternative model consistent with our result that gross foreign investment reversals decrease output even holding the net capital inflow constant. There are two economies, $i = 1,2$, and each has a representative investor who optimizes a risk-return tradeoff as follows. In the first period, she invests k_i^i in home assets and k_i^{-i} in foreign assets to maximize the expected second-period utility of her clients $Eu(c_i) = E(c_i^\sigma)$, where $\sigma \in (0,1)$. In the second, period clients consume the returns. Output in the two economies is $y_i = ak_1$, $y_2 = k_2$ with probability 0.5 and $y_i = k_1$, $y_2 = ak_2$ otherwise, where $a > 1$ and $k_i \equiv k_i^i + k_i^{-i}$. Since the productivity shocks are negatively correlated across countries, two-way capital flows can smooth consumption. However, due perhaps to information or financial frictions, buying a unit of capital abroad costs ω, where $\omega - 1 \geq 0$ is an iceberg transaction cost. Altogether, investor $i = 1,2$ solves

$$\max_{k_i^i, k_i^{-i}} 0.5\left(ak_i^i + k_i^{-i}\right)^\sigma + 0.5\left(k_{i\backslash}^i + ak_i^{-i}\right)^\sigma - k_i^i - \omega k_i^{-i} \quad \text{(a3)}$$

Optimality implies,

$$1 = 0.5\sigma\left(ac_{ih}^{\sigma-1} + c_{il}^{\sigma-1}\right) \quad \text{(a4)}$$

$$\omega = 0.5\sigma\left(c_{ih}^{\sigma-1} + ac_{il}^{\sigma-1}\right) \tag{a5}$$

where $c_{ih} \equiv \left(ak_i^{\,i} + k_i^{\,-i}\right)$ and $c_{il} \equiv \left(k_i^{\,i} + ak_i^{\,-i}\right)$ are the second-period consumption levels when the domestic economy is productive and non-productive, respectively. In the symmetric equilibrium, where k denotes each country's home investment and $\tilde{k}$ its foreign investment,

$$1 = 0.5\sigma\left(ac_h^{\sigma-1} + c_l^{\sigma-1}\right) \tag{a6}$$

$$\omega = 0.5\sigma\left(c_h^{\sigma-1} + ac_l^{\sigma-1}\right) \quad , \tag{a7}$$

where $c_h \equiv \left(ak + \tilde{k}\right)$ and $c_l \equiv \left(k + a\tilde{k}\right)$. Dividing (a6) by (a7) and rewriting implies

$$c_h = \left(\frac{a\omega - 1}{a - \omega}\right)^{\frac{1}{1-\sigma}} c_l \quad , \tag{a8}$$

which, when substituted into (a6), gives

$$c_l = \left(0.5\sigma\frac{a^2 - 1}{a\omega - 1}\right)^{\frac{1}{1-\sigma}} \tag{a9}$$

and therefore from (a8)

$$c_h = \left(0.5\sigma\frac{a^2 - 1}{a - \omega}\right)^{\frac{1}{1-\sigma}} \quad . \tag{a10}$$

Global consumption, and therefore, output in period 2 is

$$c_l + c_h = \left[0.5\sigma(a^2 - 1)\right]^{\frac{1}{1-\sigma}}\left[\left(\frac{1}{a\omega - 1}\right)^{\frac{1}{1-\sigma}} + \left(\frac{1}{a - \omega}\right)^{\frac{1}{1-\sigma}}\right] \tag{a11}$$

Given (a11) a rise in the distortion ω - for example a global liquidity shock or recession – will decreases world output if and only if

$$\frac{\partial}{\partial\omega}\left[\left(\frac{1}{a\omega - 1}\right)^{\frac{1}{1-\sigma}} + \left(\frac{1}{a - \omega}\right)^{\frac{1}{1-\sigma}}\right] = \frac{1}{1-\sigma}\left[\left(\frac{1}{a\omega - 1}\right)^{\frac{\sigma}{1-\sigma}}\left(\frac{-a}{(a\omega - 1)^2}\right) + \left(\frac{1}{a - \omega}\right)^{\frac{\sigma}{1-\sigma}}\left(\frac{1}{(a - \omega)^2}\right)\right] < 0 \Leftrightarrow$$

$$1 < a\left(\frac{a - \omega}{a\omega - 1}\right)^{2 + \frac{\sigma}{1-\sigma}} \tag{a12}$$

Since $a - \omega < a\omega - 1$ and $a > 1$, (a12) holds as $\omega \to 1$ but not as $\omega \to a$. Thus, for a small initial distortion, $\omega \approx 1$, a marginal rise in international transaction costs $\omega - 1$ decreases world

investment and output as well as output in each of the two symmetric economies. At any time $k_i^{-i} = k_{-i}^{i} = \widetilde{k}$, so the net international capital flow is always zero. However, as the rise in ω decreases $\widetilde{k}$ the gross inflow to each country falls. Therefore, consistent with our empirical findings, there is a positive relationship between output declines and foreign investment reversals even controlling for the net capital inflow.