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## Capital inflow surges and consequences

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## **ADB Working Paper Series**

### **Capital Inflow Surges and Consequences**

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**Abstract**

While capital flows to emerging markets bring numerous benefits, they are also known to create macroeconomic imbalances (economic overheating, currency overvaluation) and increase financial vulnerabilities (domestic credit growth, bank leverage, foreign currency-denominated lending). But are all inflows the same? In this paper, we examine whether the source of the inflow—residents repatriating foreign assets or nonresidents investing in the country—or the type of inflow (foreign direct investment, portfolio, other investment, etc.) makes any difference to the consequences of the capital flow. Our results, based on a sample of 53 emerging markets over 1980–2013, show that when it comes to the source of the inflow, the macroeconomic and financial stability consequences of flows driven by residents (asset flows) and nonresidents (liability flows) are broadly similar in economic terms. Formal statistical tests, however, suggest that liability flows are more prone to causing economic overheating and domestic credit expansion than asset flows. On the types of inflows, we find that compared to direct investment, portfolio debt and other investment flows are associated with larger macroeconomic imbalances and financial vulnerabilities. We conclude that policy should try to mitigate the untoward consequences of inflows, and shift their composition from risky to safer forms of liabilities.

**JEL Classification:** F21, F32, F38, F41, F42, F62

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# 1. INTRODUCTION

The global financial crisis, and its aftermath, saw boom–bust cycles in cross-border capital flows of unprecedented magnitude, rekindling debate on the benefits and costs of capital flows, and the optimal degree of capital account liberalization in emerging market economies (EMEs). Proponents of free capital mobility argue that capital flows bring myriad benefits—allowing an efficient allocation of resources, international risk sharing, intertemporal consumption smoothing, and development of financial markets. Skeptics, however, are quick to counter that much of the putative benefits have been difficult to establish empirically, whereas there is ample evidence of capital inflows leading to macroeconomic and financial imbalances in EMEs that often result in painful financial crises when the tide turns. While it is true that the benefits of capital flows have not been established unequivocally, several studies find that some types of flows such as foreign direct investment (FDI) are conducive to economic growth.<sup>1</sup> Flipping the argument, could it be that the adverse consequences of capital flows also depend on the type of flow, with some flows more prone to creating vulnerabilities and increasing crisis risk? That is the question we explore in this paper.

Conceptually, certain types of liability flows are more risky. An obvious example is debt versus equity flows, where the latter allows for greater risk sharing between the creditor and the borrower. The maturity and currency denomination of the flow also matter—short-term flows entail a higher rollover risk, while foreign exchange-denominated lending is particularly dangerous if extended to unhedged borrowers (corporates or households). Based on these considerations, the theoretical literature yields a pecking order of capital inflows, with debt (especially, foreign currency-denominated, short-term) as the riskiest, and FDI as the safest form of investment.<sup>2</sup> Empirical evidence supports these theoretical assertions, and finds that a greater share of debt (relative to FDI) is a strong predictor of crises (e.g., Frankel and Rose 1996; Furceri, Guichard, and Rusticelli 2012a; Ghosh, Ostry, and Qureshi 2016).<sup>3</sup> But little empirical evidence exists on the channels through which these flows increase the economy's vulnerability to crisis: is it that some flows are more prone to creating macroeconomic imbalances (such as economic overheating, currency appreciation)? Or are they more likely to perpetuate financial vulnerabilities (such as generalized

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<sup>1</sup> For instance, Li and Liu (2005) find that FDI promotes economic growth, and Borensztein, De Gregorio, and Lee (1998) and Alfaro et al. (2010) find that FDI contributes significantly to economic growth when the recipient country meets a certain threshold of human capital and financial development, respectively. Bekaert, Harvey, and Lundblad (2001) show that equity market liberalization has a significant positive effect on growth, which is larger for countries with greater human capital, a smaller public sector, and an Anglo-Saxon legal system. Several studies also report *indirect* benefits of flows—Levine (2001), for example, shows that liberalization of portfolio inflows increases stock market liquidity, which in turn spurs productivity and economic growth. In addition, he finds that greater foreign bank presence increases the efficiency of the domestic banking system, which boosts economic growth. See Ostry, Ghosh, and Qureshi (2015), and Ghosh, Ostry, and Qureshi (forthcoming) for detailed reviews of literature on capital account openness and growth.

<sup>2</sup> See Korinek (2010, 2011) and Ghosh, Ostry, and Qureshi (forthcoming) for a detailed discussion. Korinek (2010) argues that since different forms of capital inflows have different probabilities of future capital outflows and different payoffs in the event of a crisis, they lead to different externalities. The optimal macroprudential and/or capital controls policy hence needs to be designed accordingly.

<sup>3</sup> The ratio of short-term debt to the stock of foreign exchange reserves is also found to be a robust predictor of the likelihood and severity of crisis in EMEs (see, e.g., Berg and Pattillo 1999; Rodrik and Velasco 1999; Blanchard, Das, and Faruquee 2010).

credit booms, asset price bubbles, or balance sheet mismatches in the form of currency, maturity, and debt equity) in the system.<sup>4</sup>

Moreover, a related question is whether the type of *investor* (foreign investor or domestic resident) also matters. Thus, for example, if foreign investors are more skittish and sensitive to changes in global conditions than domestic investors (as documented in some recent studies, e.g., Ghosh et al. 2014), then flows driven by them may be more volatile and subject to sudden stops, causing financial distress. In fact, Ghosh, Ostry, and Qureshi (forthcoming) argue that foreign currency-denominated debt owed to foreign investors is more risky than that owed to domestic residents since effecting the debt repayment to the latter may require little or no change in the real exchange rate.<sup>5</sup> More generally, a growing body of literature argues for analyzing the behavior of capital flows driven by nonresidents and residents (referred to as liability flows and asset flows in the balance of payments, respectively) individually to better assess the source of vulnerabilities—instead of focusing only on their sum in the form of *net* flows (e.g., Obstfeld 2010, 2012; Borio and Disyatat 2011; Avdjiev, McCauley, and Shin 2015). Yet, there is no systematic empirical evidence on whether or how the consequences of capital flows vary by the residency of the investor.<sup>6</sup>

In this paper, therefore, we examine two related questions. First, do the hypothesized macroeconomic and financial stability consequences of capital flows, as well as the risk of financial crisis in EMEs depend on the underlying composition of flows in the form of FDI, portfolio, and other investment flows? Second, does the residency of the investor matter? For our analysis, we define macroeconomic imbalances as overvaluation of the real exchange rate, and economic overheating (captured by a positive output gap), and financial vulnerabilities as faster domestic credit expansion, higher leverage (loan-to-deposit ratio) of the financial system, and increased domestic lending in foreign currency. We define financial crisis as a systemic banking crisis or a currency crisis.

Our results, based on a sample of 53 EMEs over 1980–2013, show that the composition of the flow indeed matters: while capital inflows generally lead to macroeconomic imbalances and financial vulnerabilities, as well as to a greater likelihood of banking and currency crisis, other investment and portfolio flows (especially portfolio debt flows) are the most risky, while FDI seems to be the safest type of capital inflow. Breaking down net capital flows into asset flows (i.e., those driven by residents), and liability flows (driven by nonresidents), the macroeconomic and financial stability consequences are broadly similar in economic terms—although

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<sup>4</sup> Some recent studies analyze the association between currency appreciation and different types of flows, but find mixed results. Combes, Kinda, and Plane (2012), for example, find that portfolio inflows lead to greater real appreciation of the currency than FDI flows, while Saborowski (2009) finds that FDI flows are strongly associated with currency appreciation (though the effect is muted in financially developed countries). Results are however more unanimous on the effect of flows on credit booms—for instance, Calderon and Kubota (2012) find that the likelihood of credit booms (and, in particular, those that end in crisis) is significantly higher if the surge is driven by private “other investment” flows (a category that consists predominantly of bank flows), and to a lesser extent by portfolio investment. Similarly, Furceri, Guichard, and Rusticelli (2012b), and Igan and Tan (2015) find that the largest effect on domestic credit creation stems from debt flows as opposed to portfolio equity or FDI.

<sup>5</sup> This is because the domestic creditor consumes both traded and non-traded goods, and hence can be partly repaid in non-traded goods (i.e., in local currency) even if his claim is denominated in traded goods (i.e., in foreign currency).

<sup>6</sup> Several studies analyze the characteristics and determinants of flows driven by residents and nonresidents separately (e.g., Forbes and Warnock 2012; Calderon and Kubota 2012; Ghosh et al. 2014). In terms of consequences, Ghosh et al. (2014), and Ghosh, Ostry, and Qureshi (forthcoming) argue that analyzing net flows is more relevant for macroeconomic imbalances, while asset and liability flows (commonly referred to as “gross” flows) matter more for financial vulnerabilities.

formal statistical tests suggest that liability flows are more prone to causing economic overheating and domestic credit expansion than asset flows. Moreover, we find that currency overvaluation and domestic credit expansion are the main channels through which capital flows increase the vulnerability of emerging markets to financial crises.

Our paper contributes to the existing literature in three respects. First, unlike existing studies which focus mostly on domestic credit booms and currency appreciation—often mixing emerging markets with developing or developed economies in their empirical analysis—we systematically analyze a range of possible macroeconomic and financial stability consequences of capital flows in a consistent sample of EMEs. Second, by differentiating capital flows based on their underlying composition (FDI, portfolio, and other investment), as well as on the residency of the investor, we are able to establish that some types of flows are more risky than the others—thus, policy makers should be cautious of the total volume of net flows, but also of their composition and drivers. Third, by focusing on both vulnerabilities and crisis risk, we are able to identify that domestic credit expansion and currency overvaluation are the key factors that raise the risk of a subsequent financial crisis—the obvious implication being that policy could try to limit these during an inflow surge through macroeconomic and macroprudential policies, or through the use of capital controls to shift the composition of inflows away from the types of flows that are more prone to creating these vulnerabilities.

The rest of the paper is organized as follows. Section 2 investigates the association between capital inflows and macroeconomic imbalances more generally, as well as by the type of flow. Section 3 looks into financial vulnerabilities associated with capital inflows. Section 4 examines whether capital inflows are associated with a greater incidence of financial crises, and the role played by the various macroeconomic and financial vulnerabilities in the occurrence of crises. Section 5 concludes.

## 2. MACROECONOMIC IMBALANCES

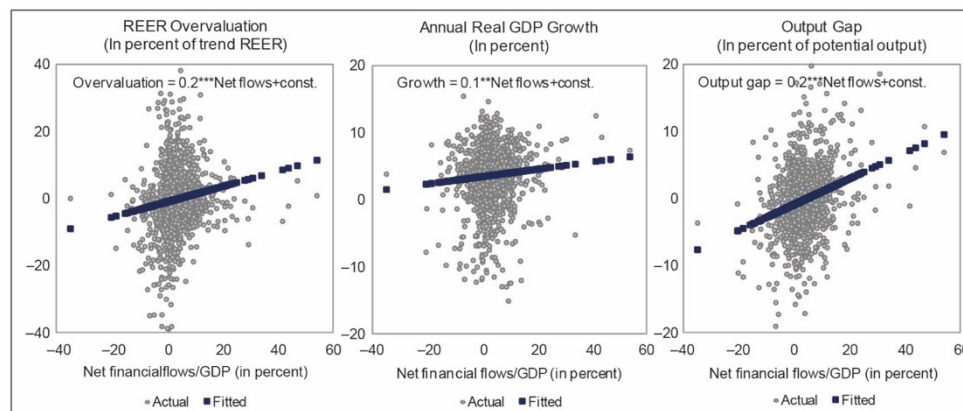
A typical concern associated with capital inflows is that they lead to currency appreciation pressures—via inflation under fixed exchange rates, and via nominal appreciation under more flexible exchange rate regimes—resulting in overvalued exchange rates. Such appreciation raises competitiveness concerns and, even if temporary, could do lasting damage to the export sector through “hysteresis” effects (Baldwin 1988; Baldwin and Krugman 1989).

In addition to currency overvaluation, another common concern of emerging market policy makers is that large inflows lead to economic overheating, and result in positive output gaps and high inflation. The idea that capital inflows are expansionary is at odds with standard open economy macro models (such as the Mundell–Fleming model) in which the currency appreciation deteriorates the current account and withdraws demand stimulus. Recent studies (e.g., Blanchard et al. 2016), however, argue that whether capital flows are expansionary or contractionary depends on the type of capital flow—that is, whether they are bond or non-bond flows. If the latter, then at a given policy rate, inflows may decrease the rate on non-bond instruments, reducing the cost of financial intermediation, and potentially offsetting the contractionary impact of currency appreciation.



A first snapshot of the data for our sample of EMEs suggests that such concerns are well-founded (Figure 1).<sup>7</sup> Although (lagged) net capital inflows are associated with faster annual output growth, they are also associated with greater overvaluation of the real effective exchange rate (REER) and larger positive output gaps.<sup>8</sup>

**Figure 1: Macroeconomic Imbalances and Capital Flows in Emerging Market Economies, 1980–2013**



GDP = gross domestic product; REER= real effective exchange rate.

Note: Figure based on estimation results reported in columns 1, 3, and 5 in Table 1. Net financial flows exclude other investment liabilities of the general government and reserve asset flows, and are expressed in percent of GDP. They are lagged one period to mitigate potential endogeneity concerns.

Source: Authors' estimates.

Undertaking a more formal analysis in Table 1, while controlling (as appropriate) for other likely covariates of the various dependent variables such as the exchange rate regime, output growth, terms of trade, trade openness, partner country growth, initial conditions, as well as country-fixed and year effects, we find that the strong positive relationship found in Figure 1 holds. Specifically, the resulting estimates imply that a 10 percentage points increase in net capital inflow to gross domestic product (GDP) ratio is associated with 2 percentage points larger currency overvaluation (column 2), 1 percentage point faster real GDP growth (column 6), and a 2 percentage points greater output gap (column 10).<sup>9</sup>

<sup>7</sup> Our sample of EMEs includes those in the International Monetary Fund's Vulnerability Exercise for Emerging Markets (VEE) as of May 2015: Albania, Algeria, Argentina, Armenia, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, People's Republic of China, Colombia, Costa Rica, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Georgia, Guatemala, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Lebanon, Lithuania, Macedonia, Malaysia, Mexico, Morocco, Pakistan, Panama, Peru, Philippines, Poland, Romania, Russian Federation, Serbia, South Africa, Sri Lanka, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, and Viet Nam; as well as those that were part of the VEE until recently: Czech Republic, Estonia, Republic of Korea, Latvia, and Slovak Republic.

<sup>8</sup> In estimations, capital flows (and other regressors) are lagged 1 year to mitigate potential endogeneity concerns. (For instance, alongside the effect of inflows on currency appreciation, if exchange rate overvaluation discourages inflows, then the regression coefficient on inflows could be downward biased.) Results are robust to the exclusion of extreme observations—defined as the bottom and top 0.25th percentile—from the sample. See appendix (Table A1) for variable definitions and data sources.

<sup>9</sup> Considering inflation as a proxy for economic overheating, we find that it is negatively correlated with net capital flows (in percent of GDP) over the full sample period, mainly because of the trend of rising capital inflows and declining inflation rates in the 1990s. Restricting the sample to post-2005 (when inflation rates in EMEs had been substantially reduced) yields the expected positive (and statistically significant) relation between inflation and capital flows (results not reported here).

While the estimated coefficients are statistically significant, they may be subject to endogeneity bias despite the use of lagged regressors, if the error term is autocorrelated. To address this concern, we adopt an alternate strategy and instrument capital inflows by the corresponding flows to other countries in the region, as well as by a de jure measure of capital account openness; these variables should be strongly correlated with flows to the recipient country but are unlikely to be correlated with the dependent variables directly.<sup>10</sup> The resulting coefficients, obtained from the instrumental variable–two stage least squares (IV-2SLS) methodology, remain statistically significant but are generally larger, and imply that a capital inflow equal to 10% of GDP would be associated with about 2.5–4 percentage points faster output growth (columns 7 and 8), but also with 14% overvaluation of the currency (columns 3 and 4), and 8 percentage points larger output gap (columns 11 and 12). Thus, taking account of endogeneity bias reinforces the association between capital inflows and macroeconomic imbalances.

**Table 1: Macroeconomic Imbalances and Capital Flows  
in Emerging Market Economies, 1980–2013**

|                                       | REER Overvaluation  |                     |                        |                        | Real GDP Growth |                     |
|---------------------------------------|---------------------|---------------------|------------------------|------------------------|-----------------|---------------------|
|                                       | OLS<br>(1)          | FE/TE<br>(2)        | IV <sup>a</sup><br>(3) | IV <sup>b</sup><br>(4) | OLS<br>(5)      | FE/TE<br>(6)        |
| Net financial flows/GDP               | 0.229***<br>(0.084) | 0.211**<br>(0.084)  | 1.445*<br>(0.836)      | 1.361**<br>(0.540)     | 0.055***        | 0.065***<br>(0.018) |
| Exchange rate regime                  |                     | 2.961*<br>(1.618)   | 0.753<br>(2.321)       | 0.916<br>(1.964)       |                 | 0.389<br>(0.434)    |
| Real GDP growth                       |                     | –0.035<br>(0.092)   | –0.440*<br>(0.243)     | –0.414**<br>(0.179)    |                 |                     |
| Terms of trade change                 |                     | 0.017<br>(0.022)    | 0.012<br>(0.030)       | 0.012**<br>(0.028)     |                 | 0.021**<br>(0.010)  |
| Trade openness                        |                     | –0.066**<br>(0.029) | –0.058<br>(0.044)      | –0.062<br>(0.043)      |                 | 0.018*<br>(0.010)   |
| Real GDP per capita (log)             |                     | 2.968*<br>(1.554)   | 4.897*<br>(2.823)      | 5.501**<br>(2.500)     |                 | –3.983**<br>(0.980) |
| Trading partner growth                |                     |                     |                        |                        |                 | 0.939***<br>(0.163) |
| Country effects                       | No                  | Yes                 | Yes                    | Yes                    | No              | Yes                 |
| Year effects                          | No                  | Yes                 | Yes                    | Yes                    | No              | Yes                 |
| Observations                          | 1,349               | 1,349               | 1,346                  | 1,332                  | 1,403           | 1,403               |
| R-squared                             | 0.023               | 0.209               |                        |                        | 0.007           | 0.403               |
| Countries                             | 53                  | 53                  | 53                     | 52                     | 53              | 53                  |
| Hansen J stat. (p-value) <sup>c</sup> |                     |                     |                        | 0.844                  |                 |                     |

*continued on next page*

<sup>10</sup> That our instruments are valid is supported by the first stage estimation results (reported in the appendix, Table A.2), which show a highly statistically significant positive association between the instruments and net financial flows (to GDP) in all specifications, as well as by the Hansen's *J*-test for overidentifying restrictions (reported in the last row of Table 1). Specifically, the *p*-value for the Hansen test statistic suggests that the null hypothesis that the instruments are orthogonal to the error term cannot be rejected at the 1% significance level. Overall, the instruments (together with control variables) fit the data reasonably well, and explain about 40% of the variation in net capital flows to GDP.

Table 1 *continued*

|                                       | Real GDP Growth     |                      |                     | Output Gap          |                   |                     |
|---------------------------------------|---------------------|----------------------|---------------------|---------------------|-------------------|---------------------|
|                                       | IV <sup>a</sup>     | IV <sup>b</sup>      | OLS                 | FE/TE               | IV <sup>a</sup>   | IV <sup>b</sup>     |
|                                       | (7)                 | (8)                  | (9)                 | (10)                | (11)              | (12)                |
| Net financial flows/GDP               | 0.381***<br>(0.126) | 0.239**<br>(0.098)   | 0.193***<br>(0.032) | 0.196***<br>(0.036) | 0.999*<br>(0.251) | 0.795***<br>(0.206) |
| Exchange rate regime                  | –0.137<br>(0.537)   | –0.028<br>(0.369)    |                     | 0.953<br>(0.616)    | –0.671<br>(1.158) | –0.297<br>(1.020)   |
| Real GDP growth                       |                     |                      |                     |                     |                   |                     |
| Terms of trade change                 | 0.017<br>(0.012)    | 0.014<br>(0.011)     |                     | 0.028**<br>(0.011)  | 0.016<br>(0.017)  | 0.021<br>(0.014)    |
| Trade openness                        | 0.015<br>(0.013)    | 0.026**<br>(0.010)   |                     | –0.006<br>(0.011)   | –0.008<br>(0.018) | –0.005<br>(0.019)   |
| Real GDP per capita (log)             | –3.528**<br>(0.988) | –3.983***<br>(0.985) |                     | 6.505***<br>(2.189) | 8.014*<br>(2.641) | 7.373***<br>(2.518) |
| Trading partner growth                | 0.608***<br>(0.183) | 0.633***<br>(0.171)  |                     |                     |                   |                     |
| Country effects                       | Yes                 | Yes                  | No                  | Yes                 | Yes               | Yes                 |
| Year effects                          | Yes                 | Yes                  | No                  | Yes                 | Yes               | Yes                 |
| Observations                          | 1,400               | 1,375                | 1,403               | 1,403               | 1,400             | 1,375               |
| R-squared                             |                     |                      | 0.077               | 0.319               |                   |                     |
| Countries                             | 53                  | 52                   | 53                  | 53                  | 53                | 52                  |
| Hansen J stat. (p-value) <sup>c</sup> |                     | 0.023                |                     |                     |                   | 0.096               |

FE/TE = country fixed effects/time effects; GDP = gross domestic product; IV = instrumental variable (two-stage least squares); OLS = ordinary least squares; REER = real effective exchange rate.

Notes: Dependent variable is REER overvaluation (in percent) in columns 1–4; real GDP growth rate (in percent) in columns 5–8; output gap (in percent) in columns 9–12. All regressors (except for trading partner growth) are 1-year lagged. Constant is included in all specifications.

Clustered standard errors are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Net financial flows to other countries in the region (in percent of regional GDP) is used as an instrument for net financial flows (in percent of GDP) in the first stage. Net financial flows to GDP is the predicted value obtained from the first stage regression with the instrument and all other regressors (as well as country fixed and year effects) included.

<sup>b</sup> Net financial flows to other countries in the region (in percent of regional GDP), and Chinn-Ito (de jure) capital account openness index are used as instruments in the first stage. Net financial flows to GDP is the predicted value obtained from the first stage regression with the instruments and all other regressors (as well as country fixed and year effects) included.

<sup>c</sup> Overidentification test of instruments (with the null hypothesis that the full set of orthogonality conditions are valid).

Source: Authors' estimates.

## 2.1 Macroeconomic Imbalances by Type of Inflow

Breaking down net capital flows into asset flows (i.e., those driven by residents), and liability flows (driven by nonresidents), the macroeconomic and financial stability consequences are broadly similar—although formal tests of coefficient equality imply that the effect of liability flows on real GDP growth and the output gap is (statistically) significantly larger (Table 2). Thus, a 10% of GDP increase in liability flows raises the real GDP growth rate by about 0.7 percentage points, while a corresponding increase in asset flows would raise the growth rate by 0.5 percentage points (column 3). Likewise, a 10% of GDP increase in liability flows would increase the output gap by 2 percentage points, while the same increase in asset flows would increase it by about 1.5 percentage points (column 5).

**Table 2: Macroeconomic Imbalances by Type of Capital Flows, 1980–2013**

|                           | REER Overvaluation  |                     | Real GDP Growth      |                      | Output Gap          |                     |
|---------------------------|---------------------|---------------------|----------------------|----------------------|---------------------|---------------------|
|                           | FE/TE<br>(1)        | FE/TE<br>(2)        | FE/TE<br>(3)         | FE/TE<br>(4)         | FE/TE<br>(5)        | FE/TE<br>(6)        |
| Asset flows/GDP           | 0.229**<br>(0.087)  |                     | 0.047**<br>(0.018)   |                      | 0.161***<br>(0.036) |                     |
| Liability flows/GDP       | 0.208**<br>(0.084)  |                     | 0.065***<br>(0.018)  |                      | 0.197***<br>(0.035) |                     |
| Net FDI flows/GDP         |                     | −0.007<br>(0.130)   |                      | 0.207***<br>(0.056)  |                     | 0.246***<br>(0.063) |
| Net portfolio flows/GDP   |                     | 0.287*<br>(0.143)   |                      | 0.064*<br>(0.036)    |                     | 0.092*<br>(0.054)   |
| Net other inv. flows/GDP  |                     | 0.254***<br>(0.087) |                      | 0.024<br>(0.024)     |                     | 0.204***<br>(0.048) |
| Exchange rate regime      | 2.949*<br>(1.619)   | 3.142*<br>(1.624)   | 0.385<br>(0.432)     | 0.271<br>(0.428)     | 0.951<br>(0.617)    | 0.903<br>(0.622)    |
| Real GDP growth           | −0.024<br>(0.094)   | −0.026<br>(0.092)   |                      |                      |                     |                     |
| Terms of trade change     | 0.018<br>(0.022)    | 0.020<br>(0.022)    | 0.020*<br>(0.010)    | 0.021*<br>(0.010)    | 0.027**<br>(0.012)  | 0.025**<br>(0.012)  |
| Trade openness            | −0.066**<br>(0.029) | −0.065**<br>(0.029) | 0.018*<br>(0.010)    | 0.017<br>(0.010)     | −0.006<br>(0.011)   | −0.006<br>(0.011)   |
| Real GDP per capita (log) | 3.012*<br>(1.569)   | 2.935*<br>(1.510)   | −4.026***<br>(0.995) | −3.939***<br>(0.961) | 6.414***<br>(2.160) | 6.501***<br>(2.195) |
| Trading partner growth    |                     |                     | 0.945***<br>(0.162)  | 0.936***<br>(0.162)  |                     |                     |
| Country fixed effects     | Yes                 | Yes                 | Yes                  | Yes                  | Yes                 | Yes                 |
| Year effects              | Yes                 | Yes                 | Yes                  | Yes                  | Yes                 | Yes                 |
| Observations              | 1,349               | 1,349               | 1,403                | 1,403                | 1,403               | 1,403               |
| R-squared                 | 0.210               | 0.212               | 0.406                | 0.410                | 0.329               | 0.324               |
| Countries                 | 53                  | 53                  | 53                   | 53                   | 53                  | 53                  |

FE/TE = country fixed effects/time effects; GDP = gross domestic product; IV = instrumental variable; OLS = ordinary least squares; REER = real effective exchange rate.

Notes: Asset and liability flows are those driven by residents and nonresidents, respectively. Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Source: Authors' estimates.

While these differences are hardly dramatic, they suggest that the impact on the recipient country economy may depend on the type of capital inflow. In this vein, the estimates reported in Table 2 suggest that the consequences of capital flows also depend on their composition. Thus, FDI is not significantly associated with currency overvaluation (column 2), but has the largest impact on real GDP growth and the output gap (columns 4 and 6).<sup>11</sup> By contrast, other investment flows are strongly

<sup>11</sup> One possible explanation for this result is that FDI is more likely (than other types of flows) to represent the financing associated with the import of capital goods. More generally, some caution is required in interpreting the results for disaggregated flows as the net concept refers to foreign purchases of that type of domestic liability plus the repatriated proceeds of residents' sale of that type of foreign asset—regardless of how those proceeds are used (i.e., whether or not they are invested in the same type of asset domestically). Although plausible, there is no necessary reason why the repatriated proceeds would be invested in the same asset class. Further disaggregating individual net flows into

associated with both currency overvaluation, and output expansion.<sup>12</sup> Similarly, portfolio flows are associated—albeit only at the 10% significance level—with currency overvaluation, positive output gaps and growth. Further splitting portfolio flows into debt and equity shows that currency overvaluation stems from the former, while output expansion is mainly associated with the latter (Appendix, Table A3).

Thus, capital inflows can amplify macroeconomic imbalances, with certain types of flows—portfolio (debt) and other investment flows—being particularly pernicious, while FDI contributes to output growth with no significant effect on currency appreciation.

### 3. FINANCIAL VULNERABILITIES

Capital inflows may be associated not only with macroeconomic concerns, but also with rising financial stability risks. Part of the reason that such flows are expansionary is that they fuel domestic credit growth. Yet, the easy availability of external financing may induce banks to loosen lending standards, reduce loan quality, and fuel rapid asset price inflation that ultimately proves unsustainable. Capital flows could also exacerbate maturity and currency mismatches on bank balance sheets (including through increased lending in foreign currency to unhedged private sector borrowers), causing financial distress to the domestic banking system when flows recede and the currency depreciates. In fact, Bruno and Shin (2014) show that capital flows tend to be associated with a buildup of leverage in the banking sector, which is also a key determinant of the international transmission of financial conditions.

The existing literature finds strong evidence that capital inflows do induce domestic credit booms.<sup>13</sup> A first look at our data corroborates these findings and shows that inflows to EMEs are associated with faster credit expansion, increased foreign currency (FX) lending, and sharper increase in leverage of the domestic banking system (Figure 2).<sup>14</sup> More formal analysis that controls for other relevant factors, as well as country and year fixed effects, shows that an increase in net capital inflows to GDP of 10 percentage points is associated with about 1 percentage point per year faster credit growth (captured by 3-year cumulative change in domestic credit-to-GDP ratio), a 4 percentage point increase in growth of banks' leverage ratio, and about 1 percentage point higher FX-denominated lending (Table 3, columns 2, 6, and 10). As above, the results hold when we take into account potential endogeneity concerns and instrument net capital flows by the corresponding flows to other countries in the region (in percent of regional GDP) and a *de jure* measure of capital account openness. The estimates from the IV-2SLS approach are generally larger but remain statistically significant, except for the case of change in FX lending where the coefficient turns statistically insignificant.

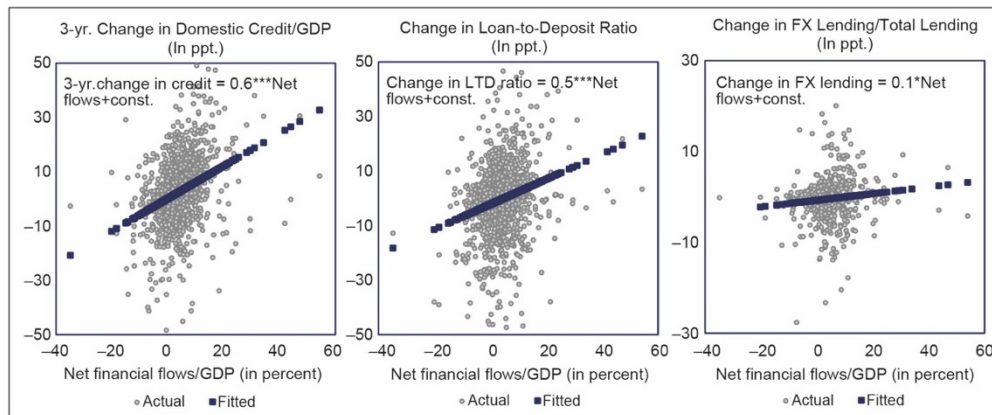
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asset and liability flows, we find that where the estimated coefficients are statistically significant in Table 2, the effect is generally driven by both asset and liability flows (results not reported here).

<sup>12</sup> The estimated coefficient of net other investment flows (lagged) is statistically insignificant in the real GDP growth estimations, but becomes significant and larger in magnitude if contemporaneous flows are used, or in IV-2SLS regressions with net flows to the region (in percent of regional GDP) and the *de jure* capital account openness index used as instruments.

<sup>13</sup> See, e.g., Mendoza and Terrones (2012); Dell'Ariccia et al. (2012); Furceri, Guichard, and Rusticelli (2012b); Calderon and Kubota (2012); and Elekdag and Wu (2013).

<sup>14</sup> The findings for FX lending are robust to the exclusion of countries with a 100% share of FX lending in total lending (mainly dollarized economies) from the sample.

**Figure 2: Financial Vulnerabilities and Capital Flows in Emerging Market Economies, 1980–2013**

FX = foreign exchange; GDP = gross domestic product; ppt = percentage point.

Note: Figure based on estimation results reported in columns 7, 9, and 11 in Table 3.

Source: Authors' estimates.

**Table 3: Financial Vulnerabilities and Capital Flows in Emerging Market Economies, 1980–2013**

|                                       | REER Overvaluation  |                      |                      |                      | Real GDP Growth     |                    |
|---------------------------------------|---------------------|----------------------|----------------------|----------------------|---------------------|--------------------|
|                                       | OLS                 | FE/TE                | IV <sup>a</sup>      | IV <sup>b</sup>      | OLS                 | FE/TE              |
|                                       | (1)                 | (2)                  | (3)                  | (4)                  | (5)                 | (6)                |
| Net financial flows/GDP               | 0.600***<br>(0.134) | 0.402***<br>(0.113)  | 0.614<br>(0.662)     | 1.258*<br>(0.676)    | 0.460***<br>(0.101) | 0.410**<br>(0.099) |
| Exchange rate regime                  |                     | -0.417<br>(1.516)    | -0.851<br>(1.634)    | -1.760<br>(1.621)    |                     | 3.385*<br>(1.887)  |
| Real GDP growth                       |                     | 0.016<br>(0.148)     | -0.034<br>(0.296)    | -0.280<br>(0.310)    |                     | 0.449**<br>(0.140) |
| Terms of trade change                 |                     | -0.014<br>(0.027)    | -0.017<br>(0.033)    | 0.000<br>(0.030)     |                     | 0.078<br>(0.062)   |
| Trade openness                        |                     | -0.011<br>(0.043)    | -0.016<br>(0.045)    | -0.017<br>(0.052)    |                     | -0.044<br>(0.031)  |
| Real GDP per capita (log)             |                     | 20.115***<br>(3.941) | 20.420***<br>(4.325) | 19.566***<br>(4.606) |                     | 6.934**<br>(2.733) |
| Initial condition <sup>c</sup>        |                     | -0.443***<br>0.055   | -0.422***<br>(0.074) | -0.382***<br>(0.071) |                     | -0.149*<br>(0.015) |
| Country effects                       | No                  | Yes                  | Yes                  | Yes                  | No                  | Yes                |
| Year effects                          | No                  | Yes                  | Yes                  | Yes                  | No                  | Yes                |
| Observations                          | 1,295               | 1,295                | 1,292                | 1,283                | 1,276               | 1,276              |
| R-squared                             | 0.094               | 0.431                |                      |                      | 0.035               | 0.233              |
| Countries                             | 53                  | 53                   | 53                   | 52                   | 53                  | 53                 |
| Hansen J stat. (p-value) <sup>c</sup> |                     |                      |                      | 0.278                |                     |                    |

*continued on next page*

Table 3 *continued*

|                                       | REER Overvaluation   |                      |                   | Real GDP Growth      |                      |                      |
|---------------------------------------|----------------------|----------------------|-------------------|----------------------|----------------------|----------------------|
|                                       | IV <sup>a</sup>      | IV <sup>b</sup>      | OLS               | FE/TE                | OLS                  | FE/TE                |
|                                       | (7)                  | (8)                  | (9)               | (10)                 | (11)                 | (12)                 |
| Net financial flows/GDP               | 1.244**<br>(0.547)   | 1.311**<br>(0.506)   | 0.072*<br>(0.036) | 0.060*<br>(0.031)    | 0.0182<br>(0.190)    | 0.263<br>(0.170)     |
| Exchange rate regime                  | 2.037<br>(2.184)     | 1.944<br>(2.234)     |                   | −0.079<br>(0.542)    | −0.410<br>(1.054)    | −0.594<br>(1.031)    |
| Real GDP growth                       | 0.129<br>(0.277)     | 0.075<br>(0.266)     |                   | −0.039<br>(0.073)    | −0.084<br>(0.134)    | −0.118<br>(0.118)    |
| Terms of trade change                 | 0.091<br>(0.064)     | 0.090<br>(0.063)     |                   | 0.000<br>(0.029)     | 0.003<br>(0.031)     | 0.004<br>(0.031)     |
| Trade openness                        | −0.036<br>(0.044)    | −0.035<br>(0.045)    |                   | −0.017<br>(0.023)    | (0.028)<br>(0.031)   | −0.036<br>(0.031)    |
| Real GDP per capita (log)             | 8.771**<br>(3.368)   | 9.057**<br>(3.464)   |                   | 5.637**<br>(2.521)   | 5.758**<br>(2.796)   | 5.491**<br>(2.782)   |
| Initial condition <sup>c</sup>        | −0.141***<br>(0.016) | −0.142***<br>(0.016) |                   | −0.124***<br>(0.023) | −0.115***<br>(0.030) | −0.107***<br>(0.028) |
| Country effects                       | Yes                  | Yes                  | No                | Yes                  | Yes                  | Yes                  |
| Year effects                          | Yes                  | Yes                  | No                | Yes                  | Yes                  | Yes                  |
| Observations                          | 1,273                | 1,264                | 489               | 489                  | 488                  | 483                  |
| R-squared                             |                      |                      | 0.016             | 0.226                |                      |                      |
| Countries                             | 53                   | 52                   | 44                | 44                   | 44                   | 43                   |
| Hansen J stat. (p-value) <sup>c</sup> |                      | 0.882                |                   |                      |                      | 0.375                |

FE/TE = country fixed effects/time effects; FX = foreign exchange; GDP = gross domestic product; IV = instrumental variable (two-stage least squares); LTD = loan-to-deposit ratio; OLS = ordinary least squares.

Notes: Dependent variable is 3-year cumulative change in domestic credit (in percent of GDP) in columns 1–4; annual change in loan to deposit ratio (in ppt.) in columns 5–8; and annual change in foreign currency loans to total loans (in ppt.) in columns 9–12. All regressors (except for initial condition and trading partner growth) are lagged one period. Constant is included in all specifications. Clustered standard errors are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Net financial flows to other countries in the region (in percent of regional GDP) is used as an instrument for net financial flows (in percent of GDP) in the first stage. Net financial flows to GDP is the predicted value obtained from the first stage regression with the instrument and all other regressors (as well as country fixed and year effects) included.

<sup>b</sup> Net financial flows to other countries in the region (in percent of regional GDP), and Chinn–Ito (de jure) capital account openness index are used as instruments in the first stage. Net financial flows to GDP is the predicted value obtained from the first stage regression with the instruments and all other regressors (as well as country fixed and year effects) included.

<sup>c</sup> Initial condition is 3-year lagged domestic credit (in percent of GDP) in columns 1–4, 3-year lagged loan to deposit ratio (in percent) in columns 5–8, and 3-year lagged foreign currency loans (in percent of total loans) in columns 9–12.

<sup>d</sup> Overidentification test of instruments (with the null hypothesis that the full set of orthogonality conditions are valid).

Source: Authors' estimates.

### 3.1 Financial Vulnerabilities by Type of Inflow

Turning to the decomposition of net capital flows into asset flows and liability flows, the financial stability consequences appear to be broadly similar—thus, flows driven by both residents and nonresidents lead to domestic credit booms, higher leverage, and increased lending in foreign currency (Table 4). Formal tests of coefficient equality, however, show that the effect of liability flows on domestic credit expansion is statistically significantly larger than that of asset flows, implying that a 10% of GDP increase in liability flows increases domestic credit growth by 4 percentage points over

3 years, while the same increase in asset flows raises lending by 3.5 percentage points (column 1).

**Table 4: Financial Vulnerabilities by Type of Capital Flows, 1980–2013**

|                           | 3-year Change in<br>Credit/GDP |                      | Change in LTD Ratio  |                      | Change in FX<br>Lending |                      |
|---------------------------|--------------------------------|----------------------|----------------------|----------------------|-------------------------|----------------------|
|                           | FE/TE                          | FE/TE                | FE/TE                | FE/TE                | FE/TE                   | FE/TE                |
|                           | (1)                            | (2)                  | (3)                  | (4)                  | (5)                     | (6)                  |
| Asset flows/GDP           | 0.357***<br>(0.122)            |                      | 0.443***<br>(0.094)  |                      | 0.052<br>(0.046)        |                      |
| Liability flows/GDP       | 0.408***<br>(0.111)            |                      | 0.405***<br>(0.100)  |                      | 0.062*<br>(0.031)       |                      |
| Net FDI flows/GDP         |                                | 0.247<br>(0.242)     |                      | 0.062<br>(0.169)     |                         | 0.035<br>(0.073)     |
| Net portfolio flows/GDP   |                                | 0.185<br>(0.158)     |                      | 0.333**<br>(0.151)   |                         | 0.116*<br>(0.064)    |
| Net other inv. flows/GDP  |                                | 0.506***<br>(0.139)  |                      | 0.535***<br>(0.136)  |                         | 0.055<br>(0.044)     |
| Exchange rate regime      | −0.402<br>(1.520)              | −0.246<br>(1.486)    | 3.375*<br>(1.890)    | 3.708*<br>(1.873)    | −0.071<br>(0.544)       | −0.088<br>(0.547)    |
| Real GDP growth           | −0.016<br>(0.154)              | 0.007<br>(0.148)     | 0.471***<br>(0.145)  | 0.452***<br>(0.140)  | −0.041<br>(0.074)       | −0.034<br>(0.073)    |
| Terms of trade change     | −0.012<br>(0.027)              | −0.014<br>(0.028)    | 0.076<br>(0.062)     | 0.078<br>(0.062)     | 0.001<br>(0.029)        | 0.002<br>(0.029)     |
| Trade openness            | −0.010<br>(0.043)              | −0.012<br>(0.043)    | −0.044<br>(0.031)    | −0.043<br>(0.030)    | −0.017<br>(0.024)       | −0.014<br>(0.023)    |
| Real GDP per capita (log) | 20.113***<br>(3.923)           | 19.840***<br>(3.889) | 7.038**<br>(2.751)   | 6.717**<br>(2.791)   | 5.562**<br>(2.456)      | 5.647**<br>(2.545)   |
| Initial condition         | −0.445***<br>(0.055)           | −0.436***<br>(0.056) | −0.149***<br>(0.015) | −0.148***<br>(0.015) | −0.124***<br>(0.022)    | −0.125***<br>(0.023) |
| Country fixed effects     | Yes                            | Yes                  | Yes                  | Yes                  | Yes                     | Yes                  |
| Year effects              | Yes                            | Yes                  | Yes                  | Yes                  | Yes                     | Yes                  |
| Observations              | 1,295                          | 1,295                | 1,276                | 1,276                | 489                     | 489                  |
| R-squared                 | 0.433                          | 0.436                | 0.234                | 0.237                | 0.226                   | 0.226                |
| Countries                 | 53                             | 53                   | 53                   | 53                   | 53                      | 53                   |

FDI = foreign direct investment; FE/TE = country fixed effects/time effects; FX = foreign exchange; GDP = gross domestic product; IV = instrumental variable (two-stage least squares); LTD = loan-to-deposit ratio.

Notes: Asset and liability flows are those driven by residents and nonresidents, respectively. Constant included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Source: Authors' estimates.

Splitting net flows based on their composition, we find that FDI is not (statistically) significantly associated with financial vulnerabilities (columns 2, 4, and 6). By contrast, other investment flows are strongly associated with domestic credit booms, and bank leverage. Similarly, portfolio flows are associated with increased bank leverage and FX-denominated lending by domestic banks. Dividing portfolio flows further into debt and equity shows that financial stability risks stem mainly from the former, while output expansion is mainly associated with the latter (Appendix, Table A3).<sup>15</sup> These results are consistent with existing studies, which find that domestic credit booms are driven

<sup>15</sup> This finding is consistent with the theoretical model of Blanchard et al. (2016).



by non-FDI flows; especially other investment liability (or debt) flows (e.g., Calderon and Kubota 2012; Furceri, Guichard, and Rusticelli 2012b; Igan and Tan 2015).

In sum, the results reported show that not all types of capital inflows are dangerous—other investment liability flows (predominantly cross-border bank flows) appear to be the most prone to aggravating financial vulnerabilities, while FDI flows seem to have the fewest untoward consequences.

## 4. CRISIS LIKELIHOOD

To what extent do the imbalances and vulnerabilities associated with capital inflows translate into crisis? Existing studies find that they often do—notably, credit growth and real exchange rate overvaluation turn out to be strong predictors of banking and currency crises in EMEs (Demirgüç-Kunt and Detragiache 1998; Gourinchas and Obstfeld, 2012; Ghosh, Ostry, and Qureshi 2015).<sup>16</sup> Caballero (2016) finds that large inflows of capital are associated with systemic banking crises even in the absence of lending booms, but that the likelihood of a crisis magnifies threefold in the presence of a credit boom. Similarly, Calderon and Kubota (2012) find that surges in gross inflows are a good predictor of credit booms that end up in a financial crisis, and this remains true even after controlling for currency appreciation and the buildup of leverage.

To establish the link between capital inflows and financial (i.e., banking or currency) crises, we estimate the following model:

$$\Pr(Crisis_{jt} = 1) = F\left(\beta k_{jt} + \sum_{m=1}^n \gamma_m z_{mjt}\right), \quad (1)$$

where  $Crisis_{jt}$  is an indicator variable of whether a banking or currency crisis occurs in country  $j$  in period  $t$ ;  $k$  indicates net financial flows (in percent of GDP) prior to the onset of the crisis; and  $z$  includes relevant control variables such as (lagged) real GDP growth, fiscal balance, stock of foreign exchange reserves (in percent of GDP), inflation, exchange rate regime, real GDP per capita, as well as country-specific and year effects.<sup>17</sup> The banking and currency crisis variables are taken from the database of Laeven and Valencia (2012). They define systemic banking crises as those in which significant signs of financial distress appear in the banking system, requiring significant policy interventions in response to significant losses. Currency crises are defined along the lines of Frankel and Rose (1996) and comprise depreciations of the nominal exchange rate against the US dollar of at least 30% that are also at least 10 percentage points greater than the previous year's depreciation. We estimate (1) using the probit model and cluster the standard errors at the country level.

The results imply that, against an unconditional crisis probability of about 4% and evaluating the effects around the mean values of all explanatory variables, a 10% GDP increase in net financial flows raises the probability of banking and currency crises by

<sup>16</sup> Analyzing data for 14 developed countries from 1870–2008, Schularick and Taylor (2012) find that faster credit growth and higher leverage in the financial system are strongly associated with financial crises in advanced economies as well.

<sup>17</sup> We use one-period lagged net financial flow (in percent of GDP) in the banking crisis estimations and two-period lagged net financial flow (in percent of GDP) in the currency crisis estimations. This is because typically a currency crisis happens after the onset of outflows—taking the 1-year lag is thus likely to simply reflect the fact that countries with larger outflows (or lower net flows) experience a currency crisis, instead of capturing that larger inflows *eventually* lead to crisis.

over 2 percentage points (Table 5, columns 1 and 4). Much of this increase in crisis likelihood, however, stems from just two variables: currency overvaluation and the change in domestic credit (in percent of GDP). When these variables are included in the probit, the estimated coefficient on net financial flows to GDP becomes statistically insignificant (columns 2 and 5). A 10-percentage-point increase in real exchange rate overvaluation, for instance, raises the likelihood of a banking or currency crisis by about 2 percentage points, while a 10-percentage-point domestic credit expansion over a 3-year period raises the likelihood of a banking crisis by about 1 percentage point (domestic credit expansion is not statistically significantly associated with currency crisis).

**Table 5: Crisis Probability and Capital Flows in Emerging Market Economies**

|                                  | Banking              |                     |                     | Currency             |                      |                      |
|----------------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|                                  | (1)                  | (2)                 | (3)                 | (4)                  | (5)                  | (6)                  |
| Net financial flows/GDP          | 0.045***<br>(0.017)  | 0.031*<br>(0.018)   | 0.024<br>(0.023)    | 0.044**<br>(0.018)   | 0.033*<br>(0.018)    | 0.045*<br>(0.026)    |
| REER overvaluation               |                      | 0.024**<br>(0.010)  | 0.024**<br>(0.011)  |                      | 0.041***<br>(0.011)  | 0.058***<br>(0.011)  |
| 3-year change in credit/GDP      |                      | 0.029***<br>(0.008) | 0.032***<br>(0.009) |                      | 0.005<br>(0.007)     | 0.006<br>(0.008)     |
| Exchange rate regime             | 0.527<br>(0.505)     | 0.379<br>(0.575)    | 0.242<br>(0.667)    | 0.123<br>(0.401)     | -0.137<br>(0.415)    | -0.455<br>(0.551)    |
| Real GDP growth                  | -0.012<br>(0.022)    | 0.005<br>(0.025)    | -0.028<br>(0.032)   | 0.018<br>(0.025)     | 0.050*<br>(0.030)    | 0.066**<br>(0.028)   |
| Reserves/GDP                     | -0.047***<br>(0.018) | -0.038*<br>(0.020)  | -0.030<br>(0.026)   | -0.114***<br>(0.042) | -0.091**<br>(0.045)  | -0.099*<br>(0.051)   |
| Trade openness                   | -0.009<br>(0.008)    | -0.010<br>(0.008)   | -0.008<br>(0.010)   | -0.006<br>(0.010)    | -0.004<br>(0.008)    | -0.001<br>(0.014)    |
| Real GDP per capita (log)        | 0.643<br>(0.403)     | 0.166<br>(0.403)    | 1.774**<br>(0.734)  | 1.041<br>(0.733)     | 0.921<br>(0.748)     | 5.530***<br>(1.515)  |
| Fiscal balance/GDP               | 0.002<br>(0.029)     | -0.005<br>(0.031)   | -0.022<br>(0.039)   | -0.067***<br>(0.022) | -0.073***<br>(0.027) | -0.126***<br>(0.035) |
| Inflation                        | 0.002<br>(0.005)     | 0.008<br>(0.005)    | -0.008<br>(0.007)   | 0.000<br>(0.005)     | 0.012***<br>(0.004)  | 0.003<br>(0.007)     |
| Country fixed effects            | Yes                  | Yes                 | Yes                 | Yes                  | Yes                  | Yes                  |
| Year effects                     | No                   | No                  | Yes                 | No                   | No                   | Yes                  |
| Observations                     | 1,177                | 1,177               | 1,177               | 1,158                | 1,158                | 1,158                |
| Countries                        | 53                   | 53                  | 53                  | 53                   | 53                   | 53                   |
| Pseudo R2                        | 0.162                | 0.222               | 0.415               | 0.300                | 0.363                | 0.543                |
| Wald-chi2 (p-value) <sup>a</sup> | 0.00                 | 0.00                | 0.00                | 0.00                 | 0.00                 | 0.00                 |

GDP = gross domestic product; REER = real effective exchange rate.

Notes: Dependent variable is a binary variable equal to one if there is a banking or currency crisis in columns 1–3 and 4–6, respectively. All specifications are estimated using the probit model. All regressors are lagged one period, except for net financial flows to GDP in columns 4–6, which is lagged two periods.

Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Test of joint significance of regressors.

Source: Authors' estimates.

Moreover, these results hold when we include year fixed effects to capture common shocks across countries, and with their addition, the estimated coefficient of capital flows on banking crises loses its statistical significance, while that on currency crises remains significant at the 10% level (columns 3 and 6). Thus, beyond the effects of

exchange rate overvaluation and credit expansion, there appear to be some residual risks of capital flows (such as currency mismatches on private sector balance sheets) that magnify the risk of currency crises. Among the other variables in the probit, a larger stock of foreign exchange reserves, a higher fiscal balance, and lower inflation are associated with a lower likelihood of a currency crisis.

#### 4.1 Crisis Likelihood by Type of Inflow

Disaggregating net flows into asset flows and liability flows, we find that both have a similar effect on crisis likelihood: for instance, a 10% GDP increase in capital inflows by either domestic residents (asset flows) or by foreigners (liability flows) raises the probability of a banking or currency crisis by about 2 percentage points (Table 6, columns 1 and 5). The estimated coefficients for both types of flows turn statistically insignificant when measures of currency overvaluation and credit expansion are included in the model for banking crises, implying that both work mainly through these channels (column 2), yet remain significant in the currency crisis probit (column 6).

**Table 6: Crisis Probability by Type of Capital Flows**

|                             | Banking              |                     |                     |                     | Currency             |                      |                      |                      |
|-----------------------------|----------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
|                             | (1)                  | (2)                 | (3)                 | (4)                 | (5)                  | (6)                  | (7)                  | (8)                  |
| Asset flows/GDP             | 0.050***<br>(0.018)  | 0.026<br>(0.023)    |                     |                     | 0.067*<br>(0.037)    | 0.114*<br>(0.064)    |                      |                      |
| Liability flows/GDP         | 0.046***<br>(0.017)  | 0.025<br>(0.023)    |                     |                     | 0.041**<br>(0.019)   | 0.045*<br>(0.026)    |                      |                      |
| Net FDI flows/GDP           |                      |                     | -0.069<br>(0.053)   | -0.150**<br>(0.076) |                      |                      | 0.007<br>(0.048)     | -0.083<br>(0.067)    |
| Net portfolio flows/GDP     |                      |                     | 0.041*<br>(0.022)   | -0.011<br>(0.026)   |                      |                      | 0.052<br>(0.032)     | 0.020<br>(0.029)     |
| Net other inv. flows/GDP    |                      |                     | 0.070***<br>(0.023) | 0.051**<br>(0.025)  |                      |                      | 0.046**<br>(0.023)   | 0.104**<br>(0.047)   |
| REER overvaluation          |                      | 0.024**<br>(0.011)  |                     | 0.024**<br>(0.012)  |                      | 0.060***<br>(0.012)  |                      | 0.063***<br>(0.013)  |
| 3-year change in credit/GDP |                      | 0.032***<br>(0.009) |                     | 0.033***<br>(0.009) |                      | 0.007<br>(0.008)     |                      | 0.008<br>(0.008)     |
| Exchange rate regime        | 0.525<br>(0.505)     | 0.240<br>(0.666)    | 0.502<br>(0.502)    | 0.222<br>(0.698)    | 0.111<br>(0.398)     | -0.537<br>(0.558)    | 0.117<br>(0.395)     | -0.513<br>(0.574)    |
| Real GDP growth             | -0.009<br>(0.022)    | -0.025<br>(0.034)   | -0.005<br>(0.024)   | -0.017<br>(0.034)   | 0.018<br>(0.025)     | 0.071**<br>(0.029)   | 0.016<br>(0.024)     | 0.082***<br>(0.027)  |
| Reserves/GDP                | -0.047***<br>(0.018) | -0.030<br>(0.026)   | -0.041**<br>(0.018) | -0.023<br>(0.027)   | -0.112***<br>(0.042) | -0.095*<br>(0.050)   | -0.112***<br>(0.043) | -0.091*<br>(0.049)   |
| Trade openness              | -0.009<br>(0.008)    | -0.008<br>(0.010)   | -0.010<br>(0.007)   | -0.013<br>(0.010)   | -0.006<br>(0.010)    | -0.002<br>(0.014)    | -0.006<br>(0.010)    | -0.002<br>(0.014)    |
| Real GDP per capita (log)   | 0.664<br>(0.409)     | 1.772**<br>(0.731)  | 0.773*<br>(0.431)   | 1.664**<br>(0.739)  | 1.145<br>(0.794)     | 5.651***<br>(1.506)  | 1.126<br>(0.740)     | 5.752***<br>(1.560)  |
| Fiscal balance/GDP          | 0.001<br>(0.029)     | -0.023<br>(0.039)   | -0.003<br>(0.029)   | -0.026<br>(0.041)   | -0.068***<br>(0.021) | -0.130***<br>(0.033) | -0.066***<br>(0.022) | -0.134***<br>(0.036) |
| Inflation                   | 0.002<br>(0.005)     | -0.007<br>(0.007)   | 0.001<br>(0.005)    | -0.008<br>(0.007)   | 0.000<br>(0.005)     | 0.003<br>(0.007)     | -0.001<br>(0.004)    | 0.002<br>(0.007)     |

*continued on next page*

**Table 6** *continued*

|                                  | Banking |       |       |       | Currency |       |       |       |
|----------------------------------|---------|-------|-------|-------|----------|-------|-------|-------|
|                                  | (1)     | (2)   | (3)   | (4)   | (5)      | (6)   | (7)   | (8)   |
| Country fixed effects            | Yes     | Yes   | Yes   | Yes   | Yes      | Yes   | Yes   | Yes   |
| Year effects                     | No      | Yes   | No    | Yes   | No       | Yes   | No    | Yes   |
| Observations                     | 1,177   | 1,177 | 1,177 | 1,177 | 1,158    | 1,158 | 1,158 | 1,158 |
| Countries                        | 53      | 53    | 53    | 53    | 53       | 53    | 53    | 53    |
| Pseudo R2                        | 0.164   | 0.412 | 0.183 | 0.434 | 0.302    | 0.546 | 0.301 | 0.551 |
| Wald-chi2 (p-value) <sup>a</sup> | 0.00    | 0.00  | 0.00  | 0.00  | 0.00     | 0.00  | 0.00  | 0.00  |

FDI = foreign direct investment; GDP = gross domestic product; REER = real effective exchange rate.

Notes: Dependent variable is a binary variable equal to one if there is a banking or currency crisis in columns 1–4 and 5–8, respectively. All specifications are estimated using the probit model. All regressors are lagged one period, except for the net financial flow to GDP variables in columns 5–8, which are lagged two periods. Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively. Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Test of joint significance of regressors.

Source: Authors' estimates.

## 5. CONCLUSIONS

Capital flows can bring numerous benefits to emerging markets, but they can also lead to macroeconomic imbalances—currency appreciation, positive output gaps, and overheating of the economy—as well as to financial vulnerabilities. Yet not all inflows are the same. While in economic terms, it makes little difference whether the flows stem from residents repatriating foreign assets or nonresidents investing in the country, formal statistical tests suggest that latter are relatively more prone to causing economic overheating and domestic credit expansion. Moreover, the type of inflow also matters. Specifically, FDI is associated with fewer macroeconomic imbalances (specifically, currency overvaluation) and financial vulnerabilities (credit growth, bank leverage, and FX-denominated lending). While this is unsurprising inasmuch as FDI is more likely to be financing imports (rather than deposits that will be lent by the domestic banking system), it presents a stark contrast to portfolio (debt) flows and other investment flows (typically cross-border bank flows), which are strongly associated with both macroeconomic imbalances and financial vulnerabilities.

Our empirical analysis also suggests that domestic credit expansion and currency overvaluation are the main channels through which these flows increase crisis risk—the obvious implication being that policy should try to limit these during an inflow surge. Even so, there may be residual risks that are likely related to balance sheet vulnerabilities. In this regard, it is again other investment flows that appear to be the most risky, while FDI seems to be the safest type of capital inflow. Beyond dealing with the untoward consequences of inflows, policy might also try to shift the composition of inflows away from the more risky and toward the safer types of liabilities.

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## APPENDIX

**Table A1: Variable Definitions and Data Sources**

| Variables                         | Description   | Source                                  |
|-----------------------------------|---|---|
| Banking/currency crisis           | Binary variable equal to 1 for banking or currency crisis, zero otherwise   | Laeven and Valencia (2013) <sup>a</sup> |
| Capital account openness index    | Index (high = liberalized; low = closed)  | Chinn-Ito (2008) <sup>b</sup>           |
| Consumer price index inflation    | In percent  | IMF's INS database                      |
| Exchange rate regime              | De facto (1 = Pegged; 0 = Nonpegged)  | Ghosh et al. (2015) <sup>c</sup>        |
| Fiscal balance to GDP             | In percent  | IMF's WEO database                      |
| Foreign currency lending          | In percent of total domestic lending  | IMF's Vulnerability Exercise database   |
| Foreign exchange reserves         | Stock (in billions of US dollars)   | IMF's IFS database                      |
| GDP current/constant prices       | In billions of US dollars (or local currency)   | IMF's WEO database                      |
| Loan to deposit ratio             | In percent  | IMF's IFS database                      |
| Net financial flows               | Net financial flows excluding financing items and other investment liabilities of general government (In US Dollars billion), i.e., the difference between IFS series codes "...4995W.9" and "...4753ZB9" (in terms of BPM5 presentation) | IMF's IFS database                      |
| Net financial flows to GDP        | In percent  | Authors' calculations                   |
| Net financial flows to the region | Sum of net financial flows to the region (in percent of regional GDP)   | Authors' calculations                   |
| Private sector credit             | In billions of local currency   | IMF's IFS database                      |
| Private sector credit boom        | 3-year cumulative change in domestic credit to GDP ratio (in percentage points)   | Authors' calculations                   |
| Real Effective Exchange Rate      | Index   | IMF's INS database                      |
| Real GDP growth                   | In percent (transformed as $x/(100+x)$ if $x \geq 0$ and $x/(100-x)$ if $x < 0$ to address outliers)  | Authors' calculations                   |
| Output gap                        | Log difference between real GDP and real GDP trend (obtained from HP filter); in percent  | Authors' calculations                   |
| Overvaluation                     | Log difference between real effective exchange rate and its trend (obtained from HP filter); in percent   | Authors' calculations                   |
| Real GDP per capita               | In US dollar (in logs)  | IMF's WEO database                      |
| Terms of trade change             | In percent  | IMF's WEO database                      |
| Trading partner growth            | Weighted average of real GDP growth in trading partners (in percent)  | IMF's WEO database                      |
| Trade openness                    | Sum of exports and imports (in percent of GDP)  | IMF's WEO database                      |

BPM = balance of payments; IFS = International Financial Statistics; IMF = International Monetary Fund; INS = Information Notice System; US = United States; WEO = World Economic Outlook.

<sup>a</sup> L. Laeven and F. Valencia. 2013. Systemic Banking Crises Database. *IMF Economic Review* 61(2): 225–270.

<sup>b</sup> M. Chinn and H. Ito. 2008. A New Measure of Financial Openness. *Journal of Comparative Policy Analysis* 10(3): 309–322.

<sup>c</sup> A. Ghosh, J. Ostry, and M. Qureshi. 2015. Exchange Rate Management and Crisis Susceptibility: A Reassessment. *IMF Economic Review* 63(1): 238–276.



**Table A2: IV-2SLS Regressions: First-Stage Estimates**

|                                   | REER overvaluation           |                     | Real GDP                   |                     | Other Gap            |                     |
|-----------------------------------|------------------------------|---------------------|----------------------------|---------------------|----------------------|---------------------|
|                                   | (1)                          | (2)                 | (3)                        | (4)                 | (5)                  | (6)                 |
| Net financial flows to the region | 0.424***<br>(0.109)          | 0.401***<br>(0.112) | 0.478**<br>(0.127)         | 0.414***<br>(0.119) | 0.595***<br>(0.142)  | 0.520***<br>(0.132) |
| Capital account openness index    |                              | 0.784**<br>(0.320)  |                            | 0.830**<br>(0.320)  |                      | 0.879***<br>(0.316) |
| Exchange rate regime              | 1.667**<br>(0.783)           | 1.842**<br>(0.748)  | 1.641**<br>(0.743)         | 1.942**<br>(0.757)  | 1.880**<br>(0.760)   | 2.147***<br>(0.773) |
| Real GDP growth                   | 0.308***<br>(0.073)          | 0.311***<br>(0.077) |                            |                     |                      |                     |
| Terms of trade change             | -0.006<br>(0.011)            | -0.006<br>(0.011)   | 0.006<br>(0.011)           | -0.006<br>(0.011)   | 0.006<br>(0.011)     | -0.007<br>(0.011)   |
| Trade openness                    | -0.007<br>(0.022)            | -0.004<br>(0.021)   | 0.004<br>(0.018)           | -0.002<br>(0.019)   | 0.000<br>(0.018)     | -0.005<br>(0.019)   |
| Real GDP per capita (log)         | -0.922<br>(1.413)            | -0.327<br>(1.352)   | -0.839<br>(1.351)          | -0.154<br>(1.263)   | -1.041<br>(1.422)    | -0.393<br>(1.320)   |
| Trading partner growth            |                              |                     | 0.776**<br>(0.186)         | 0.748***<br>(0.201) |                      |                     |
| Country effects                   | Yes                          | Yes                 | Yes                        | Yes                 | Yes                  | Yes                 |
| Year effects                      | Yes                          | Yes                 | Yes                        | Yes                 | Yes                  | Yes                 |
| Observations                      | 1,346                        | 1,332               | 1,400                      | 1,375               | 1,400                | 1,375               |
| R-squared                         | 0.412                        | 0.422               | 0.383                      | 0.403               | 0.370                | 0.391               |
| F-stat (p-value) <sup>a</sup>     | 0.00                         | 0.00                | 0.00                       | 1.00                | 0.00                 | 0.00                |
|                                   | 3-Year Change in Credits/GDP |                     | 1-Year Change in LTD Ratio |                     | Change in FX Lending |                     |
|                                   | (7)                          | (8)                 | (9)                        | (10)                | (11)                 | (12)                |
| Net financial flows to the region | 0.391***<br>(0.106)          | 0.366***<br>(0.105) | 0.457***<br>(0.116)        | 0.420***<br>(0.113) | 0.782***<br>(0.218)  | 0.802***<br>(0.223) |
| Capital account openness index    |                              | 0.718**<br>(0.319)  |                            | 0.779**<br>(0.323)  |                      |                     |
| Exchange rate regime              | 1.397*<br>(0.809)            | 1.553*<br>(0.789)   | 1.432*<br>(0.823)          | 1.602**<br>(0.793)  | 2.529**<br>(1.098)   | 2.588**<br>(1.138)  |
| Real GDP growth                   | 0.306***<br>(0.074)          | 0.300***<br>(0.075) | 0.353***<br>(0.084)        | 0.346***<br>(0.082) | 0.359**<br>(0.138)   | 0.363**<br>(0.142)  |
| Terms of trade change             | -0.031**<br>(0.014)          | -0.028**<br>(0.013) | -0.034**<br>(0.013)        | -0.030**<br>(0.013) | -0.028<br>(0.029)    | -0.033<br>(0.029)   |
| Trade openness                    | 0.005<br>(0.022)             | 0.009<br>(0.024)    | -0.008<br>(0.022)          | -0.008<br>(0.022)   | 0.104**<br>(0.047)   | 0.106**<br>(0.048)  |
| Real GDP per capita (log)         | 1.603<br>(1.596)             | 2.064<br>(1.645)    | -0.755<br>(1.794)          | -0.013<br>(1.640)   | 3.446<br>(3.820)     | 2.608<br>(3.866)    |
| Initial condition                 | -0.062**<br>(0.024)          | -0.06**<br>(0.025)  | -0.006<br>(0.009)          | -0.008<br>(0.008)   | -0.078*<br>(0.040)   | -0.084**<br>(0.041) |
| Country effects                   | Yes                          | Yes                 | Yes                        | Yes                 | Yes                  | Yes                 |
| Year effects                      | Yes                          | Yes                 | Yes                        | Yes                 | Yes                  | Yes                 |
| Observations                      | 1,292                        | 1,283               | 1,273                      | 1,264               | 488                  | 488                 |
| R-squared                         | 0.434                        | 0.442               | 0.421                      | 0.430               | 0.613                | 0.620               |
| Countries                         | 0.00                         | 0.00                | 0.00                       | 0.00                | 0.00                 | 0.00                |

FX = foreign exchange; GDP = gross domestic product; LTD = loan-to-deposit ratio; REER = real effective exchange rate.

Notes: First stage estimates obtained from two-stage least squares instrumental variable estimation. Dependent variable is net capital flows in percent of GDP. All regressors (except for net financial flows to the region in percent of regional GDP; capital account openness index, trading partner growth, and initial condition) are lagged one period. Constant included in all specifications. Clustered standard errors are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Test of joint significance of regressors.

Source: Authors' estimates.

**Table A3: Vulnerabilities by Type of Portfolio Flow**

|                                   | REER<br>Overvaluation | Real GDP<br>Growth   | Output Gap          | 3-Year<br>Change in<br>Credit/GDP | Change in<br>LTD ratio | Change in<br>FX Lending |
|-----------------------------------|-----------------------|----------------------|---------------------|-----------------------------------|------------------------|-------------------------|
|                                   | (1)                   | (2)                  | (3)                 | (4)                               | (5)                    | (6)                     |
| Net FDI flows/GDP                 | -0.002<br>(0.129)     | 0.208***<br>(0.056)  | 0.246***<br>(0.063) | 0.231<br>(0.243)                  | 0.065<br>(0.170)       | 0.037<br>(0.072)        |
| Net portfolio equity<br>flows/GDP | 0.173<br>(0.255)      | 0.169**<br>(0.064)   | 0.087<br>(0.129)    | 0.095<br>(0.324)                  | 0.274<br>(0.250)       | 0.014<br>(0.088)        |
| Net portfolio debt<br>flows/GDP   | 0.305*<br>(0.180)     | 0.047<br>(0.044)     | 0.091<br>(0.059)    | 0.198<br>(0.167)                  | 0.346**<br>(0.162)     | (0.145*<br>(0.087)      |
| Net other inv.<br>flows/GDP       | 0.256***<br>(0.090)   | 0.023<br>(0.025)     | 0.204***<br>(0.049) | 0.506***<br>(0.139)               | 0.540***<br>(0.135)    | 0.055<br>(0.046)        |
| Exchange rate<br>regime           | 3.136*<br>(1.584)     | 0.233<br>(0.423)     | 0.901<br>(0.615)    | -0.119<br>(1.491)                 | 3.678*<br>(1.870)      | -0.083<br>(0.539)       |
| Real GDP growth                   | -0.022<br>(0.095)     |                      |                     | 0.001<br>(0.149)                  | 0.452***<br>(0.140)    | -0.029<br>(0.075)       |
| Terms of trade<br>change          | 0.020<br>(0.022)      | 0.020*<br>(0.011)    | 0.025**<br>(0.012)  | -0.013<br>(0.027)                 | 0.078<br>(0.062)       | 0.001<br>(0.029)        |
| Trade openness                    | -0.066**<br>(0.030)   | 0.017<br>(0.010)     | -0.006<br>(0.011)   | -0.010<br>(0.044)                 | -0.047<br>(0.031)      | -0.014<br>(0.025)       |
| Real GDP per<br>capita (log)      | 2.893*<br>(1.469)     | -3.925***<br>(0.958) | 6.497***<br>(2.203) | 19.795***<br>(3.893)              | 6.613**<br>(2.778)     | 5.637**<br>(2.506)      |
| Trading partner<br>growth         |                       | 0.937***<br>(0.162)  |                     |                                   |                        |                         |
| Initial condition                 |                       |                      |                     | -0.435***<br>(0.058)              | -0.148***<br>(0.015)   | -0.125***<br>(0.023)    |
| Country effects                   | Yes                   | Yes                  | Yes                 | Yes                               | Yes                    | Yes                     |
| Year effects                      | Yes                   | Yes                  | Yes                 | Yes                               | Yes                    | Yes                     |
| Observations <sup>a</sup>         | 1,345                 | 1,399                | 1,399               | 1,291                             | 1,272                  | 486                     |
| R-squared                         | 0.213                 | 0.411                | 0.324               | 0.430                             | 0.237                  | 0.227                   |
| Countries                         | 53                    | 53                   | 53                  | 53                                | 53                     | 44                      |

FDI = foreign direct investment; FX = foreign exchange; GDP = gross domestic product; LTD = loan-to-deposit ratio; REER = real effective exchange rate.

Notes: Constant is included in all specifications. Clustered standard errors are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively. Number of observations is slightly fewer than in Table 2 as breakdown of net portfolio flows into equity and debt flows is unavailable in some cases.

<sup>a</sup> Number of observations is slightly fewer than in Tables 2 and 4 as breakdown of portfolio flows into equity and debt flows is unavailable in some cases.

Source: Authors' estimates.

**Table A4: Crisis Probability by Type of Portfolio Flow**

|                                  | Banking             |                     | Currency             |                      |
|----------------------------------|---------------------|---------------------|----------------------|----------------------|
|                                  | (1)                 | (2)                 | (3)                  | (4)                  |
| Net FDI flows/GDP                | -0.068<br>(0.052)   | -0.145<br>(0.078)   | 0.008<br>(0.048)     | -0.099<br>(0.082)    |
| Net portfolio equity flows/GDP   | -0.007<br>(0.157)   | -0.045<br>(0.096)   | 0.216<br>(0.257)     | 0.288<br>(0.270)     |
| Net portfolio debt flows/GDP     | 0.046**<br>(0.018)  | -0.005<br>(0.026)   | 0.041*<br>(0.021)    | 0.006<br>(0.019)     |
| Net other inv. flows/GDP         | 0.071***<br>(0.023) | 0.052**<br>(0.025)  | 0.045*<br>(0.023)    | 0.106**<br>(0.049)   |
| REER overvaluation               |                     | 0.024**<br>(0.012)  |                      | 0.064***<br>(0.013)  |
| 3-year change in credit/GDP      |                     | 0.033***<br>(0.009) |                      | 0.006<br>(0.008)     |
| Exchange rate regime             | 0.510<br>(0.507)    | 0.256<br>(0.719)    | 0.142<br>(0.382)     | -0.453<br>(0.570)    |
| Real GDP growth                  | -0.005<br>(0.023)   | -0.018<br>(0.034)   | 0.015<br>(0.024)     | 0.080***<br>(0.027)  |
| Reserves/GDP                     | -0.041**<br>(0.018) | -0.023<br>(0.028)   | -0.111**<br>(0.043)  | -0.089*<br>(0.049)   |
| Trade openness                   | -0.01<br>(0.007)    | -0.013<br>(0.010)   | -0.006<br>(0.010)    | -0.003<br>(0.014)    |
| Real GDP per capita (log)        | 0.779*<br>(0.432)   | 1.677**<br>(0.734)  | 1.069<br>(0.739)     | 5.922***<br>(1.590)  |
| Fiscal balance/GDP               | -0.002<br>(0.030)   | -0.025<br>(0.041)   | -0.068***<br>(0.024) | -0.143***<br>(0.038) |
| Inflation                        | 0.001<br>(0.005)    | -0.008<br>(0.007)   | -0.001<br>(0.005)    | 0.001<br>(0.007)     |
| Country fixed effects            | Yes                 | Yes                 | Yes                  | Yes                  |
| Year effects                     | No                  | Yes                 | No                   | Yes                  |
| Observations                     | 1,173               | 1,173               | 1,154                | 1,154                |
| Countries                        | 53                  | 53                  | 53                   | 53                   |
| Pseudo R2                        | 0.183               | 0.434               | 0.303                | 0.553                |
| Wald-chi2 (p-value) <sup>a</sup> | 0.00                | 0.00                | 0.00                 | 0.00                 |

FDI = foreign direct investment; FX = foreign exchange; GDP = gross domestic product; LTD = loan-to-deposit ratio; REER = real effective exchange rate.

Notes: Dependent variable is a binary variable equal to one if there is a banking or currency crisis in columns 1–2 and 3–4, respectively. All specifications are estimated using the probit model. All regressors are lagged one period, except for net financial flow to GDP variables in columns 3–4, which are lagged two periods. Constant is included in all specifications. Clustered standard errors (at the country level) are reported in parentheses. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

<sup>a</sup> Number of observations is slightly fewer than in Table 6 as breakdown of net portfolio flows into equity and debt flows is unavailable in some cases.

<sup>b</sup> Test of joint significance of regressors.

Source: Authors' estimates.