Debt- and Equity-Led Capital Flow Episodes

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Our earlier work has helped to switch the focus of studies of extreme capital flow movements toward the use of data on gross inflows (mainly driven by foreigners) and outflows (mainly driven by domestics) rather than relying on net flows (the sum of the two) (Forbes and Warnock, 2012). The old focus on net flows is understandable: in the early and mid-1990s, net capital inflows roughly mirrored gross inflows, so the capital outflows of domestic investors could often be ignored, and changes in net inflows could be interpreted as being driven by changes in foreign flows. More recently, however, the size and volatility of gross flows have increased while net capital flows have been more stable, which heightens the importance of differentiating between gross inflows and gross outflows. Foreign and domestic investors can be motivated by different factors and respond differently to various policies and shocks. Policymakers might also react differently based on whether episodes of extreme capital flow movements are triggered by domestic or foreign sources. Analysis based solely on net flows, while appropriate a few decades ago, would miss the dramatic changes in gross flows that have occurred over the past decade and disregard important information contained in the these flows. As domestic investors' flows have become increasingly important, changes in net flows can no longer be interpreted as being driven solely by foreigners. This point is made forcefully in Forbes and Warnock (2012).

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One question immediately emerges from the Forbes and Warnock (2012) analysis: to what extent are the extreme episodes of surges, stops, retrenchment and flight driven by different types of capital flows? We tackle this question by dividing up episodes into those that are led by debt and those that are led by equity. For a given episode—for example, a surge of inflows—if the increase in flows was mainly through debt (specifically, bonds and banking flows), we identify that episode as debt led. If the surge resulted mainly from an increase in equity inflows (specifically, portfolio equity and foreign direct investment, or FDI), it is equity led. We use the same approach to define equity- and debt-led stops, retrenchment and flight.

Our underlying quarterly data on gross inflows and gross outflows is identical to that in Forbes and Warnock (2012). It covers the period from 1980 (at the earliest) through 2009 and includes over 50 emerging and developed economies.[1] Using this database, we document the incidence of each type of episode of extreme capital flow movements over time, by income level and region. We show an unprecedented incidence of stops and retrenchment during the recent global financial crisis, as investors around the world liquidated foreign investment positions and brought money home. Importantly, we show that the vast majority of extreme capital flow episodes across our sample—80 percent of inflow episodes (surges and stops) and 70 percent of outflow episodes (flight and retrenchments)—are fueled by debt flows rather than equity flows.

Next, the paper shifts to its second goal of understanding the factors that are associated with debt- and equity-led episodes of extreme capital flows. We follow the Forbes and Warnock (2012) analysis here by describing capital flow episodes as being driven by specific global factors, contagion or domestic factors. To a first approximation, equity-led episodes appear to be idiosyncratic, bearing little systematic relation to our explanatory variables. Notably, even the risk measures that were highlighted in Forbes and Warnock (2012) as being significantly related to extreme movements in aggregate capital flows have little or no significant relationship with equity-led episodes. In contrast, risk measures are important in explaining debt-led episodes; when risk aversion is high, debt-led surges are less likely and debt-led stops are more likely. Contagion is also important for debt-led episodes, especially at the regional

1. Some graphs include 2010 data, but the empirical analysis does not because recent years' balance-of-payments data are subject to substantial revisions.

level. Country-level variables are largely insignificant, except for domestic growth shocks: debt-led stops are more likely in countries experiencing a negative growth shock, and debt-led surges are more likely in countries with a positive growth shock. Capital controls have little or no significance in both equity-led and debt-led episodes, as also found in Forbes and Warnock (2012).

Our key results—namely, that the majority of episodes are debt led and that debt-led episodes are associated with factors that agree with theory and past work—suggest that understanding debt flows is critically important. For example, the literature on credit booms is an important contribution to understanding sharp movements in capital flows (Gourinchas, Valdés and Landerretche, 2001; Mendoza and Terrones, 2008).

The remainder of the paper is as follows. Section 1 focuses on measures of extreme capital flow episodes. It explains our methodology and presents some descriptive statistics. Section 2 discusses the global, contagion and domestic factors we use to explain the incidence of surges, stops, flight and retrenchment; explains the estimation strategy; and reports results on the factors associated with debt- and equity-led capital flow waves. Section 3 concludes.

1. Identifying Debt- and Equity-Led Extreme Capital Flow Episodes

This section discusses our measures of debt- and equity-led capital flow episodes and provides a descriptive analysis of the episodes.

1.1 Methodology

Several methodologies can be used to identify capital flow episodes; each has advantages and disadvantages. The traditional approach using proxies for net flows is exemplified in the literature on sudden stops (for example, Calvo, Izquierdo and Mejía, 2004) and capital flow bonanzas (Reinhart and Reinhart, 2009). A number of studies facilitated a switch from net flows to gross flows in the examination of extreme capital flow episodes (Faucette, Rothenberg and Warnock, 2005; Cowan and De Gregorio, 2007; Cowan and others, 2008; Rothenberg and Warnock, 2011).

In this paper, our methodology closely follows that in Forbes and Warnock (2012), which builds on the traditional measures of

sudden stops and capital flow bonanzas but makes three fundamental changes relative to the traditional approach: we use data on actual flows instead of current-account-based proxies for flows; we use data on gross flows from the outset to identify episodes, rather than relying on proxies for net flows; and we analyze both large increases and large decreases of both inflows and outflows, instead of just focusing on either increases or decreases. Forbes and Warnock (2012) is the first paper to analyze all types of capital flow episodes, whether driven by foreigners or domestics and whether characterized by sharp increases or decreases.

Our main innovation relative to our earlier paper is that we delve into the types of flows—namely, debt (including banking) or equity (including FDI)—that are behind the extreme flow episodes. A cursory look at the underlying data for gross flows in Chile suggests that the country's aggregate gross capital flows are largely (but not entirely) driven by movements in debt flows (figure 1).

More specifically, we use quarterly gross flow data in a sample of 58 countries over the period from 1980 through 2009 to identify four types of episodes:[2]

—Surges: a sharp increase in gross capital inflows;

—Stops: a sharp decrease in gross capital inflows;

—Flight:[3] a sharp increase in gross capital outflows; and

—Retrenchment: a sharp decrease in gross capital outflows.

The first two types of episodes (that is, surges and stops) are driven by foreigners, while the last two (flight and retrenchment) are driven by domestic investors. For any type of episode, a debt-led episode is one in which the debt flows were larger in magnitude than the equity flows. All other episodes are equity led, in which portfolio equity and FDI flows account for the majority of flows during the episode.

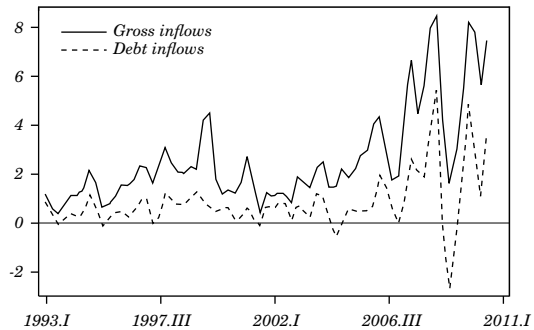
We calculate year-over-year changes in four-quarter gross capital inflows and outflows and define episodes using three criteria: (1) the current year-over-year change in four-quarter gross capital inflows or outflows is more than two standard deviations above or below the historical average during at least one quarter of the episode; (2) the episode lasts for all consecutive quarters for which the year-over-year change in annual gross capital flows is more than one standard

2. We start with as broad a sample as possible and only exclude countries that do not have detailed quarterly gross flow data.

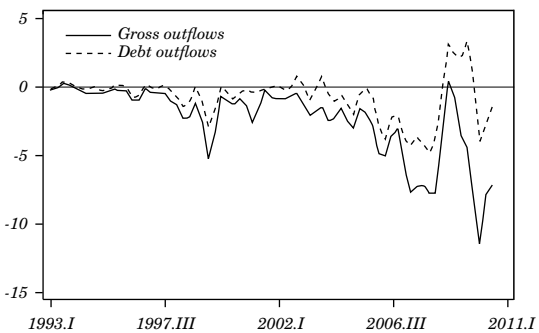
3. Flight is sometimes called starts (Cowan and others, 2008) or sudden diversification.

Figure 1. Chile's Gross Flows[a]

A. Total and debt inflows



B. Total and debt outflows



Source: Authors' elaboration.
a. The graphs show gross debt and equity inflows and outflows for Chile. Each flow is calculated as the two-quarter moving average. Gross outflows are reported using BPM5 definitions, so that a negative number indicates a gross outflow.

deviation above or below the historical average; and (3) the length of the episode is greater than one quarter.[4]

To provide a more concrete example of our methodology, consider the calculation of surge and stop episodes. Let C_t be the four-quarter

4. Summing capital flows over four quarters is analogous to the literature's focus on one year of flows and eliminates seasonal fluctuations. The historical average and standard deviation are calculated over the last five years. We require that countries have at least four years worth of data to calculate a historical average.

moving sum of gross capital inflows (GINFLOW) and compute annual year-over-year changes in C_t:

$$C_t = \sum_{i=0}^{3} \text{GINFLOW}_{t-i}, \text{ with } t = 1, 2, \ldots, N \tag{1}$$

and

$$\Delta C_t = C_t - C_{t-4}, \text{ with } t = 5, 6, \ldots, N. \tag{2}$$

Next, compute the rolling means and standard deviations of ΔC_t over the last five years. A surge episode is defined as starting the first month t that ΔC_t increases more than one standard deviation above its rolling mean. The episode ends once ΔC_t falls below one standard deviation above its mean. In addition, for the entire period to qualify as a surge episode, there must be at least one quarter t when ΔC_t increases at least two standard deviations above its mean.

A stop episode, defined using a symmetric approach, is a period when gross inflows fall one standard deviation below their mean, provided they reach two standard deviations below at some point. The episode ends when gross inflows are no longer at least one standard deviation below the mean.

Episodes of flight and retrenchment are defined similarly, but using gross private outflows rather than gross inflows and taking into account that in balance-of-payments (BOP) accounting terms, outflows by domestic residents are reported with a negative value.[5] In other words, when domestic investors acquire foreign securities, gross outflows are negative in BOP accounting terms. A sudden flight episode therefore occurs when gross outflows (in BOP accounting terms) fall one standard deviation below the mean, provided they reach two standard deviations at some point, and ends when gross outflows come back above one standard deviation below the mean. A sudden retrenchment episode occurs when gross outflows increase one standard deviation above their mean, provided they reach two standard deviations above at some point, and ends when gross outflows come back below one standard deviation above their mean.

5. As of August 2012, the IMF's balance-of-payments data are reported using the sixth edition of the Balance-of-Payments Manual. Our study predates the change to the sixth edition, so throughout this paper, balance-of-payments terminolgy and accounting rules refer to the fifth edition of the manual (BPM5).

For any type of episode, a debt-led episode is one in which the change in debt flows was larger in magnitude than the change in equity flows. That is, a debt-led episode is one in which the ΔC_t in equation (2) was driven primarily by a change in debt flows. All other episodes are equity led, in which portfolio equity and FDI flows represent the majority of flows behind the episode.

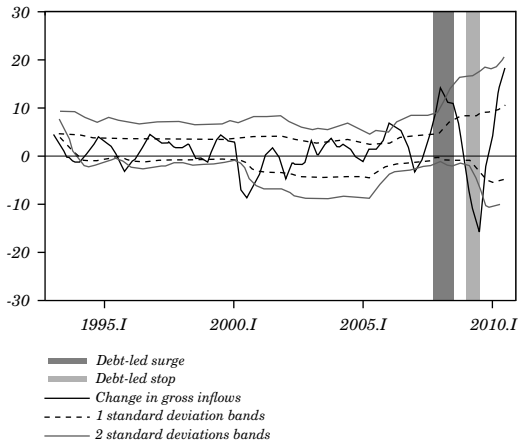
Our primary source of flow data is the International Monetary Fund's *International Financial Statistics* (IFS) on quarterly gross capital inflows and outflows.[6] A number of modifications are necessary, however, to transform the IFS flow data into a usable data set; some are straightforward, whereas others involve detailed inspection of country data and the filling in of gaps using source-country information. The creation of the underlying flow data set is described in more detail in Forbes and Warnock (2012, appendix A), which also lists the 58 countries in the resulting sample and the start date for which quarterly capital flow data is available for each country. In our baseline measure, we define gross capital inflows as the sum of inflows of direct investment, portfolio and other inflows; gross private capital outflows are defined analogously as the sum of direct investment, portfolio and other outflows. We also conduct sensitivity tests using alternative measures. In 2007, our sample includes US$10.8 trillion of gross capital inflows, capturing 97 percent of global capital inflows recorded by the International Monetary Fund (IMF).

Figure 2 (panel A) shows our identification of debt- and equity-led surges and stops for one country (Chile) from 1990 through 2009. The solid line is the change in annual gross capital inflows as defined in equation (2). The dashed lines are the bands for mean capital inflows plus or minus one standard deviation, and the dotted lines are the comparable two-standard-deviation bands. We classify an episode as a sudden stop if the change in annual capital inflows falls below the lowest line (the two-standard-deviation line) for at least one quarter, with the episode starting when it initially crosses the one-standard-deviation line and ending when it crosses back over the same line. Similarly, we classify an episode as a sudden surge if annual capital flows rise above the highest line (the two-standard-deviation line), with the episode starting when flows initially cross the one-standard-deviation line and ending when they cross back over the same line.

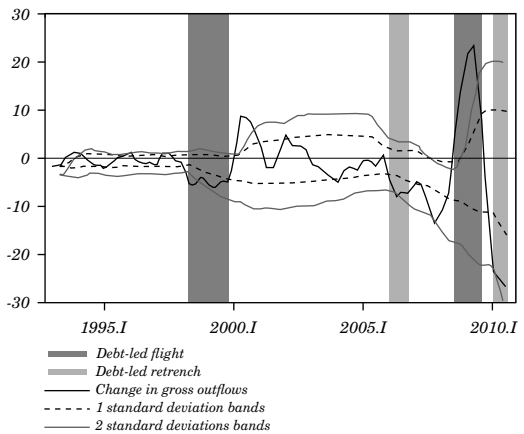
6. Accessed through Haver Analytics in January 2012.

Figure 2. Chile: Construction of the Episodes[a]

A. Surge and stop episodes



B. Retrenchment and flight episodes



Source: Authors' elaboration.

a. Panel A shows the construction of our measures of debt- and equity-led surges and stops for Chile. A surge episode of any type begins when gross inflows (the solid line) exceed one standard deviation above the rolling mean, provided they eventually exceed two standard deviations above the mean. The surge episode ends when gross inflows again cross the one standard deviation line. A surge is identified as debt-led if debt inflows exceeded equity inflows during the episode. Stops are defined analogously; a stop episode begins when gross inflows fall one standard deviation below the rolling mean, provided they eventually fall two standard deviations below the mean, and ends when gross inflows again cross the one standard deviation line. Flights and retrenchments, shown in panel B, are defined analogously but using gross outflows data.

Table 1. Summary Statistics for Episodes, 1980–2009

	Percent of episodes that are debt led			
Sample	*Surge*	*Stop*	*Flight*	*Retrenchment*
Full sample	82	80	71	72
By income group[a]				
High income	81	83	79	75
Middle income	81	83	63	76
Lower income	84	68	64	56
By region				
North America	67	69	74	72
Western Europe	89	87	81	77
Asia	80	79	67	68
Eastern Europe	88	71	64	82
Latin America	81	85	74	67
Other[b]	33	54	42	29

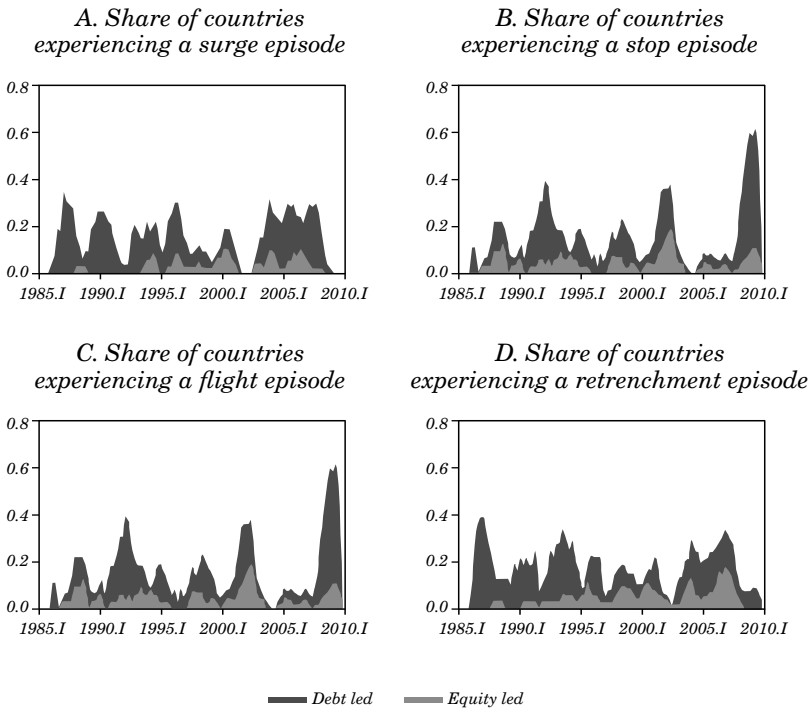
Source: Authors' elaboration.
a. Income classifications are based on per capita gross national income in 2000 as reported by the World Bank. We combine the World Bank's lower and lower-middle income countries into the group "lower income" because there are only four countries in our sample that qualify as lower income based on the World Bank classification. Our middle income group then includes countries classified as upper-middle income by the World Bank.
b. Other encompasses South Africa and Israel.

A given episode is debt led if the change in debt flows (that is, bonds and banking flows) is larger in magnitude than the change in equity flows (that is, portfolio equity and FDI); otherwise the episode is equity led. Debt-led episodes are identified with shaded bars in the figure; nonshaded episodes (that is, times when the solid line crosses the outermost bands) are equity led. For example, for Chilean inflows the most recent surge and stop were debt led, whereas previous inflow episodes were equity led.

1.2 The Episodes: Debt- and Equity-Led Surges, Stops, Flight and Retrenchment

Using the quarterly gross flow data and the criteria discussed above, from 1980 through 2009 we identify 167 surges, 221 stops, 196 flights and 214 retrenchments. The appendix lists episodes by country and suggests that the Chilean experience, with just as many equity-led as debt-led episodes, is not the norm. Table 1 aggregates the results and reports summary statistics on the incidence of

Figure 3. Percent of Countries with Each Type of Episode



Source: Authors' elaboration.

episodes for the full sample and the average length of each episode by income group and region.[7] The table shows that most extreme capital flow episodes around the world are debt led (80 percent of inflow episodes and 70 percent of outflow episodes). Equity-led episodes are, by contrast, relatively infrequent. Figure 3 shows the incidence of debt- and equity-led episodes through time.

7. We use income classifications based on per capita gross national income in 2000 as reported by the World Bank. We combine the World Bank's lower and lower-middle income countries into the group "lower income" because there are only four countries in our sample that qualify as lower income based on the World Bank classification. Our middle income group then includes countries classified as upper-middle income by the World Bank. We focus on six regions: North America, Western Europe, Asia, Eastern Europe, Latin America and other (which encompasses South Africa and Israel).

2. Global, Contagion and Domestic Factors

This section provides regression analysis of the relationship between debt- and equity-led episodes of extreme capital flows and global, contagion and domestic factors.

2.1 Estimation Strategy and Variables

Our estimation strategy follows Forbes and Warnock (2012). More specifically, to assess the role of these global, contagion and domestic variables on the conditional probability of having a surge, stop, flight or retrenchment episode each quarter, we estimate the following model:

$$\Pr\left(e_{i,t}=1\right)=F\left(\phi_{t-1}^{\text{Global}}\mathbf{B}_G+\phi_{i,t-1}^{\text{Contagion}}\mathbf{B}_C+\phi_{i,t-1}^{\text{Domestic}}\mathbf{B}_D\right), \tag{3}$$

where $e_{i,t}$ is an episode dummy variable that takes the value of one if country i is experiencing an episode (surge, stop, flight or retrenchment) in quarter t; $\phi_{t-1}^{\text{Global}}$ is a vector of global factors; $\phi_{i,t-1}^{\text{Contagion}}$ is a vector of contagion variables; and $\phi_{i,t-1}^{\text{Domestic}}$ is a vector of domestic variables. The appropriate methodology to estimate equation (3) is determined by the distribution of the cumulative distribution function, $F(\cdot)$. Because episodes occur irregularly (83 percent of the sample is zero), $F(\cdot)$ is asymmetric. We therefore estimate equation (3) using the complementary logarithmic (or cloglog) framework, which assumes that $F(\cdot)$ is the cumulative distribution function (CDF) of the extreme value distribution. In other words, this estimation strategy assumes that

$$F\left(z\right)=1-\exp\left[-\exp\left(z\right)\right]. \tag{4}$$

While we estimate each type of episode separately, we use a seemingly unrelated estimation technique that allows for cross-episode correlation in the error terms. This captures the fact that the covariance matrix across episodes is not zero, without assuming a structural model specifying a relationship between episodes. We also cluster the standard errors by country.

In Forbes and Warnock (2012), we provide a detailed review of the literature on capital flows that motivates the parsimonious set

of variables we now use—global factors such as global risk, liquidity, interest rates and growth; contagion through trade linkages, financial linkages and geographic location; and domestic factors such as a country's financial market development, integration with global financial markets, fiscal position and growth shocks. We focus on measures that are available over the full sample period from 1985 to 2009 for most countries in the sample.[8] The variables are discussed in detail below.

2.1.1 Global variables

For our initial analysis, we measure global risk as the original volatility index calculated by the Chicago Board Options Exchange (the VXO).[9] This measures implied volatility using prices for a range of options on the S&P 100 index and captures overall economic uncertainty or risk, including both the riskiness of financial assets and investor risk aversion. To measure global liquidity, we use the year-over-year growth in the global money supply, with the global money supply calculated as the sum of M2 in the US, the euro area and Japan and M4 in the United Kingdom, all converted into US dollars. Global interest rates are measured using the average rate on long-term government bonds in the US, the core euro area and Japan. Global growth is measured by quarterly global growth in real economic activity. The last three variables are based on data from the IMF's IFS database.

2.1.2 Contagion variables

We use three measures to capture contagion effects. The first is a measure of geographic proximity, with a dummy variable equal to one if a country in the same region has an episode. The regions are

8. Most of the variables are available quarterly. For market statistics that are available at a higher frequency, we use quarterly averages. Economic statistics that are only available on an annual basis are calculated by approximating quarterly values based on the annual frequencies. Also, as specified in equation (3), each variable is lagged by one quarter unless noted.

9. The VXO, as the original volatility index is now known, is similar to the current VIX. The VIX is calculated using a broader set of prices, but it is only available starting in 1990. The correlation between the two measures is 99 percent, so we focus on the VXO for our baseline analysis to maximize sample size. Section 2.3 discusses alternative measures of risk.

described above. We also measure contagion through trade linkages (TL) as an export-weighted average of rest-of-the-world episodes:

$$\mathrm{TL}_{xt} = \frac{\sum_{i=1}^{n}\left(\mathrm{Exports}_{x,i,t} \times \mathrm{Episode}_{i,t}\right)}{\sum_{i=1}^{n}\mathrm{Exports}_{x,i,t}} \times \frac{\mathrm{Exports}_{x,t}}{GDP_{x,t}}, \tag{5}$$

where $\mathrm{Exports}_{x,i,t}$ is exports from country x to country i in quarter t from the IMF's Direction of Trade Statistics; $\mathrm{Exports}_{x,t}/\mathrm{GDP}_{x,t}$ is a measure of country x's trade openness; and $\mathrm{Episode}_{i,t} = 1$ if country i had an episode in the quarter. TL_{xt} is calculated for each country x for each type of episode (surge, stop, flight and retrenchment) in each quarter t.

We also include a measure of financial linkages that is as similar as possible to the trade linkages measure, given the more limited data available on bilateral financial linkages. The measure is based on banking data provided by the Bank for International Settlements (BIS) and uses the algorithm underlying the analysis in McGuire and Tarashev (2006, 2007). While no measure of financial linkages is perfect, we focus on banking data because they are the only cross-country financial data that are of reasonable quality and widely available across countries and time periods. Let $\mathrm{BANK}_{x,i}$ be total bank claims between country x and BIS reporting entity i, where some i are individual countries (namely, the US, the United Kingdom, the Netherlands and Japan) but for confidentiality reasons other i are groups of countries.[10] Our measure of financial linkages (FL) first computes the GDP-weighted averages of episodes within each group, termed group episodes, which vary between zero and one.[11] Then for a country x, FL_x is a $\mathrm{BANK}_{x,i}$-weighted average of the group episodes multiplied by a financial openness measure $(\mathrm{BANK}_x/\mathrm{GDP}_x)$.

10. The groupings are as follows: AT CY GR IE PT; BE LU; FR DE IT ES; FI DK NO SE; HK MO SG BH, BS BM KY AN PA; GG IM JE; BR CL MX; TR ZA; TW IN MY KR; and CH AU CA.

11. The GDP-weighted average of episodes within a group is computed because we do not have the full matrix of bilateral banking claims, just claims vis-à-vis groups (and a few individual countries).

2.1.3 Country variables

To capture the domestic factors, we use five variables. Depth of the financial system is the sum of each country's stock market capitalization divided by GDP, from Beck and Demirgüç-Kunt (2009); in robustness tests we use other measures that are only available for smaller samples. Capital controls is a broad measure of the country's capital controls as calculated in Chinn and Ito (2008).[12] This statistic is one of the few measures of capital controls available back to 1985 for a broad sample of countries; we explore the impact of a range of other measures in section 2.3. Real GDP growth is from the IFS, with the growth shock as the deviation between actual growth and the country's trend growth. Country indebtedness is public debt to GDP from the new database described in Abbas and others (2010). We also include a control for GDP per capita.[13]

2.2 Main Results

To assess whether global, contagion and domestic factors are associated with debt- and equity-led surge, stop, flight and retrenchment episodes, we estimate equation (3) using a complimentary logarithmic framework that includes adjustments for covariances across episodes and robust standard errors clustered by country. The results are presented in tables 2 and 3.

The immediate impression from the results for equity-led episodes (table 2) is that very few variables are significant. To a first approximation, equity-led episodes appear to be idiosyncratic, bearing little systematic relation to the explanatory variables. Moreover, some of the estimates that are significant do not correspond to the underlying economic theory. For example, equity-led surges and stops are both more likely to occur when global interest rates are low. The one noteworthy significant coefficient estimate in table 2 indicates that equity-led stops and surges are more likely when a country's trading partners are also experiencing them. Finally, the

12. We focus on the KAOPEN measure of capital controls in Chinn and Ito (2008), updated in April 2011. To be consistent with other measures of capital controls in the additional tests in section 2.3, we reverse the sign so that a positive value indicates greater controls.

13. All country-level variables, except for the index of capital controls, GDP per capita, and the contagion variables, are winsorized at the 1 percent level to reduce the impact of extreme outliers.

Table 2. Regression Results for Equity-Led Episodes of Extreme Capital Flows[a]

Factor	*Surge*	*Stop*	*Flight*	*Retrenchment*
Global factors				
Risk	–0.023	–0.007	–0.063*	0.012
	(0.039)	(0.012)	(0.034)	(0.012)
Liquidity	–19.591	–6.498	4.088	–5.645
	(14.658)	(11.209)	(11.426)	(12.009)
Interest rates	–0.355*	–0.285**	–0.216*	0.078
	(0.196)	(0.106)	(0.131)	(0.108)
Growth	38.518	–0.408	21.951*	–0.513
	(25.861)	(6.708)	(13.182)	(6.545)
Linkages				
Regional	–0.347	–0.287	–0.679**	–0.333
	(0.485)	(0.407)	(0.279)	(0.336)
Trade	2.838**	2.223**	–0.073	1.865*
	(0.910)	(0.944)	(0.863)	(1.090)
Financial	–3.188*	–0.301	–0.740	–0.222
	(1.770)	(0.919)	(1.358)	(1.048)
Domestic Factors				
Financial system	0.384	0.420	0.060	0.176
	(0.380)	(0.299)	(0.296)	(0.256)
Capital controls	0.021	0.013	–0.008	0.090
	(0.159)	(0.119)	(0.119)	(0.119)
Debt to GDP	–0.004	–0.003	–0.004	–0.009
	(0.007)	(0.008)	(0.006)	(0.008)
Growth shock	–1.034	–0.745	–0.198	–0.283
	(0.673)	(0.773)	(0.595)	(0.828)
GDP per capita	–0.011	–0.010	–0.026*	0.012
	(0.016)	(0.017)	(0.015)	(0.016)
No. observations	3,446	3,446	3,446	3,446

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level
a. The dependent variable is a dummy variable that takes the value of one if there is an equity-led episode (surge, stop, flight or retrenchment) and zero otherwise. Variables are defined in section 2.1. Estimates are obtained using the complementary logarithmic (or cloglog) framework, which assumes that $F(\cdot)$ is the cumulative distribution function (CDF) of the extreme value distribution. To capture the covariance across episodes, the set of four episodes is estimated using seemingly unrelated estimation with robust standard errors clustered by country.

Table 3. Regression Results for Debt-Led Episodes of Extreme Capital Flows[a]

Factor	*Surge*	*Stop*	*Flight*	*Retrenchment*
Global factors				
Risk	–0.059**	0.013**	–0.016	0.007
	(0.021)	(0.005)	(0.023)	(0.006)
Liquidity	7.441	–0.714	–9.859	4.056
	(5.144)	(5.012)	(6.680)	(6.083)
Interest rates	0.015	0.101**	–0.038	0.131**
	(0.058)	(0.049)	(0.084)	(0.042)
Growth	22.805**	–0.182	1.353	–1.836
	(9.448)	(3.230)	(7.349)	(3.398)
Linkages				
Regional	0.490	0.383**	0.849**	0.335**
	(0.306)	(0.128)	(0.315)	(0.159)
Trade	1.118**	0.298	0.539	0.566
	(0.434)	(0.679)	(0.514)	(0.454)
Financial	–1.821**	1.953**	–0.425	1.354**
	(0.903)	(0.679)	(1.903)	(0.503)
Domestic Factors				
Financial system	–0.403*	0.223*	–0.315	0.106
	(0.228)	(0.115)	(0.202)	(0.150)
Capital controls	0.011	–0.101	0.226**	–0.003
	(0.087)	(0.076)	(0.088)	(0.074)
Debt to GDP	–0.004	0.003	–0.007**	0.001
	(0.004)	(0.002)	(0.004)	(0.003)
Growth shock	0.992**	–1.518**	–0.348	0.294
	(0.331)	(0.767)	(0.571)	(0.569)
GDP per capita	0.005	0.004	0.024**	0.016**
	(0.008)	(0.007)	(0.009)	(0.007)
No. observations	3,446	3,446	3,446	3,446

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
a. The dependent variable is a dummy variable that takes the value of one if there is a debt-led episode (surge, stop, flight or retrenchment) and zero otherwise. Variables are defined in section 2.1. Estimates are obtained using the complementary logarithmic (or cloglog) framework, which assumes that $F(\cdot)$ is the cumulative distribution function (CDF) of the extreme value distribution. To capture the covariance across episodes, the set of four episodes is estimated using seemingly unrelated estimation with robust standard errors clustered by country.

risk measures that were highlighted in Forbes and Warnock (2012) as explaining extreme episodes in aggregate capital flows have little or no significant relationship with equity-led episodes.

Risk measures are significant, however, in explaining debt-led extreme capital flows episodes (table 3). When risk aversion is high, debt-led surges are less likely and debt-led stops are more likely. Contagion is also important for debt-led episodes, especially at the regional level. For the country-level variables, growth shocks are most important: debt-led stops are more likely in countries experiencing a negative growth shock, and debt-led surges are more likely in countries with a positive growth shock. Capital controls continue to have little or no significance in explaining debt-led episodes, as also documented for equity-led episodes and episodes of aggregate capital flows.

2.3 A Closer Look at Global Risk and Capital Controls

Two results from our baseline analysis of extreme capital flow episodes are the significance of global risk (at least for debt-led episodes) and the insignificance of capital controls. This Section looks more closely at these results.

The finding that global risk is the most consistently significant factor associated with capital inflow episodes (measured based on gross flows) has important implications for understanding capital flow movements. To further explore this role of risk, we use three different measures of risk (in addition to our baseline measure of the VXO): the VIX, the Credit Suisse First Boston (CSFB) Risk Appetite Index (RAI) and the variance risk premium (VRP).[14] The most common measures of risk—such as the VXO and the VIX—capture both economic uncertainty and risk aversion. The RAI is constructed with the aim of capturing only risk aversion (or risk appetite) while

14. See section 2.1.1 for details on the VXO and VIX, which are nearly identical but cover different time periods. The RAI is the beta coefficient of a cross-sectional regression of a series of risk-adjusted asset price returns in several countries on the past variance of these assets. This calculation is based on 64 global assets, including equities and bonds for all developed countries and major emerging markets. If the beta is positive, the price of riskier assets is rising relative to the price of safer assets, so risk appetite among investors is higher. For more information, see Wilmot, Mielczarski and Sweeney (2004). To simplify comparisons with the other risk measures, we reverse the sign of the RAI. The VRP is the difference between the risk-neutral and objective expectation of realized variance, where the risk-neutral expectation of variance is measured as the end-of-month observation of the VIX squared and de-annualized and the realized variance is the sum of squared five-minute log returns of the S&P 500 index over the month (see Zhou, 2010).

controlling for overall risk and uncertainty. Misina (2003) shows, however, that it may not control for changes in overall risk unless a strict set of theoretical conditions is met. In contrast, the VRP index is based on a less rigid set of assumptions and therefore is a more accurate measure of risk aversion independent of expectations of future volatility (that is, future risk). A minor disadvantage of the VRP (as well as the VIX) is that it is only available starting in 1990.

Table 4 reports the estimated coefficients on the risk variable when the base regression reported in tables 2 and 3 is repeated with these alternate measures of risk (with the top line replicating the baseline results from the earlier tables). For debt-led inflow episodes (panel A), the coefficient on risk is highly significant in all but one case. Broad measures of risk (including the VXO, the VIX and possibly the RAI) that capture both changes in economic uncertainty and changes in risk aversion are positively correlated with stop and retrenchment episodes and negatively correlated with surges. The measure that most accurately isolates changes in risk aversion (the VRP) is positively and significantly related to stops and negatively related to surges. This suggests that risk aversion (and not just increased economic uncertainty) is an important factor associated with debt-led stop and surge episodes. For equity-led episodes (panel B), risk matters only for flight, which is less likely when global risk aversion is high. Otherwise, no risk measure is associated with any type of equity-led episode. A key implication from table 4 is that some of the main results of Forbes and Warnock (2012) for aggregate capital flow episodes are caused by debt-led episodes and not equity-led ones.

A second key result from the baseline regressions in tables 2 and 3 is that a country's capital controls are not significantly related to any type of extreme capital flow episode (except that countries with greater controls are more likely to have flight episodes). This does not support the recent interest in capital controls as a means of reducing capital flow surges and overall capital flow volatility. To further explore this result, we use several measures of capital controls. First, instead of a direct *de jure* measure of capital controls, we use a broad *de facto* measure of financial integration—namely, the sum of foreign assets and liabilities divided by GDP.[15] Second, we consider a broad measure of capital account restrictions from

15. The financial integration data are from an updated and extended version of the data set constructed by Lane and Milesi-Ferretti (2007), available online at www.philiplane.org/EWN.html

Table 4. Coefficient on Global Risk Variable with Alternate Measures of Risk

Type of episode and risk measure	*Surge*	*Stop*	*Flight*	*Retrenchment*	*No. observations*
A. Debt-led episode					
VXO	–0.059**	0.013**	–0.016	0.007	3,446
	(0.021)	(0.005)	(0.023)	(0.006)	
VIX	–0.073**	0.016**	–0.014	0.007	3,291
	(0.029)	(0.006)	(0.031)	(0.007)	
CSFB RAI	–0.036	0.101**	–0.027	0.112**	3,453
	(0.029)	(0.025)	(0.042)	(0.025)	
Volatility risk premium	–0.025*	0.005**	–0.004	0.001	3,291
	(0.013)	(0.002)	(0.009)	(0.003)	
B. Equity-led episodes					
VXO	–0.023	–0.007	–0.063*	0.012	3,446
	(0.039)	(0.012)	(0.034)	(0.012)	
VIX	–0.041	–0.007	–0.078*	0.006	3,291
	(0.046)	(0.013)	(0.040)	(0.014)	
CSFB RAI	–0.124	0.010	–0.042	0.029	3,453
	(0.084)	(0.045)	(0.049)	(0.045)	
Volatility risk premium	–0.013	0.002	–0.019	–0.002	3,291
	(0.019)	(0.005)	(0.015)	(0.004)	

Source: Authors' elaboration.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
a. The table reports the coefficients on global risk when the base regressions reported in tables 2 and 3 are estimated using one of the alternative measures listed in the table. See table 2 or 3 for information on the estimation technique and additional variables included in the regressions.

Schindler (2009) that is only available from 1995 to 2005. Third, we use measures of capital account restrictions from the same source and time period, but that focus specifically on controls on just inflows or outflows.[16] Finally, we also use two new indices of capital controls from Ostry and others (2011), which measure capital controls in the financial sector and regulations on foreign exchange.

Table 5 shows the coefficient estimates on each of these capital control measures when we repeat the base regression from tables 2 and 3 using the alternate measure of controls or financial integration (with the top line replicating the baseline results). Capital controls are almost never significant for either debt- or equity-led episodes, except occasionally for flight episodes. More capital account restrictions are associated with more debt-led flight episodes (for some measures of controls) and fewer equity-led flight episodes (again, for some controls measures). Other than for flight episodes (for which four of the ten coefficients are significant), only one coefficient out of 30 is (marginally) significant. Greater capital controls do not seem to be associated with a reduction in the probability of having a surge or stop episode driven by foreigners, counter to an argument made by policymakers to support the use of these controls.

3. Conclusions

We extend the analysis in Forbes and Warnock (2012) by separating episodes of extreme capital flows into those driven primarily by debt flows (that is, bonds and banking flows) and those driven by equity flows (portfolio equity and FDI). Most episodes around the world result primarily from changes in debt flows, including 80 percent of episodes of sharp changes in capital inflows (driven by foreigners) and 70 percent of episodes of sharp movements in capital outflows (driven by domestics).

Risk measures are highly correlated with sudden changes in debt inflows (driven by foreigners), as found for aggregate capital flows in Forbes and Warnock (2012). When risk aversion is high, debt-led surges are less likely and debt-led stops are more likely. Contagion, especially within regions, is also important for debt-led

16. For regressions predicting surges and stops, we use the index of controls on local purchases and sales, respectively, by nonresidents. For regressions predicting flight and retrenchments, we use the index of controls on purchases or sales abroad, respectively, by residents.

Table 5. Coefficient on Capital Control Variable with Alternate Measures of Capital Controls

Type of episode and capital control measure	*Surge*	*Stop*	*Flight*	*Retrenchment*	*No. observations*
A. Debt-led episodes					
Capital controls (Chinn and Ito, 2008)	0.011	–0.101	0.226**	–0.003	3,446
	(0.087)	(0.076)	(0.088)	(0.074)	
Financial integration (Lane and Milesi-Ferretti, 2007)	–0.010	–0.000	–0.149	0.020	3,446
	(0.034)	(0.016)	(0.095)	(0.015)	
Overall capital account restrictions (Schindler, 2009)	0.427	–0.983*	1.390*	–0.210	1,783
	(0.731)	(0.591)	(0.749)	(0.595)	
Specific capital account restrictions (Schindler, 2009)	0.222	–0.083	0.660	0.416	1,783
	(0.397)	(0.410)	(0.420)	(0.330)	
Financial controls (Ostry and others, 2011)	0.239	–0.401	0.553	0.417	1,210
	(0.761)	(0.428)	(0.611)	(0.619)	
Forex regulations (Ostry and others, 2011)	–0.480	0.118	0.886	0.493	1,240
	(0.499)	(0.571)	(0.614)	(0.632)	
B. Equity-led epsidoes					
Capital controls (Chinn and Ito, 2008)	0.021	0.013	–0.008	0.090	3,446
	(0.159)	(0.119)	(0.119)	(0.119)	
Financial integration (Lane and Milesi-Ferretti, 2007)	0.001	–0.094	0.086**	–0.143	3,446
	(0.098)	(0.064)	(0.043)	(0.074)	
Overall capital account restrictions (Schindler, 2009)	0.060	1.201	–0.700	1.834	1,783
	(0.725)	(1.205)	(0.715)	(1.151)	
Specific capital account restrictions (Schindler, 2009)	0.170	0.495	–1.076**	0.575	1,783
	(0.647)	(0.640)	(0.486)	(0.672)	
Financial controls (Ostry and others, 2011)	0.057	0.159	–0.680	0.884	1,210
	(1.086)	(1.110)	(1.042)	(0.921)	
Forex regulations (Ostry and others, 2011)	–1.280	–0.518	–0.046	–0.363	1,240
	(1.142)	(0.799)	(1.263)	(0.803)	

Source: Authors' elaboration.

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

a. The table reports the coefficients on capital controls when the base regressions reported in tables 2 and 3 are estimated using one of the alternative measures listed in the table. All measures of capital controls have higher values if the country has greater capital controls, except the financial integration measure (Lane and Milesi-Ferretti, 2007), which takes on a higher value if the country is more financially integrated. See tables 2 or 3 for information on the estimation technique and additional variables included in the regressions.

episodes. Among the country-level variables, growth shocks are most important: debt-led stops are more likely in countries experiencing a negative growth shock, and debt-led surges are more likely in countries with a positive growth shock. Capital controls are not significantly related to debt-led episodes, as also found in Forbes and Warnock (2012) for episodes based on overall capital flows. In contrast to debt-led episodes, equity-led episodes appear to be idiosyncratic, bearing little systematic relation to our explanatory variables. Notably, even the risk measures that were highlighted in Forbes and Warnock (2012) have little or no significant relationship with equity-led episodes.

Our results indicate that the majority of episodes are debt led and that debt-led episodes are associated with factors that are in line with theory and past work. Much more work is needed, however, to understand the nature of extreme capital flow episodes, especially episodes caused by sharp changes in capital outflows (flight and retrenchments).

APPENDIX

List of Equity- and Debt-Led Episodes by Country, 1985 to 2009

Table A1. Equity-Led Episodes by Country, 1985 to 2009

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Argentina	—	—	—	1992:4–1993:2
Australia	1993:4–1994:3; 2006:2–2007:1	2005:1–2005:4	2006:2–2007:1	2005:1–2005:4
Austria	2005:1–2005:4	2006:1–2006:4	2005:1–2005:4	2006:1–2006:4
Bangladesh	1998:1–1998:3	—	1995:3–1997:1	—
BelLux	1999:3–2000:3	1994:1–1995:1; 2001:4–2002:3	1999:3–2000:3; 2005:2–2006:1	1994:1–1995:1; 2001:4–2002:3
Bolivia	1996:1–1996:3	—	2001:1–2001:2; 2003:3–2004:1	2004:3–2005:1
Brazil	1988:1–1988:4	1995:1–1995:2	1987:4–1988:3	1997:4–1998:2
Canada	2000:1–2001:1; 2006:2–2007:1	1991:2–1991:3; 2008:4–2009:2	2000:1–2001:1; 2006:2–2007:1	2008:4–2009:3
Chile	2005:4–2006:3	2000:2–2001:1; 2007:1–2007:2	2007:2–2008:1	1997:2–1997:3; 2000:2–2000:4
Colombia	2005:4–2006:3	—	2006:2–2006:3	—
Croatia	—	—	2000:1–2000:4; 2006:4–2007:3	—
Czech Republic	2002:3–2003:1	2003:2–2004:1; 2006:2–2006:4	—	2002:1–2002:3
Denmark	1993:3–1994:2; 1995:3–1996:2	1998:3–1999:1; 2008:4–2009:4	1993:3–1994:2	2001:2–2002:2; 2008:3–2009:4
Estonia	—	—	—	2000:1–2000:2
Finland	1998:4–1999:1	2009:2–2009:3	1998:4–1999:1	2009:1–2009:3
Germany	—	—	—	1990:4–1992:2
Guatemala	—	1994:4–1995:3	1998:2–1998:3; 1999:1–1999:4; 2001:1–2001:3	1988:3–1988:4; 1989:2–1990:1; 2002:2–2002:3
Hungary	2007:2–2008:1	2009:3–2009:4	2001:2–2002:1; 2006:1–2008:1	2009:3–2009:4
Indonesia	—	1997:4–1998:3; 2006:4–2007:1; 2009:1–2009:3	2002:3–2003:2; 2004:1–2005:1; 2005:3–2006:2	1997:2–1998:3; 2006:3–2007:1
Ireland	2003:3–2004:2	2001:2–2001:3	1997:4–1998:4; 2006:3–2007:2	—

Table A1. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Israel	1999:2–2000:1; 2006:1–2006:4	1998:3–1998:4; 2001:2–2002:2; 2007:3–2007:4	1998:1–1998:4; 2006:1–2006:4	1995:2–1995:3; 2001:2–2002:2; 2007:3–2009:2
Japan	—	2006:3–2007:1	—	1987:4–1988:3
Korea	—	—	—	2005:1–2005:3
Malaysia	—	—	2006:2–2007:4	—
Mexico	—	—	2001:3–2002:2	1991:3–1991:4
Netherlands	—	2001:2–2001:3; 2002:1–2002:4	2005:2–2006:2	2001:2–2001:3; 2002:1–2002:4
New Zealand	2000:2—2001:1	—	2000:2–2001:1	—
Nicaragua	—	—	—	2002:4–2003:2
Norway	—	—	1994:3–1995:3	1987:4–1988:4; 1992:2–1994:1; 1999:2–1999:3; 2001:4–2002:3
Peru	—	1998:1–1998:2	2003:2–2004:1	—
Philippines	1994:2–1994:3; 1996:1–1997:1; 2005:2–2005:4	1997:3–1998:4	1991:4–1994:2; 1999:1–1999:2; 2007:1–2007:2	1997:3–1998:2
Poland	—	2001:4–2002:3	2004:2–2005:1	2002:3–2003:2
Portugal	2003:4–2004:2	1999:3–1999:4	1990:2–1991:2; 2003:3–2004:1	1989:4–1990:1
Romania	—	1999:4–2000:1	2003:4–2004:1; 2006:4–2007:2	—
Russia	—	2006:2–2006:3	—	—
Slovenia	2002:3–2003:3	2003:4–2004:2; 2008:3–2009:3	1998:3–1999:2	—
South Africa	1997:2–1998:1; 2003:4–2004:4; 2005:2–2006:2	2007:1–2007:2; 2008:3–2009:3	1995:3–1996:2; 1997:2–1998:2; 2003:4–2004:3; 2006:1–2006:4	1999:1–1999:2; 2000:3–2001:1
Spain	—	1994:2–1995:1	—	—
Sri Lanka	2000:1–2000:4	1994:2–1994:3; 1995:4–1996:1; 1998:3–1999:1; 2001:2–2002:1	1995:1–1995:3	1993:2–1994:3; 1998:4–1999:1; 2001:4–2002:3

Table A1. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Sweden	—	—	—	2001:1–2002:3
Taiwan	1999:2–2000:2; 2003:3–2004:2	—	2000:1–2000:4; 2003:3–2004:1	2008:2–2009:2
Thailand	—	2008:3–2009:3	—	1986:4–1988:4; 2008:1–2009:3
Turkey	—	—	2006:4–2007:3	—
United States	—	1988:3–1988:4; 2001:3–2002:2	—	2001:3–2002:2
Venezuela	2003:4–2004:1	—	—	—

Source: Authors' elaboration.

Table A2. Debt-Led Episodes by Country, 1985 to 2009

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Argentina	1990:4–1992:3; 2003:1–2003:4	1989:2–1990:3; 1994:4–1995:1; 1998:4–1999:3; 2000:4–2002:2; 2008:2–2009:3	1989:3–1990:1; 1991:2–1992:3; 2002:4–2003:1; 2006:3–2008:3	1988:3–1989:1; 1998:3–1999:2; 2009:2–2009:4
Australia	1995:3–1996:3; 2002:3–2002:4; 2003:4–2004:3	1989:3–1991:3; 1997:3–1998:1; 1998:3–1998:4	1995:4–1996:3; 2004:1–2004:3	1989:2–1991:1; 1994:4–1995:2; 2003:1–2003:3
Austria	1992:2–1993:1; 1999:2–2000:1	1996:4–1997:1; 1998:2–1998:3; 2001:1–2002:1; 2008:3–2009:3	1992:2–1993:1; 1997:2–1998:1; 1999:2–2000:1	1986:1–1986:2; 1993:3–1993:4; 1998:2–1998:3; 2001:2–2002:1; 2008:4–2009:4
Bangladesh	1989:1–1989:4; 2003:4–2004:1; 2005:1–2005:2	1991:3–1992:1; 2006:1–2006:2	1987:1–1987:3; 1988:2–1989:3; 2005:4–2006:3; 2008:2–2008:4	1992:2–1993:1; 2001:1–2001:4; 2009:3–2009:4
BelLux	1987:1–1987:4	1988:2–1989:1; 2008:2–2009:3	1987:1–1987:4	1988:2–1989:1; 2008:2–2009:3
Bolivia	2007:3–2008:4	1995:1–1995:2; 1999:2–2001:2; 2006:3–2007:2	1994:1–1994:4; 2008:4–2009:3	2006:2–2006:3
Brazil	1990:2–1991:1; 1994:1–1994:3; 1995:4–1996:2; 2006:3–2007:4	1993:1–1993:3; 1999:1–1999:2; 2008:2–2009:3	1994:2–1994:4; 1998:3–1999:2; 2006:4–2007:3	1992:1–1992:4; 1995:2–1996:1; 2008:2–2008:3
Canada	1996:4–1997:3;	1995:2–1996:1; 1999:1–1999:4;	1986:2–1986:4; 1994:2–1994:4; 1996:3–1997:2	1993:2-1993:3; 1995:2–1996:1; 1998:1–1998:3
Chile	2007:4–2008:3	2009:1–2009:3	1998:2–1999:4; 2006:1–2006:4	2008:3–2009:3
Colombia	—	2008:2–2009:1	—	2002:2–2003:1; 2007:2–2007:3
Croatia	2002:4–2003:4	2004:4–2005:3	2002:4–2003:1	2001:3–2002:1; 2004:4–2005:4
Czech Republic	—	2008:4–2009:3	2003:3–2005:1	2000:1–2000:4; 2008:4–2009:4
Denmark	2005:1–2005:4	1989:2–1989:4; 1991:4–1993:2; 1994:3–1995:1	2005:2–2005:4	1992:2–1993:2; 1994:3–1995:1
Estonia	2003:1–2005:1	1998:3–1999:3; 2008:2–2009:4	2001:1–2001:2; 2004:2–2005:3	1998:4–1999:1; 2008:2–2009:3

Table A2. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Finland	1987:1–1987:4; 1996:3–1997:3; 2004:3–2004:4; 2006:2–2007:1	1991:1–1992:2; 2001:1–2001:4	1986:3–1987:1; 1988:3–1989:1; 1993:1–1993:3; 2004:3–2005:1; 2006:2–2006:4	1987:3–1987:4; 1990:3–1990:4; 1992:1–1992:3; 2001:1–2001:4
France	1986:3–1987:4; 1997:4–1998:3; 2001:1–2001:2;	1991:1–1992:1; 2001:4–2002:3; 2008:1–2009:3	1986:4–1987:4; 1992:3–1992:4; 1997:4–1998:3; 2001:1–2001:2	1991:2–1992:1; 2001:4–2002:3; 2008:1–2009:3
Germany	1986:1–1986:4; 1989:2–1990:1; 1992:3–1993:2; 2005:1–2005:4; 2007:2–2008:1	1987:4–1988:3; 1994:1–1994:4; 2001:1–2002:2; 2008:3–2009:3	1986:1–1986:4; 1993:1–1993:4; 2004:3–2005:4	1987:3–1988:2; 1994:2–1994:4; 2000:4–2002:2; 2008:2–2009:3
Greece	2005:1–2005:4	2006:1–2006:4; 2009:2–2009:4	2005:1–2005:3	2006:1–2006:4
Guatemala	1987:4–1988:1; 2006:1–2006:4	2008:4–2009:3	1990:3–1991:2; 2004:1–2004:4	1991:3–1992:1; 2008:4–2009:3
Hong Kong	—	2008:3–2009:3	—	2008:3–2009:3
Hungary	2003:1–2003:4; 2004:2–2005:3	1996:4–1997:1; 2002:2–2002:3;	—	—
Iceland	1987:1–1987:4; 1995:4–1996:4; 2003:3–2006:1	1989:2–1990:1; 2001:2–2002:1; 2008:2–2009:3	1986:3–1987:2; 1993:2–1993:3; 1997:3–1998:2; 1999:1–1999:4; 2003:1–2006:1	1992:1–1992:3; 2001:3–2002:2; 2006:4–2007:1; 2008:1–2009:2
India	1993:4–1994:4; 1996:2–1997:1; 2003:3–2004:2; 2004:4–2005:3; 2006:4–2008:1	1989:4–1990:4; 1991:3–1992:1; 1998:2–1998:3; 2008:3–2009:3	1990:3–1991:2; 1995:4–1996:4; 2000:4–2001:3; 2004:1–2004:3; 2008:4–2009:2	1992:1–1992:4; 1999:2–2000:2; 2002:1–2002:4; 2007:4–2008:2
Indonesia	1990:3–1991:2; 1995:2–1996:3; 2005:4–2006:1	1993:2–1993:3	1993:3–1994:3	2003:3–2003:4
Ireland	1989:3–1990:2; 1992:4–1993:4; 1995:3–1996:3; 1997:4–1999:1; 2006:3–2007:3	1991:3–1992:2; 2008:2–2009:3;	1987:2–1988:1; 1989:3–1990:1; 1992:3–1993:1; 1995:4–1996:3; 2003:3–2004:2	1991:4–1992:2; 2000:4–2001:3; 2008:2–2009:3
Israel	1986:3–1987:1; 1989:4–1990:3	1988:3–1989:2; 1996:3–1996:4; 2008:4–2009:2	1986:2–1987:1; 1992:1–1992:3	1991:1–1991:3; 1993:3–1993:4

Table A2. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Italy	1987:1–1987:3; 1996:1–1997:1; 2003:1–2003:4; 2005:2–2006:1	1991:4–1992:2; 1992:4–1993:3; 1999:1–1999:2; 2000:4–2002:3; 2007:3–2008:4	1987:1–1987:3; 2003:1–2003:4; 2005:1–2005:4	1986:1–1986:2; 1993:1–1993:3; 2000:3–2002:3; 2007:3–2008:4
Japan	1986:2–1987:3; 1993:4–1995:1; 2000:2–2001:1	1990:4–1991:4; 1992:2–1993:1; 1998:1–1999:1; 2005:2–2005:3; 2008:3–2009:3	1986:1–1987:2; 1993:4–1994:4; 2000:2–2001:1	1990:3–1991:3; 1996:3–1996:4; 1998:2–1999:4; 2008:3–2009:3
Korea	1994:3–1995:4	1997:2–1998:3; 2008:1–2009:2	1994:2–1995:4; 2002:4–2003:3; 2006:1–2007:4	1997:3–1999:1; 2008:3–2009:3
Latvia	2003:3–2005:1; 2006:2–2007:4	2005:3–2005:4; 2008:3–2009:3	2006:3–2007:4	2005:3–2006:1; 2008:3–2009:2
Lithuania	2004:2–2004:3; 2005:4–2006:2; 2006:4–2008:1	2000:4–2001:2; 2008:3–2009:4	2004:1–2004:4	2001:2–2001:3; 2008:3–2009:3
Malaysia	—	2005:4–2006:3; 2008:3–2009:2	—	2008:3–2009:2
Mexico	1989:2–1991:2; 2007:3–2008:2	1994:4–1995:4; 2008:4–2009:3	1987:3–1988:2; 1990:1–1990:4; 1993:2–1994:1	1992:2–1993:1; 1997:3–1997:4; 2008:4–2009:3
Netherlands	1995:3–1996:2; 1997:4–1998:4; 2005:2–2006:2	1990:4–1991:4; 2008:1–2009:3	1986:2–1987:1; 1997:4–1998:4	1990:4–1992:1; 2008:1–2009:3
New Zealand	1986:3–1987:2; 2006:3–2007:3	1987:4–1988:3; 2008:2–2009:3	1986:4–1987:2; 1989:2–1990:2; 2006:3–2007:3	1986:1–1986:2; 1988:1–1989:1; 2005:3–2006:1
Nicaragua	—	2000:3–2001:2	2001:1–2001:2; 2001:4–2002:1	1998:1–1998:4
Norway	1992:4–1993:2; 2000:3–2000:4; 2002:4–2003:2; 2005:4–2007:1	1988:3–1989:2; 1991:3–1992:2; 1997:4–1998:1; 2001:3–2002:1; 2007:4–2008:4; 2009:2–2009:4	1986:3–1987:3; 2000:2–2001:2; 2005:4–2007:1	2007:4–2008:3; 2009:2–2009:4
Panama	—	2008:4–2009:3	—	2008:4–2009:3
Peru	2006:4–2008:2	1998:4–1999:3; 2005:4–2006:1; 2008:4–2009:3	2001:1–2001:2; 2005:4–2006:3; 2009:2–2009:4	2007:1–2007:2; 2007:4–2008:3
Philippines	2007:1–2007:3	1992:1–1992:2; 2008:1–2009:1	—	2008:1–2008:4

Table A2. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Poland	2003:4–2004:4; 2007:1–2008:2	2008:4–2009:3	—	2008:3–2009:3
Portugal	1987:3–1988:2; 1988:4–1990:2; 1994:3–1995:3; 2000:1–2000:4; 2006:1–2006:2	1992:3–1993:2; 1996:2–1996:3; 2002:4–2003:1; 2004:4–2005:2; 2008:3–2009:2	1993:1–1993:4	1987:4–1988:1; 1992:1–1992:2; 1996:1–1996:3; 2002:4–2003:1; 2004:3–2005:2
Romania	2000:4–2001:2; 2004:1–2005:3; 2006:4–2007:4	2008:3–2009:4	2004:4–2005:3	2007:4–2008:2
Russia	2003:2–2004:1; 2007:1–2008:1	2008:4–2009:3	2003:2–2004:2; 2007:2–2009:1	2001:3–2002:2 2009:3–2009:4
Slovak Republic	2004:3–2005:2	2006:1–2006:4	2008:2–2008:3; 2009:1–2009:4	1999:1–1999:2; 2007:2–2007:3
Slovenia	2007:1–2007:4	—	2002:4–2003:3; 2007:1–2007:4	2008:1–2009:3
South Africa	1987:1–1987:4	1990:2–1990:4; 1998:3–1999:2; 2000:3–2001:1	1991:2–1993:1	1987:4–1988:2
Spain	1987:1–1988:2; 1990:4–1991:3	1992:1–1992:2; 2001:3–2002:2; 2008:1–2009:4	1988:2–1989:1; 1990:1–1991:2; 1992:3–1993:4	1987:1–1987:3; 1991:4–1992:1; 1994:2–1995:1; 2001:3–2002:2; 2007:3–2009:3
Sri Lanka	1989:4–1990:3	2008:1–2008:2	1990:3–1991:2; 2007:3–2008:1; 2009:1–2009:3	1990:1–1990:2
Sweden	1989:2–1990:4; 2004:4–2005:3	1991:2–1992:2; 1997:1–1997:3; 2001:4–2002:3; 2008:4–2009:3	1986:3–1988:1; 1988:4–1990:3; 1995:3–1996:3	1991:1–1992:1; 1997:1–1997:3; 2008:1–2009:3
Switzerland	2005:3–2006:2	2008:1–2009:1	2005:3–2006:1	2008:1–2009:1
Taiwan	—	1995:3–1995:4; 1997:4–1998:3; 2001:1–2001:2; 2005:1–2005:2; 2008:4–2009:2	1996:1–1996:3	1997:1–1997:4; 2002:2–2002:3
Thailand	1987:4–1990:3; 1995:2–1996:1; 2004:3–2006:1	1992:1–1992:4; 1996:3–1998:2; 2007:1–2007:4	1989:3–1990:2; 1993:2–1994:2; 2005:1–2006:1	1991:2–1991:4; 1994:4–1995:1; 1996:3–1997:2

Table A2. (continued)

	Type of episode			
Country	*Surge*	*Stop*	*Flight*	*Retrenchment*
Turkey	1990:1–1990:4; 1992:3–1993:4; 2000:1–2000:3	1991:3–1991:4; 1994:2–1995:1; 2001:1–2001:4; 2007:4–2008:2; 2008:4–2009:4	1991:1–1991:2; 1995:4–1996:3	1994:3–1995:3; 2007:4–2008:2; 2009:2–2009:4
United Kingdom	1992:3–1993:4	1990:1–1990:3; 1991:3–1992:1; 1994:2–1994:4; 1998:1–1998:4; 2001:3–2002:2; 2008:2–2009:2	1992:4–1993:2; 2000:3–2000:4;	1991:3–1992:2; 1998:1–1998:4; 2001:3–2002:2; 2008:2–2009:2
United States	1992:3–1992:4; 1993:3–1994:3; 1999:4–2000:3; 2006:4–2007:2	1989:4–1990:4; 1998:1–1999:1; 2007:4–2009:2	1986:2–1986:4; 1993:3–1994:2; 2004:1–2004:4; 2006:4–2007:3	1990:3–1990:4; 1998:1–1998:4; 2008:1–2009:2
Venezuela	2005:2–2005:4; 2007:2–2008:1	2006:2–2006:4	2005:2–2006:2	2001:1–2001:4; 2006:4–2007:1; 2008:4–2009:3

Source: Authors' elaboration.

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