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## Capital Flows are Fickle: Anytime, Anywhere

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**IMF Working Paper**

Research Department

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**Abstract**

Has the unprecedented financial globalization of recent years changed the behavior of capital flows across countries? Using a newly constructed database of gross and net capital flows since 1980 for a sample of nearly 150 countries, this paper finds that private capital flows are typically volatile for all countries, advanced or emerging, across all points in time. This holds true across most types of flows, including bank, portfolio debt, and equity flows. Advanced economies enjoy a greater substitutability between types of inflows, and complementarity between gross inflows and outflows, than do emerging markets, which reduces the volatility of their total net inflows despite higher volatility of the components. Capital flows also exhibit low persistence, across all economies and across most types of flows. Inflows tend to rise temporarily when global financing conditions are relatively easy. These findings suggest that fickle capital flows are an unavoidable fact of life to which policymakers across all countries need to continue to manage and adapt.

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<b>Contents</b>	<b>Page</b>
Abstract.....	1
I. Introduction.....	4
II. Data.....	7
III. The Behavior of Capital Flows Over Time.....	10
A. Volatility.....	12
B. Substitutability Across Capital Flows.....	18
C. Persistence.....	21
D. Correlation with Domestic GDP Growth.....	22
IV. Capital Flows and the Global Environment.....	24
V. Conclusions.....	32
References.....	33
VI. Appendix I. Definition of Country Groups.....	35
 <b>Tables</b>	
1A. The Net Capital Flows in percent GDP: Volatility.....	13
1B. Gross Capital Inflows and Outflows in percent GDP: Volatility.....	14
2. Capital Flows: Correlations Across Types of Flow.....	20
3. Capital Flows: Correlations Between Inflows and Outflows.....	20
4. Capital Flows in percent GDP: Persistence.....	21
5. Capital Flows in percent GDP: Correlation with GDP Growth.....	24
Appendix Table 1: Economy Groupings.....	36
 <b>Figures</b>	
1. Cross Border Capital Flows.....	4
2. Greece: Composition of Gross and Net Capital Flows.....	9
3. The Evolution of Total Gross and Net Capital Flows.....	10
4. The Collapse and Recovery of Capital Flows by Type.....	11
5. Volatility of Capital Flows: Standard Deviation.....	15
6. Rolling Coefficient of Variation by Type of Flow.....	16
7. Correlations between Flows of Various Types and the Rest of the Financial Account.....	19
8. Rolling Persistence of Capital Flows.....	22
9. Rolling Persistence by Type of Flow.....	23
10. Capital Flows in Periods of Easy Global Financing Conditions.....	25
11. Emerging Market Economies: Net Capital Flows.....	26
12. Emerging Market Economies: Net Private Capital Flows Under Alternate Global Financing Conditions.....	27
13. Advanced Economies: Net Capital Flows.....	28

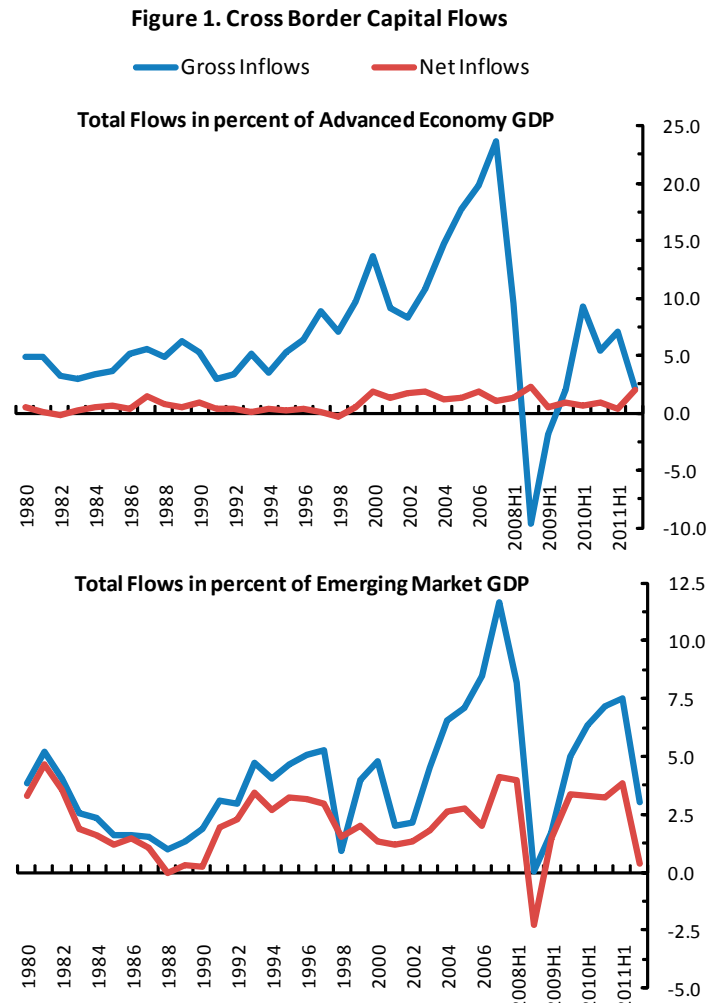
14. Advanced Economies: Net Capital Flows Under Alternate Global Financing Conditions .....	29
15. Emerging Market Economies: Gross Capital Inflows .....	30
16. Advanced Economies : Gross Capital Inflows .....	31

## I. INTRODUCTION

International capital flows have been on a roller-coaster ride for the past few decades. Both advanced and emerging market economies experienced a remarkable surge in *gross* capital inflows from the mid-1990s through the first half of the 2000s (Figure 1; see Appendix I and Appendix Table 1 for the composition of the economy groupings). Subsequently, inflows dropped sharply at the onset of the global financial crisis in 2008, for both advanced and emerging economies, even though the crisis was largely concentrated in the former. Flows regained their upward momentum in 2009, only to fall again in late 2011 as the European sovereign debt crisis intensified. However, the experience with net capital inflows was somewhat different across advanced and emerging market economies. In the former, net inflows were generally stable despite large movements in gross flows, while in the latter, net inflows moved in tandem with gross inflows, dipping during periods of stress and recovering afterwards.

Against a backdrop of increasing globalization and the exceptional turbulence in recent years in global financial markets, this paper

investigates whether the behavior of capital flows has fundamentally changed over time or across countries. Have capital flows become more volatile and less persistent? Does the conventional wisdom that so-called “hot money” flows (portfolio and bank-related flows) are the most changeable hold up? Are the high volatility and low persistence of capital flows typically only experienced by emerging markets or are these issues also relevant for advanced economies? The perceived greater volatility of capital flows for emerging markets is likely one key reason why policymakers in these countries tend to eye capital flows with



Sources: CEIC; Haver Analytics; IMF, *Balance of Payments Statistics*; national sources; and IMF staff calculations. Sources: CEIC; Haver Analytics; IMF, *Balance of Payments Statistics*; national sources; and IMF staff calculations.

Note: Data are on total flows (gross or net) plotted on an annual basis until 2007 and on a semiannual basis thereafter. Semiannual data are calculated as the sum of capital flows over the two relevant quarters divided by the sum of nominal GDP (both in U.S. dollars) for the same period. Total flows over GDP by group are calculated as the sum of the flow variable across countries in the group divided by the sum of their GDPs. Total flows may not equal the sum of the individual components because of a lack of data on the underlying composition for some economies.

mixed enthusiasm (see Broner and Rigobon, 2006). There are also concerns that flows to emerging markets are overly sensitive to “push” factors that are beyond the influence of domestic policies. Over the last decade however, even as emerging markets have become more attractive for foreign investors, they themselves have increasingly invested abroad (see Obstfeld, 2012). Thus, their experience with capital flows may indeed have shifted. The paper sheds light on these issues by assessing the nature of capital flows from a longer-term perspective.

Compiling a dataset of both gross and net flows, we analyze the evolving nature of flows for a sample of 147 economies during 1980–2011, looking at their trends, composition, volatility, persistence and sensitivity to global conditions. Net flows are the financial counterpart to the current account balance and one of the factors that determine exchange rates. Gross flows can be drivers of credit and asset prices, affecting domestic financial stability. Thus, it is important to analyze both alike, which this paper does.

The paper makes three contributions to the literature on capital flows. First, it presents a detailed and up-to-date database of private capital flows for a large group of advanced, emerging market and other developing economies for over thirty years, with the aim of gauging any differences in the behavior of capital flows across inflows and outflows, types of flows, economies, and time.<sup>2</sup> As such, it unifies the many existing studies which cover different sub-samples of countries or examine different time periods.<sup>3</sup>

Second, as noted above, the paper assesses *both* gross and net flows, in contrast to most of the earlier literature which largely focused on net flows. Interest in analyzing gross flows has grown over the past few years (see Lane and Milesi-Ferretti, 2007, and Obstfeld, 2012). Recently, Forbes and Warnock (2012) and Broner and others (2013) have highlighted large differences in the behavior of gross and net inflows. For instance, Broner and others (2013) show that gross capital in/outflows tend to be more procyclical and more volatile than net inflows. However, the authors do not adjust for the large differences in the absolute size of gross versus net flows in making their assessment. Our paper further deepens the understanding of differences in the nature of gross versus net flows and their components, explicitly adjusting for the rising size of gross flows over time.

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<sup>2</sup> See Appendix Table 1 for the economy groupings and a full list of economies included in the analysis. Our definition of private capital flows excludes changes in recorded reserves, IMF lending, and other flows where the official sector (central bank or monetary authority and general government) are recorded as a counterparty—see Section II for additional details.

<sup>3</sup> For example, Claessens, Dooley, and Warner (1995), Sarno and Taylor (1999a, 1999b), Lipsey (1999), Albuquerque (2003), Broner and Rigobon (2006), Levchenko and Mauro (2007), and Becker and Noone (2009), among others.

Third, the paper examines the behavior of capital flows around periods characterized by relatively low global interest rates. This relates to a key concern in many policymakers minds since the Great Recession—capital flows to emerging market and developing economies may reverse when currently low interest rates in advanced economies start to rise. Besides its policy relevance, the analysis also complements studies focusing on the behavior of capital flows during other global economic episodes such as financial crises (see Milesi-Ferretti and Tille, 2010, and Broner and others, 2013).<sup>4</sup>

Our analysis reveals several key regularities:

- Capital flows across all economy groups and for most types of flows exhibit volatility—with standard deviations of flows for the median country typically much higher than their average levels—and low persistence—with AR(1) regression coefficients typically below one-half.
- As the size of gross capital flows has grown, they have become more volatile everywhere. But, adjusting for size, the volatility of each incremental unit of gross and net flows (relative to GDP) for the median country is broadly similar across all economy groups, and has in fact declined over time for emerging markets. The relative stability of FDI across groups and over time lends support to the conventional wisdom about other types of flows being “hotter”, but there is little significant difference in volatility across portfolio and bank-related flows.
- Advanced economies experience greater substitutability across the various types of net flows and greater complementarity of gross inflows and outflows. This partly explains why they face similar levels of volatility in total net flows as other economies, despite higher volatility of each component of flows.
- Both gross capital inflows and outflows tend to rise when global financing conditions, proxied by interest rates in advanced economies and the level of risk aversion in financial markets, are relatively easy, and to fall when these conditions tighten. For emerging markets, total net inflows are 2 percent of GDP higher when global financing conditions are easy than when they are not.
- Although gross outflows also rise during such periods, they are too small to offset the increase in gross inflows for emerging markets. Thus, the rise (fall) of capital flows faced by these economies is driven by *foreign* investors. For advanced economies, gross outflows are large enough that net inflows do not always track gross inflows.

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<sup>4</sup> Related work analyses the relationship between low global interest rates and credit booms in emerging markets. See, for example, Bruno and Shin (2012).

Although we recognize the importance of a number of closely related questions about capital flows (such as their causal determinants and the effectiveness of capital flow management policies), our main purpose in this paper is to provide a longer-term perspective on the behavior of capital flows across different economies.<sup>5</sup> In doing so, we clarify a simple but important aspect about capital flows—despite differences in policies across economies and over time, the typical economy has tended to experience relatively high volatility and low persistence of capital flows. The differences in the behavior of flows either across economy groups, or types of flows are not that significant. This is an important perspective for policymakers as they seek to manage and live with capital flows going forward. As emerging markets become more financially integrated with global markets, this will induce greater two-way capital flow volatility, but likely less so for net flows, as observed for advanced economies. Thus, greater diversification of domestic residents’ investment abroad may provide a natural hedge to manage capital flow variability.

The rest of the chapter is organized as follows. Section II describes the data on private capital flows and their components, highlighting their evolution over time. Section III presents the broad statistical properties—volatility, persistence, substitutability and cyclicity—of flows and their components. Section IV explores how capital flows have behaved under alternative global economic and financial conditions. Section V concludes.

## II. DATA

We compile an extensive dataset of capital flows for 147 countries at an annual frequency and 58 countries at a quarterly frequency, drawing primarily from the IMF’s Balance of Payments Statistics (BPS). As described in the fifth edition of the IMF’s *Balance of Payments and International Investment Position Manual* (BPM5), “capital flows” refers to cross-border financial transactions recorded in economies’ external financial accounts.<sup>6</sup> Gross capital inflows arise when the economy incurs more external liabilities (inflows with a positive sign) or the economy reduces its external liabilities (inflows with a negative sign). Thus, gross inflows are net sales of *domestic* financial instruments to *foreign* residents. Gross capital outflows arise when the economy acquires more external assets (outflows with a positive sign) or the economy reduces its holdings of external assets (outflows with a negative sign). Thus, gross outflows are net purchases of *foreign* financial instruments by *domestic* residents. Net capital flows are the difference between gross inflows and outflows.

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<sup>5</sup> See IMF (2011a and 2011b) and the references therein for related work.

<sup>6</sup> The definitions of the line items of countries’ external financial accounts were revised under the sixth and the latest edition of the IMF’s *Balance of Payments and International Investment Position Manual* (BPM6), which was implemented in 2008. However, the database used in this paper is built on data reported in BPM5 methodology as most member countries’ desks still reported data on that basis at the time of the analysis.



Positive net capital flows thus represent a deterioration of an economy's net external position, and negative net capital flows represent an improvement in its net external position.

International capital flows are broken down into several categories: (1) foreign direct investment (FDI); (2) portfolio investment, covering holdings of bonds and equity equal to less than ten percent of ownership of a firm; (3) financial derivatives; (4) international reserves; and, (5) "other investment." The "other investment" category encompasses a number of international financial transactions, including loans and deposits, banking capital, trade credits, and official government flows. We introduce the concept of *private* capital flows within the "other investment" category, where private is defined from the point of view of the recipient sector. Thus, all flows to the general government and monetary authorities within the "other investment" component of the financial account are excluded. After excluding these official financing flows, flows to and from the banking sector comprise the largest share of "other investment"—therefore, for simplicity, we use the term "bank flows" to describe this component.<sup>7</sup> The reason for excluding government loans and central bank borrowing is that they are often driven by factors different from those relevant for other capital flows. For example, they may capture the response of official institutions to sudden changes in private capital flows. Finally, IMF lending and reserve asset accumulation, which could also be influenced by non-market-driven factors, are excluded from the computation of private flows.

While inflows, outflows and net capital flows, as well as their components, are reported in nominal U.S. dollars, we normalize these flows by nominal GDP in U.S. dollars in order to capture their macroeconomic relevance. The latter series is taken from the World Bank World Development Indicators (WDI) database and extended with data from the IMF's *World Economic Outlook* (WEO) database.

Although the IMF BPS are the most comprehensive database on capital flows available, there are several issues that need to be highlighted. Some countries (especially developing countries) do not report data for all forms of capital flows, and it is difficult to verify if the data are in fact missing as opposed to being zero.<sup>8</sup> The time coverage of the data also varies substantially from country to country. While most advanced economies began reporting data in the early 1970s, this is not the case for many of the emerging and developing economies.<sup>9</sup> To get a more rounded picture, we thus begin our analysis in 1980.

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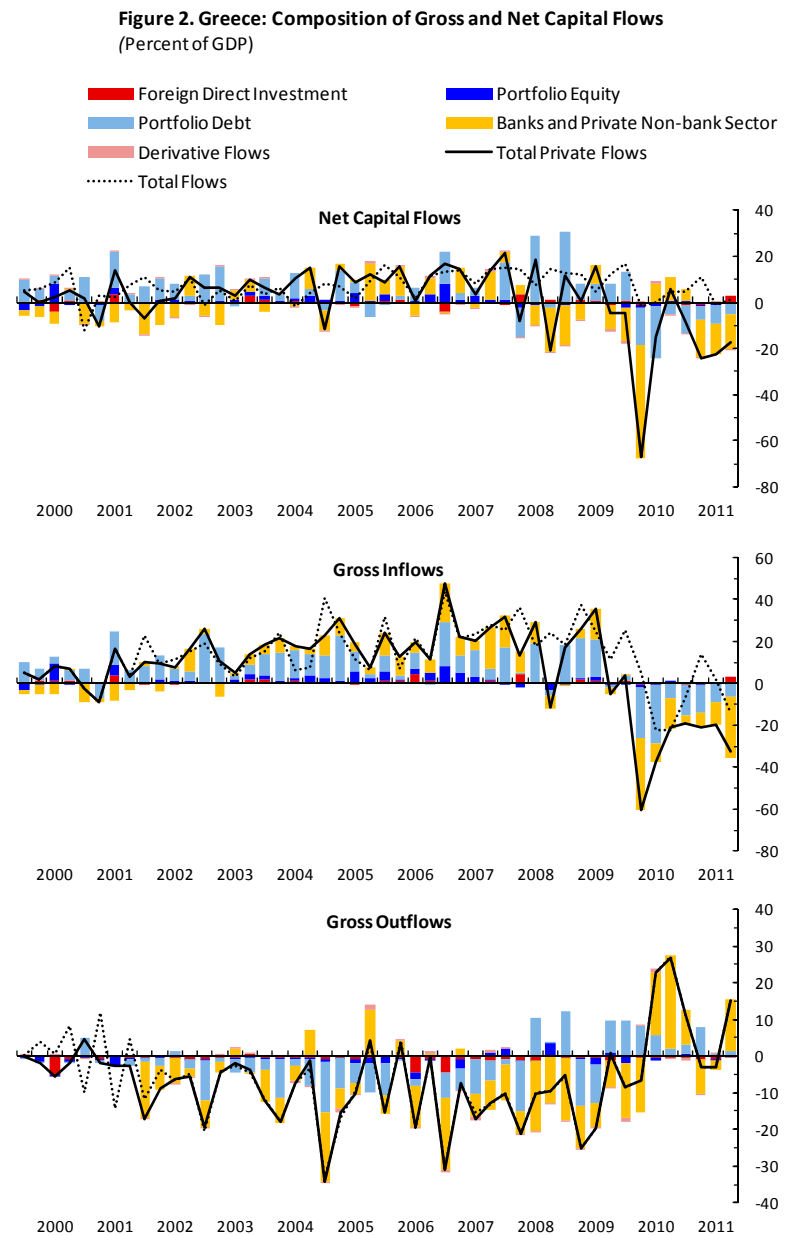
<sup>7</sup> Note however, that our proxy of private capital flows includes portfolio flows to the government (e.g., direct purchases of government bonds).

<sup>8</sup> Portfolio flows, for example, were negligible for many non-advanced countries until recently.

<sup>9</sup> See Appendix Table 1 for the definition of the three economy groups used in the analysis: advanced economies, emerging markets, and other developing economies.

Quarterly data on capital flows are also compiled from the IMF BPS database and extended with data from other sources as possible, (e.g., Haver Analytics and the CEIC and EMED databases). Quarterly nominal GDP (not seasonally adjusted) series in local currency and the average nominal exchange rate vis-à-vis the U.S. dollar are obtained from the IFS and are extended with alternative sources when needed. Data on capital flows and GDP at the quarterly level are available for only a subset of 58 economies, although they correspond to all the major economies (see IMF, 2011b).

Figure 2 shows why it is better to focus on the concept of private capital flows to understand their typical behavior. The dotted line in the charts traces total capital flows to Greece in the 2000s, including official loans to the government and central bank. The solid line is our proxy for private flows, which excludes official flows to the government and central bank. As can be seen in the figure, total gross and net flows to Greece were surprisingly stable at the very start of its sovereign debt crisis in late 2008. However, this reflected inflows from official sources that more than offset the sharp decline in private flows from elsewhere. Focusing on total flows would give a misleading picture that capital flows to Greece were generally unaffected at the onset of its crisis.



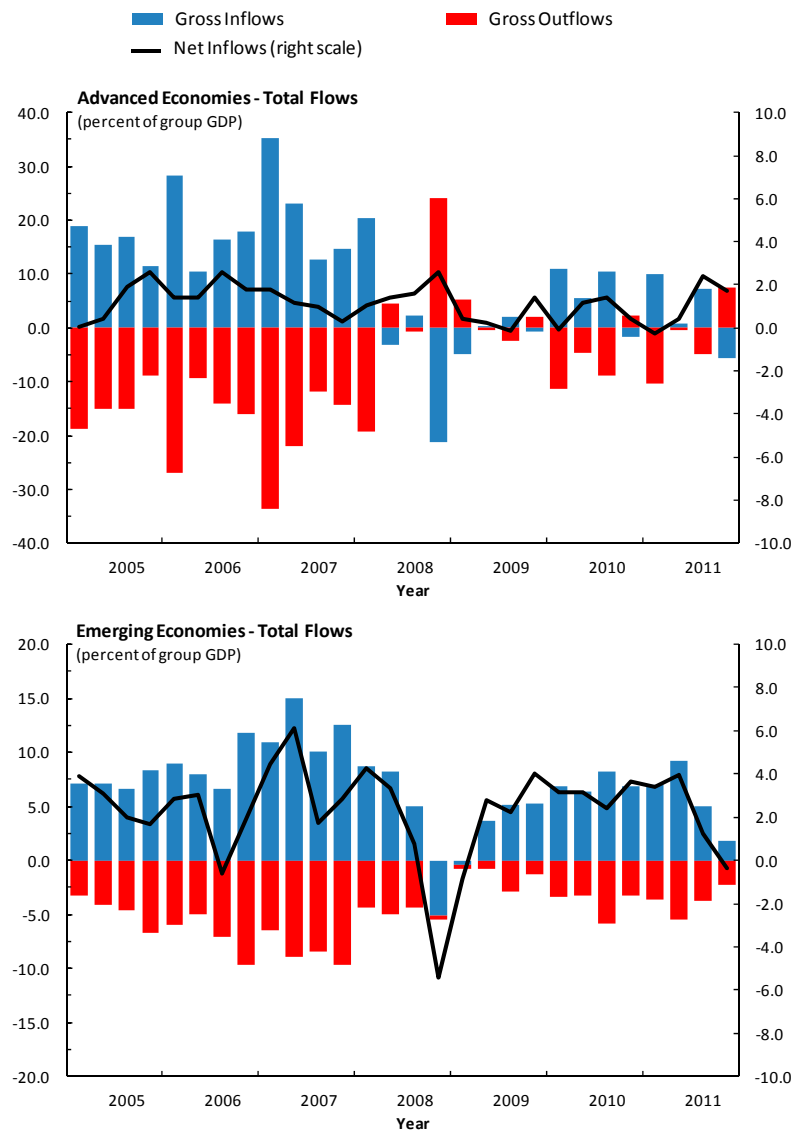
Sources: IMF, *Balance of Payments Statistics*; IMF, *International Financial Statistics*; and IMF staff calculations.

### III. THE BEHAVIOR OF CAPITAL FLOWS OVER TIME

It is useful to consider how gross and net capital flows are related within the balance of payments identity to understand the differences in their behavior across countries. The identity suggests that changes in gross capital inflows must be reflected in changes in the current account deficit, foreign reserves, or gross capital outflows, if outward capital mobility is allowed. Thus, when the current account balance does not move much, and where reserves are not accumulated, gross capital inflows and outflows have to offset each other, leading to stable net flows, a behavior that is observed in advanced countries (see further below). In contrast, when reserves are accumulated or outflows are not fully liberalized, changes in gross flows in either direction need not induce offsetting changes in gross flows in the opposite direction.<sup>10</sup>

Gross capital flows have grown at a tremendous pace and are orders of magnitudes larger than net flows. For advanced economies, they rose five-fold from 5 percent of GDP in the 1980s to 25 percent of GDP in the run up to the Great Recession (Figures 1 and 3). For emerging markets, they increased from 2½ percent of GDP in the 1980s to 12 percent of GDP during the same period. In contrast, net flows were largely stable for advanced economies, at less

Figure 3. The Evolution of Total Gross and Net Capital Flows



Sources: CEIC; Haver Analytics; IMF, *Balance of Payments Statistics*; national sources; and IMF staff calculations.

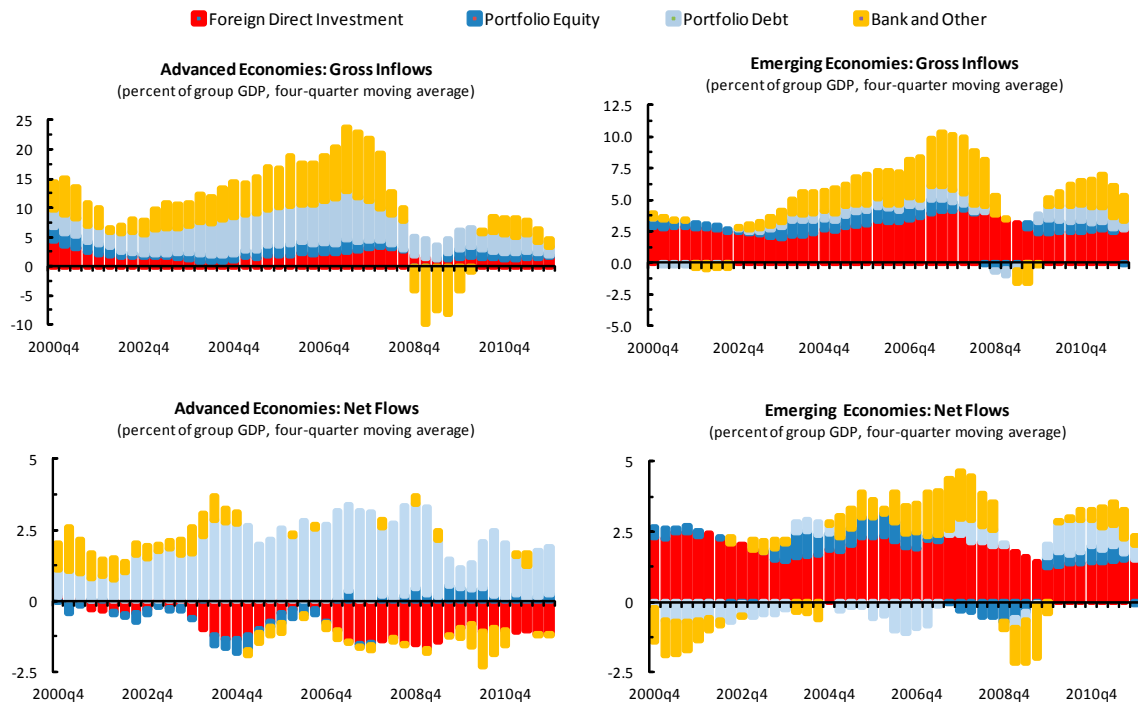
Note: Net flows, which do not include IMF lending and reserve accumulation, may not equal the sum of gross inflows and gross outflows because of a lack of data on gross flows for some economies.

<sup>10</sup> As remarked in the previous section, our focus in the rest of the paper is the behavior of private capital flows, excluding flows to the official sector and reserve accumulation. Indeed, the behavior of official capital flows can be very different from private flows (see Arslanalp and Tsuda, 2012).

than 2 percent of GDP in the past thirty years. For emerging markets, net flows were also smaller than gross inflows, but moved with the latter, rising from 2 percent of GDP in the 1980s–1990s to 4 percent of GDP before the Great Recession.<sup>11</sup>

The behavior of flows during the Great Recession also suggests that investments abroad by domestic residents (or gross outflows) were more instrumental in determining net flows in advanced economies than in emerging market economies (Figure 3). Although, advanced economies experienced a sharp reversal in inflows in the beginning of 2009, their gross outflows also swung inwards, allowing for much smoother changes in net flows. In contrast, in emerging markets, gross outflows shrank but did not reverse. As such, net flows dipped along with gross inflows during the Great Recession.

Figure 4. The Collapse and Recovery of Capital Flows by Type



Sources: CEIC; Haver Analytics; IMF *Balance of Payments Statistics*; national sources; and authors' calculations.

Across instruments, the rise and fall in capital flows was mainly driven by bank flows. This was indeed true for the sharp rise in capital flows during the 2000s (Figure 4), although

<sup>11</sup> Note however, the sharp divergence between aggregate gross and net flows in advanced economies also reflects the fact that these economies receive a majority of their inflows from each other. If these flows were netted out, total gross inflows to advanced economies from non-advanced economies would be smaller. In contrast, emerging markets likely continue to receive a bulk of their inflows from advanced economies, and therefore gross inflows to them are closer in size with the total gross inflows to them from advanced economies.

portfolio debt flows also rose through the 2000s for advanced economies. During the Great Recession, there was a broad reversal of capital flows of all types, but more pronounced for bank flows, followed by portfolio debt flows. The post-Great Recession pick up in capital flows was also led by these debt-creating (bank and portfolio debt) flows, with some reversal in late 2011. The swings in FDI flows were less sharp, although not negligible, especially for emerging market economies.

### A. Volatility

We construct two measures of the volatility of capital flows. The first measure is the standard deviation of detrended private capital flows as a share of GDP.<sup>12</sup> However, the larger the average level of the flow, the higher could be its dispersion, making it hard to compare the volatility of flows with widely different means. The second measure of volatility, the coefficient of variation, overcomes this problem by scaling the standard deviation by the absolute value of the mean of the flow and gives the volatility of each unit of the cross-border flow relative to GDP. Using annual data, we show the volatility measures for the median country in each economy group for the entire sample period (Tables 1A and 1B), as well as their evolution over a 10-year rolling window (Figures 5 and 6).

These measures confirm that capital flows are volatile but there is very little difference in volatility across the economies. Starting with net flows, the standard deviation of net flows to any economy group over the last thirty years has typically exceeded the average size of flows to that group (Table 1A, panels A and B). Across economies, although the standard deviation of net flows to emerging market and other developing economies is about 1¼ times larger than the standard deviation of net flows to advanced economies, the differences are not statistically significant (Table 1A, panel B). The volatilities of alternative types of net flows to emerging and developing economies are in fact much lower than the volatility of these components to advanced economies. This suggests greater substitution between alternative types of net flows or between gross inflows and outflows in advanced economies relative to the others (we examine this aspect in the next sub-section). Overall, once volume of flows is controlled for, a unit of net flow relative to GDP has tended to demonstrate broadly similar levels of volatility across the three economy groups over the past thirty years (Table 1A, panel C).

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<sup>12</sup> For this measure, we linearly detrend (both net and gross) private capital flows over GDP in order to account for the observed increase over time in the level, which is particularly pronounced in gross inflows and outflows. Any trend rise in the level may show up as a spurious rise in the volatility of the series. However, the results are broadly unchanged if the regular series are used instead. The linear trends extracted are country-specific.

Table 1A. Net Capital Flows in percent GDP: Volatility

1980-2011	Private Capital Flows	FDI	Portfolio Equity	Portfolio Debt	Bank and Other
<b>Panel A. Mean</b>					
Advanced	0.71	-0.43	-0.44	0.92 ~	0.64 ~
Emerging	2.24 *	1.80 *	0.00 * ~	0.29 * ~	0.41 ~
Other Developing	2.31 *	2.89 *	0.02 * ~	-0.03 * ~	0.14 ~
<b>Panel B. Standard Deviation</b>					
Advanced	3.25	1.68	1.74	3.49 ~	3.53 ~
Emerging	4.05	1.40	0.64 * ~	1.61 *	3.14 ~
Other Developing	3.81	1.88	0.14 * ~	0.53 * ~	2.77 ~
<b>Panel C. Coefficient of Variation</b>					
Advanced	2.07	2.15	3.67 ~	3.04	3.73 ~
Emerging	1.60	0.91 *	3.53 ~	2.57 ~	3.73 ~
Other Developing	1.61	1.00 *	2.63 ~	3.45 ~	3.13 ~

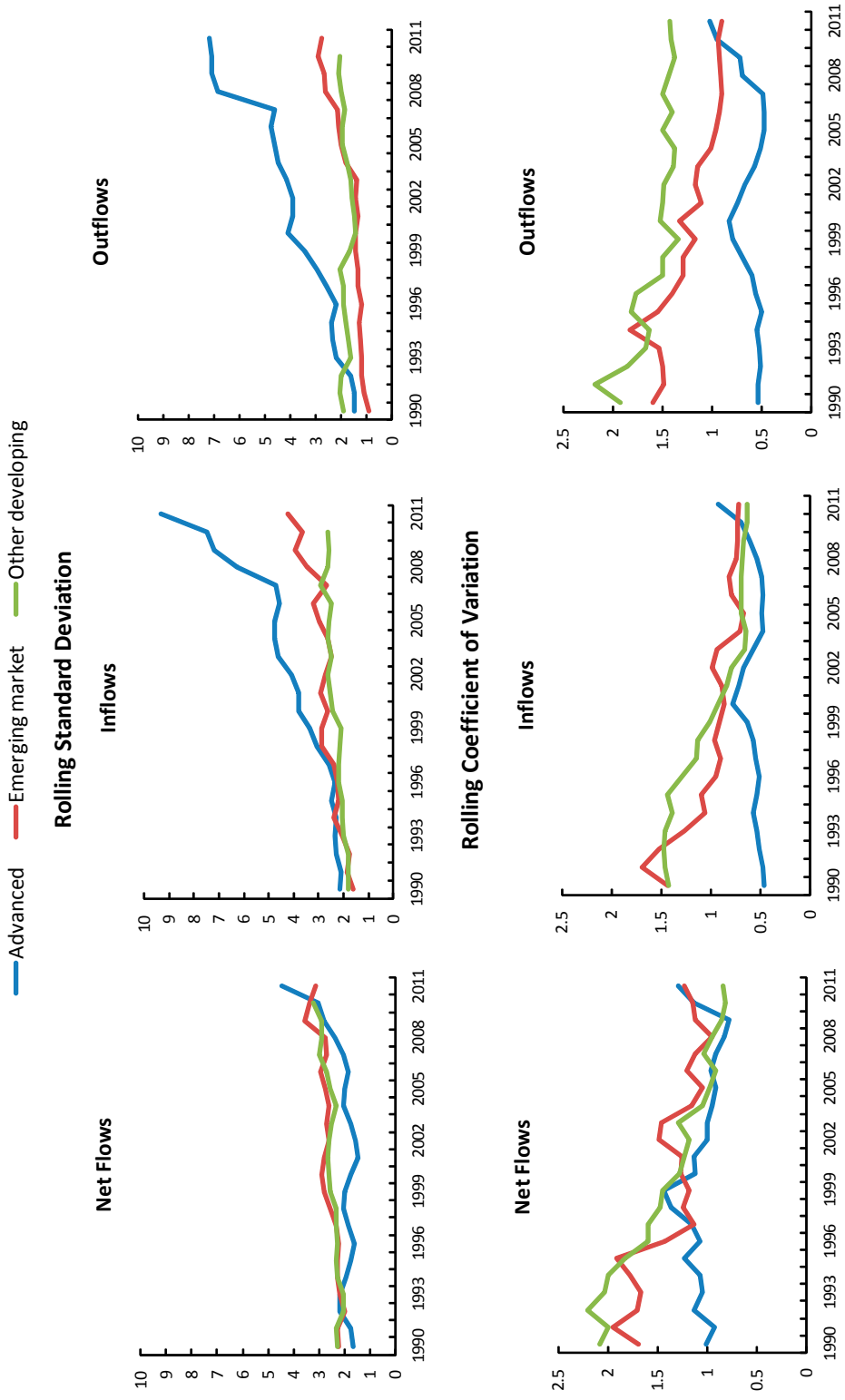
Note: The table presents medians of the indicated summary statistics for the particular group of economies. The \* indicates significant differences (at the 10 percent level) in the distribution of the statistics across country groups. The ~ indicates significant differences (at the 10 percent level) between the type of flow and FDI in the country group. Both equality of distributions tests are based on the Wilcoxon rank-sum test.

Table 1B. Gross Capital Inflows and Outflows in percent GDP: Volatility.

1980-2011	Private Capital Flows	FDI	Portfolio Equity	Portfolio Debt	Bank and Other
<i>Gross Inflows</i>					
<b>Panel A. Mean</b>					
Advanced	7.37	2.14	0.57 ~	2.95 ~	2.94 ~
Emerging	3.80 *	2.11	0.25 * ~	0.68 * ~	1.30 * ~
Other Developing	3.40 *	3.03	0.05 * ~	0.10 * ~	1.08 * ~
<b>Panel B. Standard Deviation</b>					
Advanced	7.91	1.85	1.18	3.19 ~	5.12 ~
Emerging	4.10 *	1.39	0.55 * ~	1.28 *	2.80 * ~
Other Developing	3.65 *	1.86	0.09 * ~	0.38 * ~	2.42 *
<b>Panel C. Coefficient of Variation</b>					
Advanced	0.93	0.93	1.82 ~	1.14	1.55 ~
Emerging	1.09	0.83	1.91 ~	1.72 * ~	2.06 * ~
Other Developing	1.10	0.95	1.58 ~	2.50 * ~	2.11 * ~
<i>Gross Outflows</i>					
<b>Panel D. Mean</b>					
Advanced	-6.44	-2.56	-1.07 ~	-2.22	-2.69
Emerging	-1.71 *	-0.40 *	-0.16 * ~	-0.37 *	-0.76 * ~
Other Developing	-0.99 *	-0.15 *	-0.01 * ~	-0.12 *	-0.73 * ~
<b>Panel E. Standard Deviation</b>					
Advanced	7.10	2.18	1.56	3.40	3.47 ~
Emerging	2.20 *	0.40 *	0.25 * ~	0.78 *	1.78 * ~
Other Developing	2.06 *	0.20 *	0.07 * ~	0.35 * ~	2.07 * ~
<b>Panel F. Coefficient of Variation</b>					
Advanced	1.11	0.85	1.50 ~	1.39 ~	1.46 ~
Emerging	1.35 *	1.26 *	1.84 * ~	1.78 * ~	1.90 ~
Other Developing	1.89 *	1.53 *	2.57 * ~	1.88 *	1.95 * ~

Note: The table presents medians of the indicated summary statistics for the particular group of economies. The \* indicates significant differences (at the 10 percent level) in the distribution of the statistics across country groups. The ~ indicates significant differences (at the 10 percent level) between the type of flow and FDI in the country group. Both equality of distributions tests are based on the Wilcoxon rank-sum test.

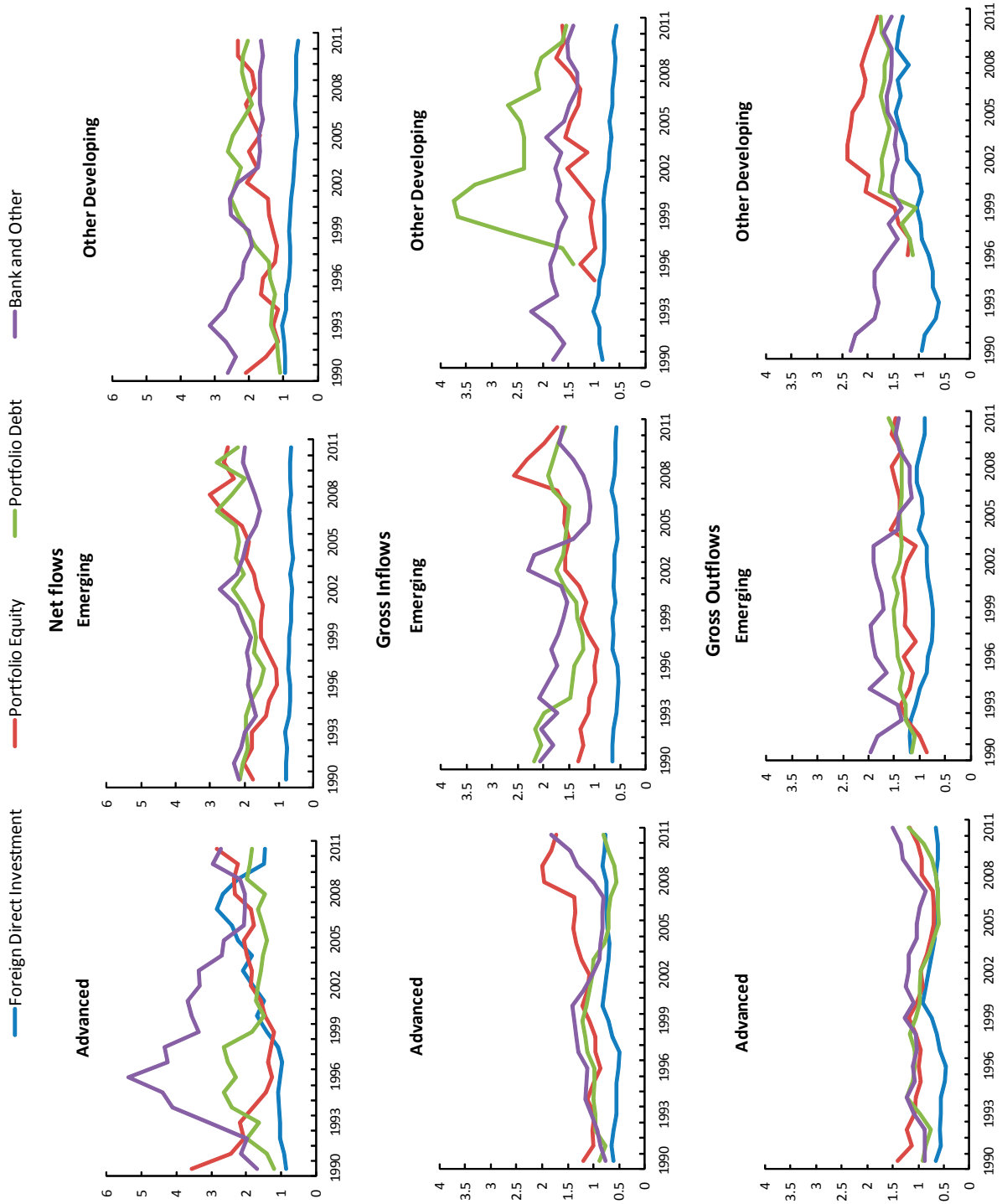
**Figure 5. Volatility of Capital Flows**



Note: Statistics are shown for the median country in each group. All standard deviations are expressed for flows as a percentage of GDP. Gross inflows and outflows are linearly detrended on a country-by-country basis before the rolling standard deviation is calculated. Statistics are calculated over a rolling 10-year window.



Figure 6. Rolling Coefficient of Variation by Type of Flow



Note: Statistics are shown for the median country in each group. Persistence is measured by the rolling ordinary least squares estimate of the AR(1) coefficient over a 10-year window.

Considering next gross inflows and outflows, the standard deviation of flows for advanced economies has tended to be much higher than that for emerging market and other developing economies (Table 1B, panel B and E), reflecting the larger volume of gross flows (Table 1B, Panels A and D). The coefficients of variation of gross inflows are broadly similar across the three groups of economies (Table 1B, Panels C and F). Similar to net flows, each unit of total gross inflows relative to GDP is generally less volatile than the volatility of their corresponding components.

These findings suggest that the received wisdom from the literature that capital flows are more volatile in emerging markets than in advanced economies (see for example, Prasad and others, 2003, Broner and Rigobon, 2006, Levchenko and Mauro, 2007, and Becker and Noone, 2009) should be qualified. After controlling for magnitude, each unit of capital flow relative to GDP is broadly similarly volatile across advanced, emerging market and other developing economies. Similarly, although gross flows are more volatile than net flows (as argued by Broner and others, 2013), this greater volatility is simply a function of the larger magnitude of the former. Controlling for size, the volatility of each unit of gross inflows and outflows (relative to GDP) is not that different from that of net flows for the median country in each economy group.

Turning to the coefficient of variation for alternative types of flows, FDI flows (net or gross) are somewhat less volatile than the other types of net or gross flows for each economy, in line with the findings in the literature, but there is not much difference between the volatility of the other kinds of flows for any given economy group. In other words, equity flows tend to be largely as volatile as the debt creating flows. Across economy groups, gross inflows and outflows of debt-creating flows are found to be only slightly more volatile in emerging market and other developing economies than in advanced economies, whereas net flows of debt-creating flows broadly similarly volatile.

The two measures of volatility also tell a different story of how the variability of flows has evolved over time. The rise in the size of gross inflows and outflows has been accompanied by a rise in their standard deviation (see Figure 5, top panel). However, a unit of capital inflow-to-GDP to emerging market and other developing economies is, if anything, slightly less volatile today than twenty years ago and currently similar in level to the volatility of a unit of capital inflow-to-GDP for advanced economies (Figure 5, bottom panel). Among the components, the coefficient of variation of (gross or net) FDI inflows has tended to be lower than that of other components over time for emerging market and other developing economies (Figure 6). Beyond this, there were no pronounced differences in the variability between the non-FDI types of flows within or across the economies.<sup>13</sup>

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<sup>13</sup>The results for equity and debt flows to and from emerging market and other developing economies should be treated with caution as very few of these countries report data on these flows prior to the 2000s.

## B. Substitutability Across Capital Flows

Are the differences in the volatility of net capital flows across countries related to the substitutability across the different types of flows and between inflows and outflows? For example, even if bank flows were volatile, this may not be a concern for the overall capital account, if other types of instruments tend to offset this volatility.<sup>14</sup> We examine the substitutability of the components of the financial account by computing the correlations between alternative types of capital flows and the rest of the financial account, as well as the cross-correlations between various flows.

For advanced economies, there is a strong negative correlation between the net flows in each of the four instruments and the remaining components (Figure 7, Table 2). This substitutability is largely absent in the components of net capital flows in emerging market and other developing economies. This partly helps explain why the volatility of total net flows in advanced economies is not that different from that in other economies despite higher volatility of the corresponding components of net flows (see Table 1A again). Table 2 suggests that for advanced economies, the degree of substitutability is high and significant between net portfolio debt and bank flows, as well as between net equity and FDI and net equity and portfolio debt flows, in line with the findings of Becker and Noone (2009).

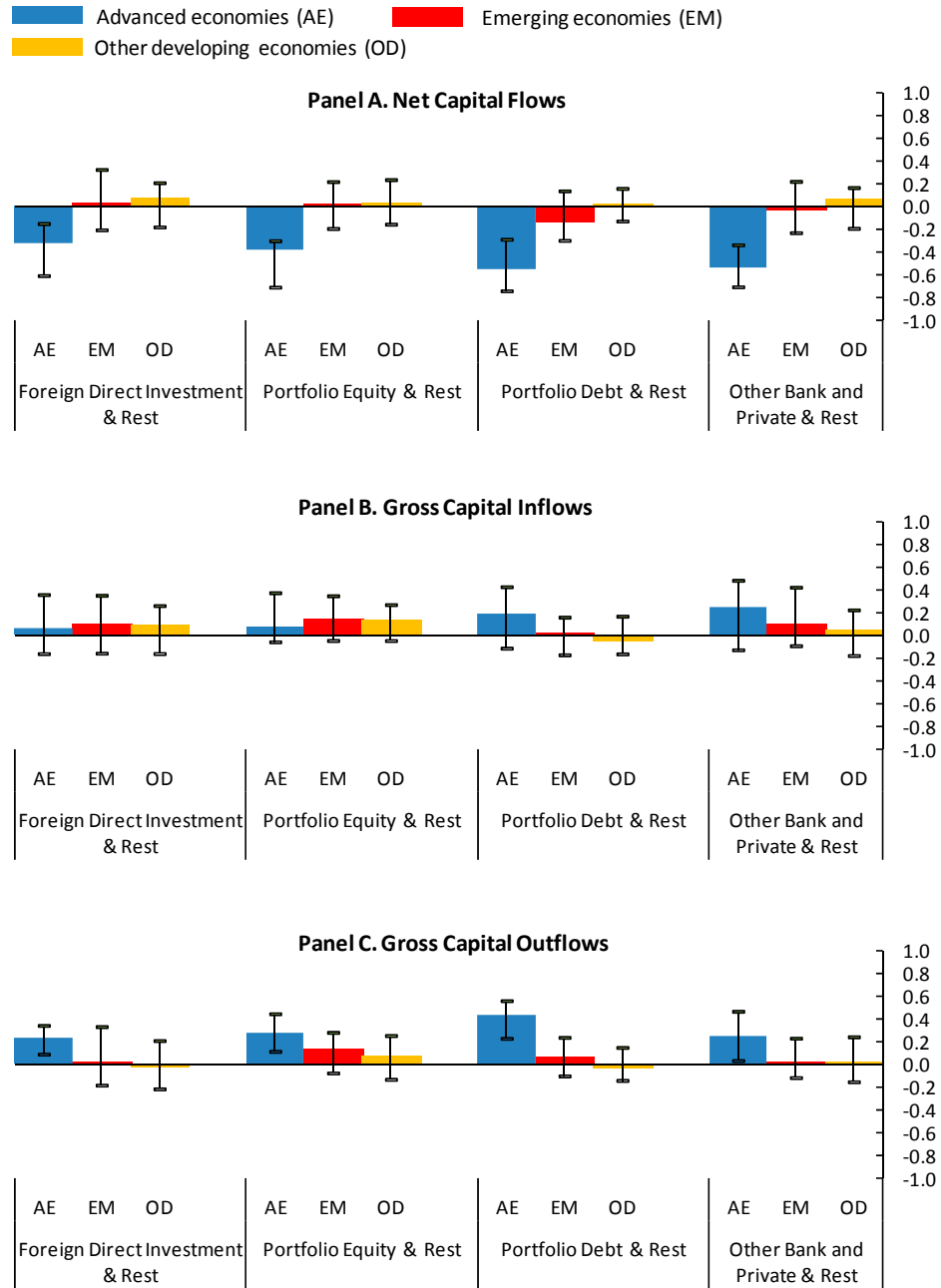
There is no particular pattern in the correlations across alternative types of gross flows, except for advanced economies, for whom, most outflows appear to be complementary to other outflows from the financial account (Figure 7, Panel C). It is possible that outflows from advanced economies are procyclical, which affect all types of flows in a similar way, and helps reduce the depth of capital flow reversals during economic downturns. We explore this possibility in sub-section D. The positive correlation between alternative types of capital outflows also drives the negative correlation between alternative types of net flows for advanced economies.

Finally, we also find positive comovement between inflows and outflows for each economy group. Higher inward investment by foreigners tends to coincide with higher outward investment by domestic agents (Table 3). This correlation could be evidence of a generalized process of globalization, or could be due to the procyclicality of both inflows and outflows (see Broner and others, 2013). As expected, the pattern is much more pronounced in advanced economies, which generally tend not to accumulate foreign reserves. In emerging market and other developing economies, while significant, the correlations between gross inflows and outflows of total and different types of flows are smaller in magnitude.

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<sup>14</sup> For a theoretical framework that delivers predictions on the co-movements of various categories of capital flows in a small-open economy with financial frictions over the business cycle, see Smith and Valderrama (2009).

**Figure 7. Correlations between Flows of Various Types and the Rest of the Financial Account**



Source: Authors' calculations.

Note: The vertical bar represents the median correlation (across economies) between the flows in percent of GDP of a particular type of flow and the remainder of the financial account computed with annual data during 1980-2011. The whiskers show the 75th and 25th percentiles from the distribution of country correlation coefficients.

Table 2. Capital Flows: Correlations Across Types of Flows

	Net			Inflows			Outflows		
	Advanced	Other		Advanced	Emerging	Other	Advanced	Emerging	Other
		Emerging	Developing						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
FDI & Portfolio Equity	-0.36 *	0.05	0.03	0.05	0.04	0.09	0.30 *	0.12 *	-0.01
FDI & Portfolio Debt	-0.08	-0.09 *	0.06	-0.01	-0.11 *	-0.01	0.26 *	0.05	0.02
FDI & Other Investment	-0.05	0.01	0.08	0.17 *	0.15 *	0.05	0.16 *	0.05	0.00
Portfolio Equity & Portfolio Debt	-0.27 *	0.03	-0.10	0.15 *	0.03	-0.05	0.37 *	0.03	0.08
Portfolio Equity & Other Investment	-0.12 *	0.04	0.05	0.12	0.09 *	0.13 *	0.08	0.09 *	0.09
Portfolio Debt & Other Investment	-0.40 *	-0.03	-0.05	0.13	0.05	0.00	0.29 *	0.04	-0.01

Note: The table presents medians of the correlation between the types of flows denoted in the row heading over the 1980-2011 period for the group of economies indicated in the column heading. The correlation is computed from the capital flow normalized by GDP and detrended using a linear trend. The \* indicates that the median is significantly different from zero (at the 10 percent level).

Table 3. Capital Flows: Correlations Between Inflows and Outflows

	Other		
	Advanced	Emerging	Developing
	(1)	(2)	(3)
Total Private Capital Flows	0.90 *	0.35 *	0.26 *
FDI	0.64 *	0.30 *	0.07
Portfolio Equity	0.26 *	0.06	0.09
Portfolio Debt	0.34 *	0.04	0.02
Other Investment	0.69 *	0.18 *	0.17 *

Note: The table presents medians of the correlation between the inflows and outflows of the types of flows denoted in the row heading over the 1980-2011 period for the group of economies indicated in the column heading. The correlation is computed from the capital flow normalized by GDP and detrended using a linear trend. The \* indicates that the median is significantly different from zero (at the 10 percent level).

### C. Persistence

The degree of persistence of capital flows is a measure of their predictability. We measure persistence as the AR(1) regression coefficient of net and gross flows and their components estimated separately for each country over the entire study period (Table 4), as well as over a 10-year rolling window (Figures 8–9).

There are no significant differences in the persistence of total net private flows across countries (Figure 8). Although gross inflows and outflows are found to be somewhat more persistent for advanced economies relative to emerging and other developing economies, these differences are small.<sup>15</sup> AR(1) coefficients for total net flows are typically below 0.5, whereas for gross inflows between 0.5–0.6.

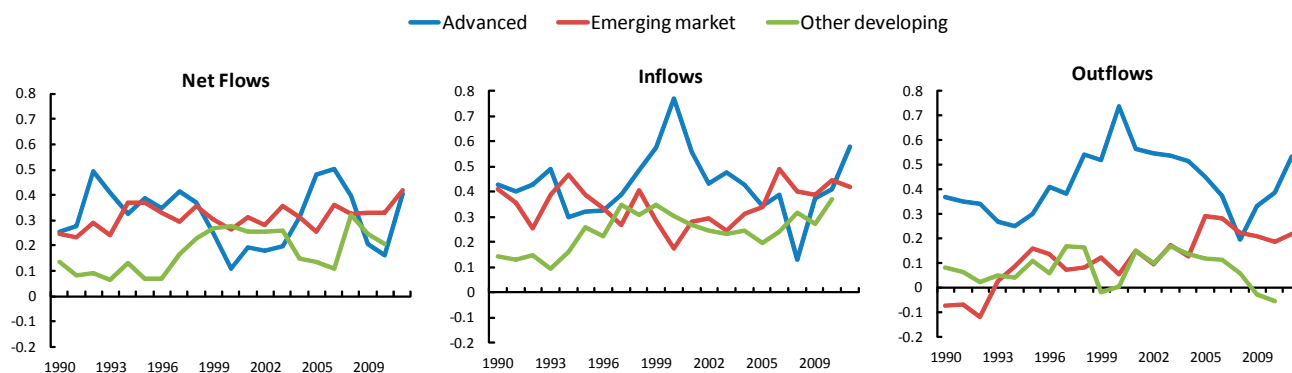
Table 4. Capital Flows in percent GDP: Persistence

1980-2011	Private Capital Flows	FDI	Portfolio Equity	Portfolio Debt	Bank and Other
<b>Panel A. Net Capital Flows</b>					
Advanced	0.43	0.30	0.21	0.23	0.38
Emerging	0.48	0.56 *	0.23 ~	0.17 ~	0.40 ~
Other Developing	0.44	0.50 *	0.07 ~	0.05 * ~	0.33 ~
<b>Panel B. Gross Capital Inflows</b>					
Advanced	0.62	0.43	0.22 ~	0.56 ~	0.44
Emerging	0.54 *	0.66 *	0.21 ~	0.17 * ~	0.40 ~
Other Developing	0.52 *	0.52	-0.10 * ~	0.02 * ~	0.32 * ~
<b>Panel C. Gross Capital Outflows</b>					
Advanced	0.58	0.53	0.34	0.49	0.39 ~
Emerging	0.36 *	0.47	0.21 * ~	0.14 * ~	0.21 ~
Other Developing	0.18 *	0.21 *	0.06 *	0.17 *	0.17 *

Note: The table presents medians of the indicated summary statistics for the particular group of economies. The \* indicates significant differences (at the 10 percent level) in the distribution of the statistics across country groups. The ~ indicates significant differences (at the 10 percent level) between the type of flow and FDI in the country group. Both equality of distributions tests are based on the Wilcoxon rank-sum test.

<sup>15</sup>The findings of previous studies on the persistence of the financial account are mixed. For net flows, while Broner and Rigobon (2006) find that total financial flows are more persistent in emerging and developing economies, Levchenko and Mauro (2007) and Becker and Noone (2009) reach the opposite conclusion.

Figure 8. Rolling Persistence of Capital Flows



Note: Statistics are shown for the median country in each group. Persistence is measured by the rolling ordinary least squares estimate of the AR(1) coefficient over a 10-year window.

Across types of instruments, gross and net FDI inflows are generally the most persistent type of flow in emerging and other developing economies, whereas portfolio debt and equity flows typically the least persistent. However, for emerging market economies, the persistence of FDI flows in both gross and net terms has actually fallen over time (with some reversal since the decades ending in the mid -2000s—see Figure 9). This could be related to the increase in the share of financial FDI—that is direct borrowing by a subsidiary bank from its parent—in total FDI over time, which may be more volatile than non-financial FDI.<sup>16</sup> In advanced economies, the persistence among various types of flows is essentially indistinguishable.

#### D. Correlation with Domestic GDP Growth

To investigate the cyclical properties of capital flows, we compute their correlation with domestic real GDP growth rates, a proxy for the cyclical position of the economy. Table 5 reports the results for the three groups of economies and all types of net and gross flows:

- In emerging market and developing economies, total net flows are mildly procyclical with domestic GDP growth. In advanced economies, there is no evidence of procyclicality of total net private flows.
- For advanced economies, both gross inflows and outflows rise during good times, thereby offsetting the effects on net flows. A similar pattern is also observed for emerging and other developing economies, but the size of the correlation with GDP is much stronger for gross inflows, implying that net capital flows track mostly the behavior of foreign investors. These results support the findings by Broner and others (2013).

<sup>16</sup> See Ostry and others (2010) for the impact of a rising share of financial FDI on macroeconomic volatility.

Figure 9. Rolling Persistence by Type of Flow



Note: Statistics are shown for the median country in each group. Persistence is measured by the rolling ordinary least squares estimate of the AR(1) coefficient over a 10-year window.



Table 5. Capital Flows in percent GDP: Correlation with GDP growth

1980-2011	Private Capital Flows	FDI	Portfolio Equity	Portfolio Debt	Bank and Other
<b>Panel A. Net Capital Flows</b>					
Advanced	-0.04	0.01	-0.06	-0.06	0.08
Emerging	0.25 *	0.19 *	0.05 * ~	-0.05 ~	0.22 *
Other Developing	0.08	0.14 *	-0.03 ~	-0.11 ~	-0.03 * ~
<b>Panel B. Gross Capital Inflows</b>					
Advanced	0.26	0.14	0.06	0.01	0.33 ~
Emerging	0.32	0.23	0.08	-0.03 ~	0.29
Other Developing	0.12 *	0.13	0.06	-0.06 ~	-0.02 * ~
<b>Panel C. Gross Capital Outflows</b>					
Advanced	-0.26	-0.15	-0.21	-0.07	-0.25 ~
Emerging	-0.12 *	-0.16	-0.04 * ~	-0.06	-0.08 *
Other Developing	-0.08 *	0.09 *	-0.09 ~	-0.06	-0.06 * ~

Note: The table presents medians of the indicated summary statistics for the particular group of economies. The \* indicates significant differences (at the 10 percent level) in the distribution of the statistics across country groups. The ~ indicates significant differences (at the 10 percent level) between the type of flow and FDI in the country group. Both equality of distributions tests are based on the Wilcoxon rank-sum test.

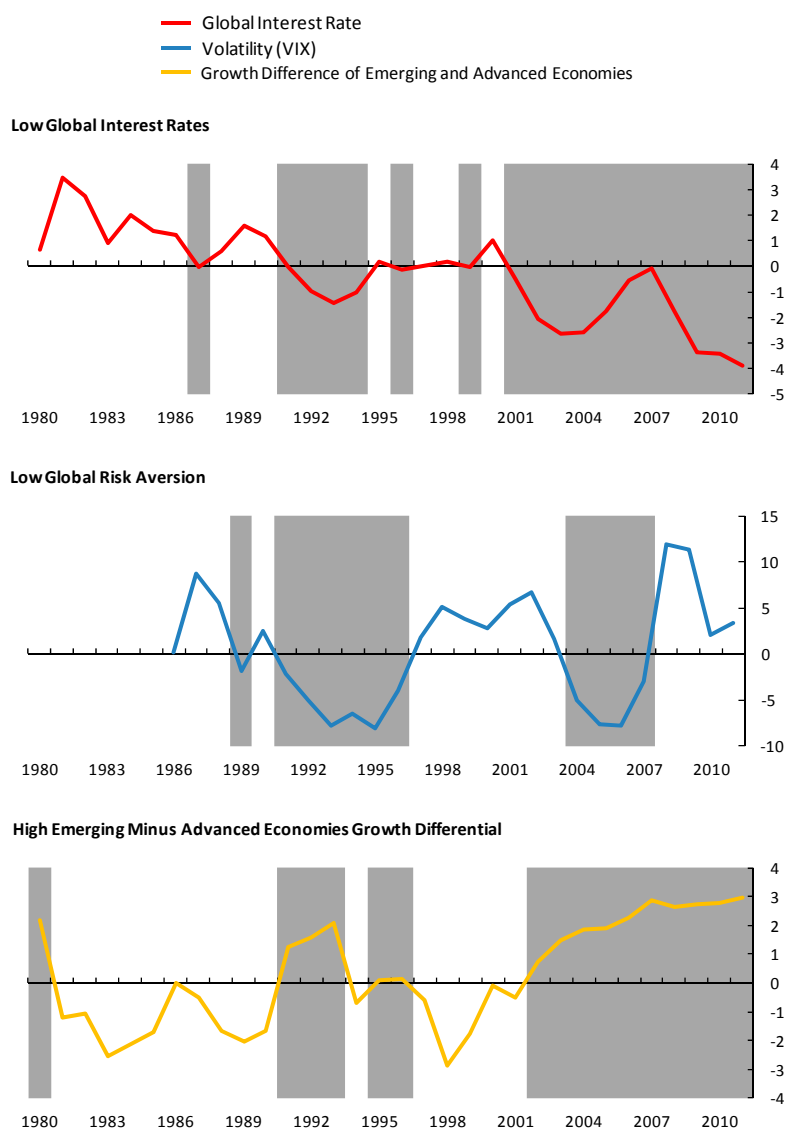
#### IV. CAPITAL FLOWS AND THE GLOBAL ENVIRONMENT

We finally turn to the role of the global environment underpinning capital flows to various economies. Specifically, we distinguish between different aspects of the global environment that are relevant for policymakers today—periods when the global interest rate is lower or global investors’ risk appetite is higher than normal times (a summary proxy for relevant “push” factors); or when growth differentials between emerging markets and advanced economies are large (a summary proxy for potential “pull” factors)—and document the differences in the behavior of capital flows during these periods relative to other periods. The patterns between capital flows and underlying conditions should not be interpreted as causal links however, but as historical associations.

Periods of low global interest rates, low global risk aversion, and strong emerging economies growth performance are defined, respectively, as periods when the global real interest rate (computed as the GDP-weighted average of the real European Central Bank financing rate and the Bundesbank base rate prior to 1999, and the U.S real federal funds rate), global risk aversion (proxied by the Chicago Board of Options Exchange Volatility Index (VIX) level) and the growth differential between advanced and emerging economies are lower than their median values over the entire 1980–2011 period.<sup>17</sup>

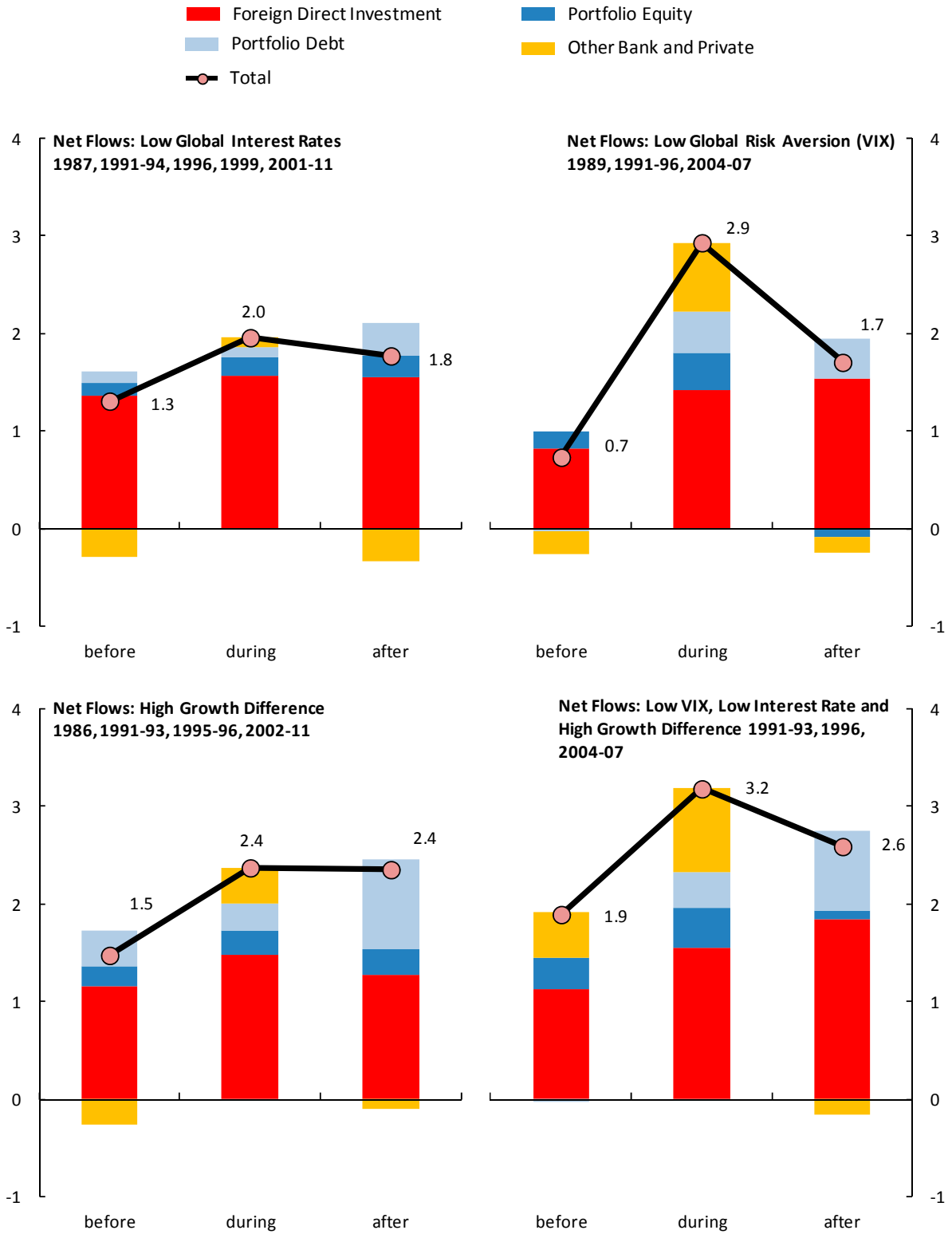
Historically, most periods of low global interest rates have overlapped with periods of large growth differentials between emerging and advanced economies but *not* with periods of low global risk aversion (Figure 10). Thus, accommodative monetary policy has coincided with weak economic prospects and low expected inflation in advanced economies (see also Calvo and others, 2001). In contrast, during the recent global crisis, risk appetite did not always move in tandem with low interest rates, especially when there was financial stress. There were two relatively long periods when all three conditions coincided: (1) the run-up to the Asian crisis (1991–96, excluding 1994 due to a lower growth differential and 1995 due to higher global interest rates) and (2) the run-up to the global crisis (2004–07).

Figure 10. Capital Flows in Periods of Easy Global Financing Conditions

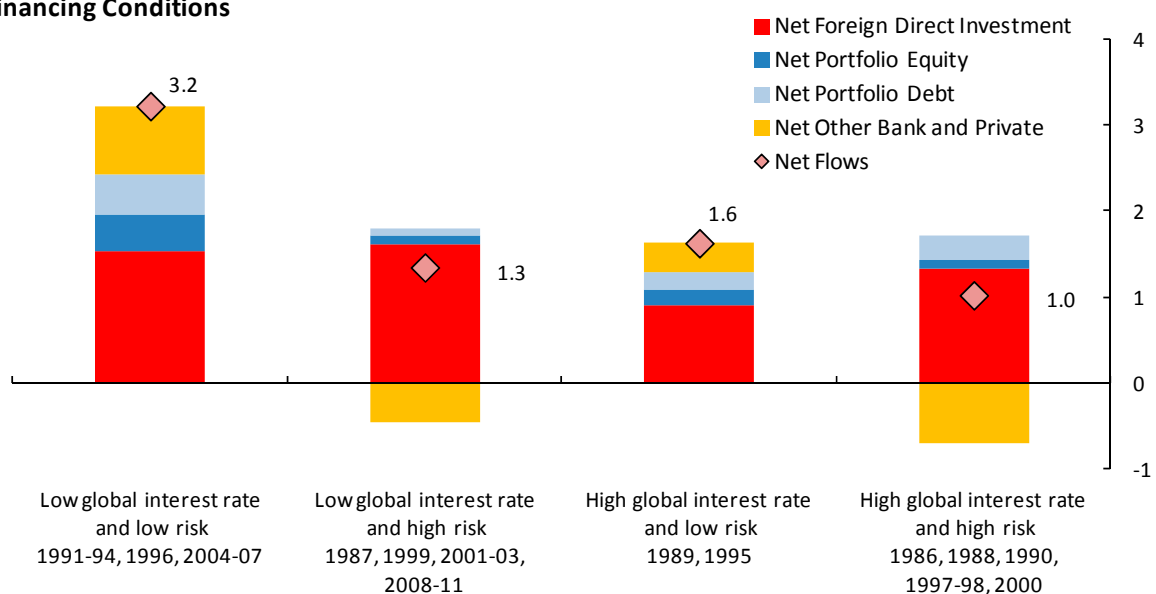


<sup>17</sup> The growth differential between emerging and advanced economies is the difference between the weighted average real GDP growth rates of each group.

**Figure 11. Emerging Market Economies: Net Capital Flows**



**Figure 12. Emerging Market Economies: Net Private Capital Flows Under Alternative Global Financing Conditions**

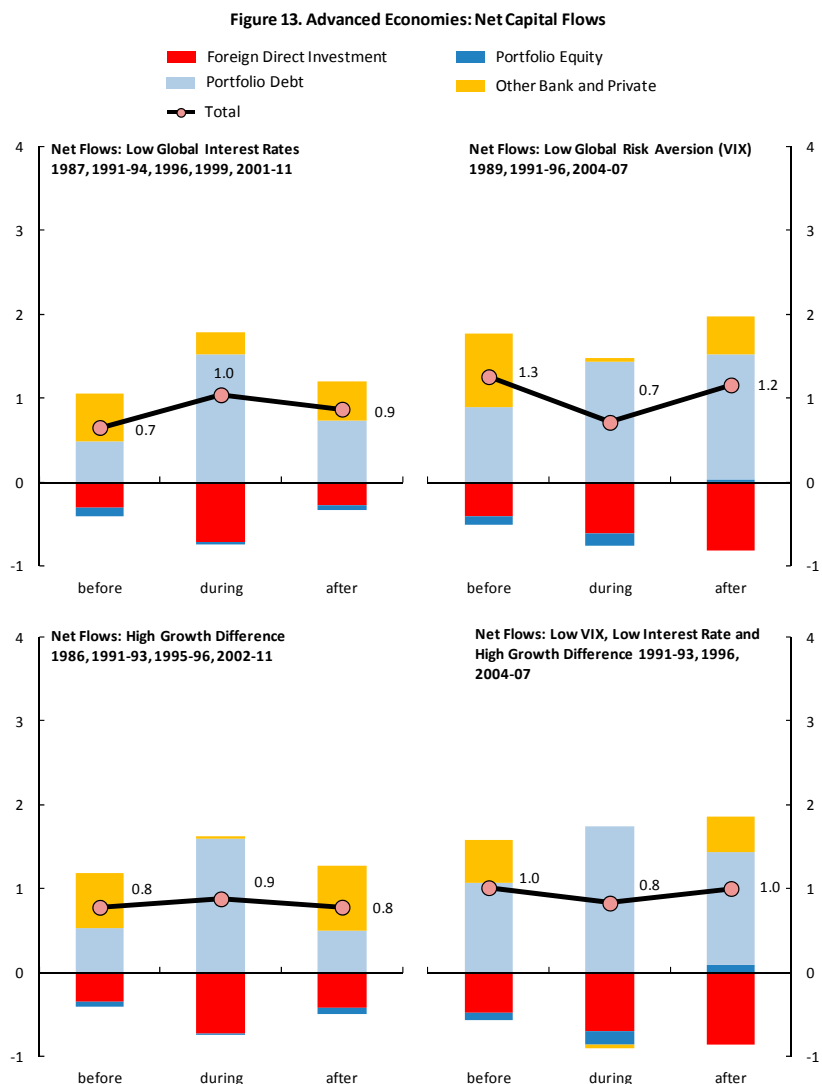


Total net capital flows to emerging markets during each type of episode were larger than the year before or after and largest when all three types of episodes coincided (Figure 11).<sup>18</sup> The sharpest increase (and decline) occurred around periods of low risk aversion—net flows increased by  $2\frac{1}{4}$  percentage points of GDP from the year preceding the period and fell by  $1\frac{1}{4}$  percentage points afterward. Conversely, the increase was smaller when the underlying condition was characterized by only low global interest rates. Indeed, net flows to emerging markets were strongest when global interest rates and risk aversion were *both* low (Figure 12)—being more than 2 percentage points of GDP higher than flows when either global interest rates or risk aversion or both were high. In fact, when global risk aversion was high but global interest rates were low, net flows were only marginally above where they were when both conditions were tight.

For advanced economies, among the scenarios considered, net flows are in fact lowest compared to the years before and after when global risk aversion is low (Figure 13, top right). These economies experience more net flows when risk appetite is low rather than when it is high (Figure 14). This could imply that investors tend to invest more in emerging market economies than in advanced economies when risk appetite is high and the opposite when risk appetite is low, reflecting the higher perceived riskiness of emerging markets. Also, in contrast to what one might expect, advanced economies generally tend to experience a slight increase in net capital flows when their growth outcome is poorer than emerging market economies.

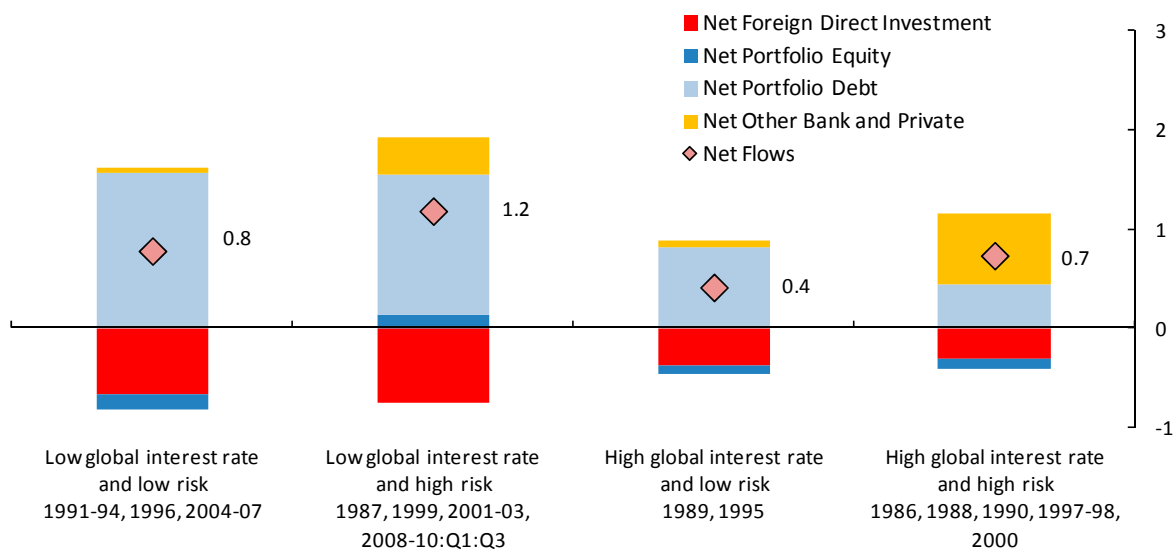
<sup>18</sup>Net flows are averaged across years for multiyear events.

The above dynamics of net flows to emerging market economies under alternative global economic and financial conditions appear to be largely driven by bank flows (Figures 11–12). The rise in these flows was typically the sharpest during the event and likewise declined most dramatically afterward. In particular, bank flows appear to be strongly correlated with changes in global risk aversion. Although all other types of flows tended to increase during the events considered, their behavior in the aftermath varied. For instance, portfolio debt flows typically remained elevated at the end of periods characterized by a relatively strong growth performance in emerging market economies or at the end of easy global financing conditions (whereby higher net debt flows at the end of the episodes may reflect greater cross-border borrowing by emerging market economies to meet larger financing needs). Conversely, FDI generally remained strong even after the end of loose global financing conditions but fell at the end of strong growth episodes in emerging markets.<sup>19</sup>



<sup>19</sup>A number of robustness checks, for example, excluding the 10 largest emerging markets or including financial centers, did not change this picture. The similarity in the pattern of net capital flows across all emerging market regions suggests that the association between global events and capital flows to emerging market economies is not driven by only a few systemically important economies.

**Figure 14. Advanced Economies: Net Capital Flows under Alternative Global Financing Conditions**

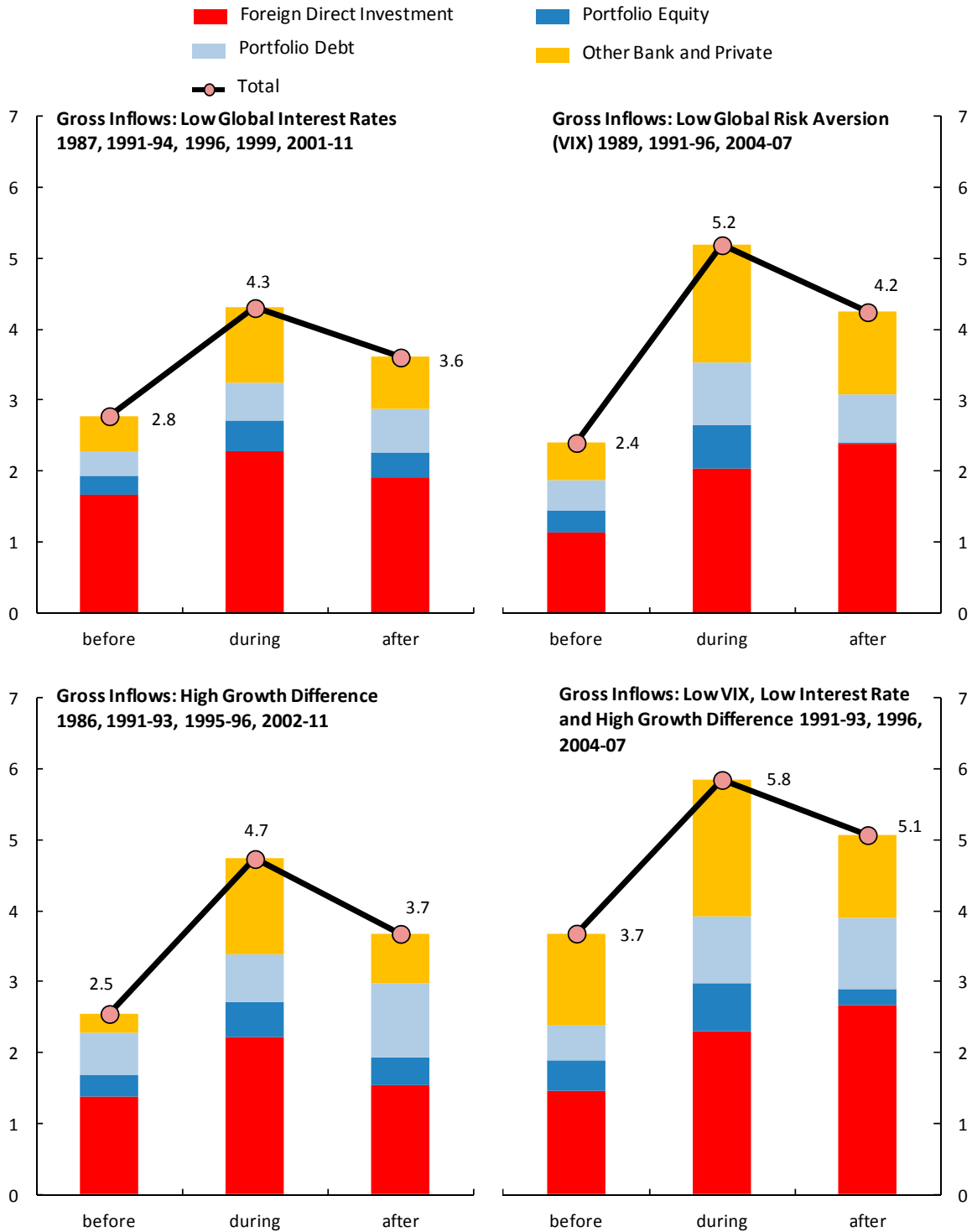


Bank as well as portfolio debt flows also had a prominent role to play in driving the dynamics of capital flows to advanced economies under alternative scenarios. The fall in net flows to advanced economies during periods of low risk aversion is mimicked primarily by bank flows, and to a smaller extent by FDI flows. In contrast, net portfolio debt flows increase for advanced economies during relatively weak economic conditions, possibly reflecting greater external borrowing when economic conditions are worse.

Are the characteristics of net flows to emerging market economies also observed in gross flows (Figure 15)?<sup>20</sup> We find that the dynamics in net flows are largely driven by those of gross inflows in terms of both the level and the drivers of flows under alternative scenarios. Although gross outflows also tend to increase for emerging markets during these scenarios compared to the periods before and after, their size is smaller, such that net flows are largely driven by the behavior of foreign investors.

<sup>20</sup> The results with gross outflows are not presented here, but available upon request.

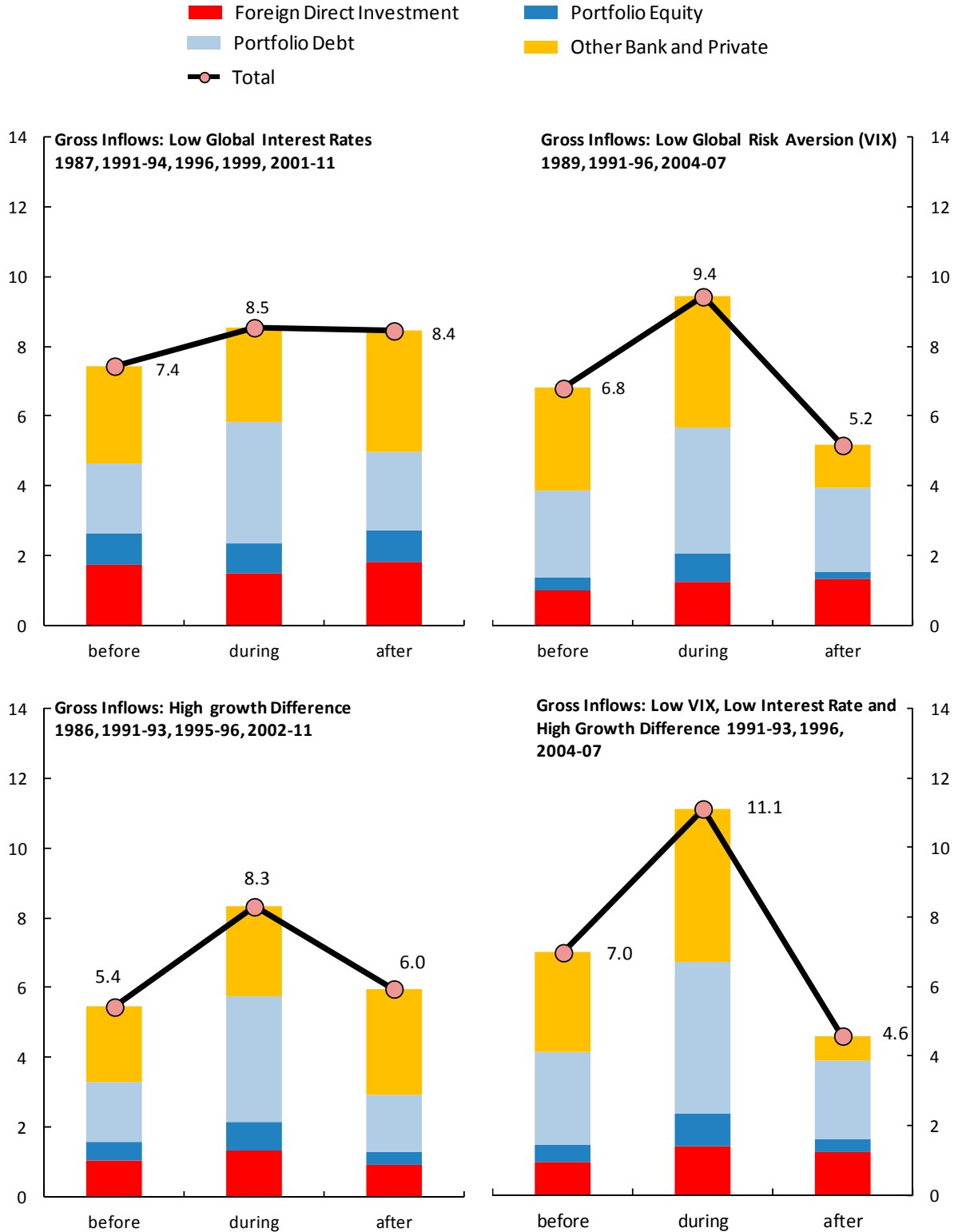
**Figure 15. Emerging Market Economies: Gross Capital Inflows**



The picture is somewhat different for advanced economies (Figure 16). Gross inflows to advanced economies also increase when global risk aversion is low, suggesting that gross outflows—proxying for residents investing abroad—increase by more. Thus, the behavior of both domestic residents’ investment abroad, and foreigners’ investment inwards together

determine the dynamics of net flows under alternative scenarios, such that the latter do not always mimic the behavior of gross inflows.

**Figure 16. Advanced Economies: Gross Capital Inflows**





## V. CONCLUSIONS

This paper presents a comprehensive database of gross and net capital flows for a large sample of countries, and documents the behavior of capital against a backdrop of increasing financial globalization in the past few decades. We find, first, that capital flow volatility is a fact of life for all economies—advanced, emerging market, and developing. Increasing volatility of capital flows over time is largely driven by the volume of flows, as each incremental unit of net or gross flow relative to GDP is not becoming more volatile.

Second, advanced economies enjoy greater substitutability between alternative types of flows, and complementarity between inflows and outflows than do emerging market and developing economies. This partly explains why the volatility of total net flows for advanced economies is largely similar as that of emerging markets and developing economies, despite the generally higher volatility of most of the components of flows.

Third, low persistence or predictability of capital flows is also a fact of life for all economies. With the exception of FDI flows, which tend to be more persistent than other kinds of flows, at least for emerging market and developing economies, there is not much difference in persistence across the different types of flows.

Finally, easy global financing conditions—with relatively low interest rates in advanced economies, and high investor risk appetite—generally see temporary tides of capital flows. Gross flows—of foreigners investing in, and residents investing out—rise when global interest rates and risk aversion are low, and reverse when they are high. For emerging markets however, gross outflows are too small to offset the sharp rise in gross inflows during such conditions, such that net flows are largely driven by foreign investors. For advanced economies, both foreigners and domestic residents increase their cross-border investment when global financing conditions are easy, such that net flows are more stable.

The findings of the paper suggest that the high variability and low predictability of capital flows is pervasive across all economies and will likely continue in a climate of increasing financial globalization. Thus, emerging market economies are not subject to any greater fickleness in capital flows than advanced economies. As such, policymakers everywhere will need to live with this volatility and use macroeconomic and macroprudential measures that help maintain overall economic and financial resilience to such volatility.

## REFERENCES

- Albuquerque, Rui, 2003, “The Composition of International Capital Flows: Risk Sharing Through Foreign Direct Investment,” *Journal of International Economics*, Vol. 61, pp. 353–83.
- Arslanalp, Serkan, and Takahiro Tsuda, 2012, “Tackling Global Demand for Advanced Economy Sovereign Debt,” IMF Working Paper 12/284.
- Becker, Chris, and Clare Noone, 2009, “Volatility and Persistence of Capital Flows,” Reserve Bank of Australia Research Discussion Paper No. 2009–09 (Sydney: Reserve Bank of Australia). Available at <http://www.rba.gov.au/publications/rdp/2009/pdr/rdp2009-09.pdf>.
- Broner, Fernando, and Roberto Rigobon, 2006, “Why Are Capital Flows So Much More Volatile in Emerging than in Developed Countries?” in *External Vulnerability and Preventive Policies*, ed. by Ricardo Caballero, César Calderón, and Luis Céspedes (Santiago: Central Bank of Chile).
- Broner, Fernando, Tatiana Didier, Aitor Erce and Sergio Schmukler, 2013 “Gross Capital Flows: Dynamics and Crises”, *Journal of Monetary Economics*, No. 60, pp. 113–33.
- Calvo, Guillermo A., Eduardo Fernández-Arias, Carmen Reinhart, and Ernesto Talvi, 2001, “The Growth-Interest Rate Cycle in the United States and its Consequence for Emerging Markets,” Research Department Working Paper No, 458 (Washington: Inter-American Development Bank). Available at [www.iadb.org/res/publications/pubfiles/pubWP-458.pdf](http://www.iadb.org/res/publications/pubfiles/pubWP-458.pdf).
- Claessens, Stijn, Michael Dooley, and Andrew Warner, 1995, “Portfolio Capital Flows: Hot or Cold?” *World Bank Economic Review*, Vol. 9, No. 1, pp. 153–74.
- Forbes, Kristin J., and Francis E. Warnock, 2012, “Capital Flow Waves: Surges, Stops, Flight, and Retrenchment” *Journal of International Economics* No. 88, pp. 235–51.
- Fratzscher, Marcel, 2011, “Capital Flows, Push versus Pull Factors and the Global Financial Crisis,” NBER Working Paper No. 17357.
- International Monetary Fund (IMF), 2000, “Offshore Financial Centers,” IMF Background Paper (Washington). Available at: <http://www.imf.org/external/np/mae/osshore/2000/eng/back.htm>.
- , 2011a, “Recent Experiences in Managing Capital Flows: Cross-Cutting Themes and Proposed Guidelines for Emerging Markets”.

- , 2011b, “International Capital Flows: Reliable or Fickle”, *World Economic Outlook*, April, Chapter 4, pp. 125–63.
- , 2013, “Guidance Note for the Liberalization and Management of Capital Flows.”
- Levchenko, Andrei, and Paolo Mauro, 2007, “Do Some Forms of Financial Flows Help Protect Against Sudden Stops?” *World Bank Economic Review*, Vol. 21, No. 3, pp. 389–411.
- Lipsey, Robert, 1999, “The Role of Foreign Direct Investment in International Capital Flows,” NBER Working Paper No. 7094.
- , 2001, “Foreign Direct Investment in Three Financial Crises,” NBER Working Paper No. 8084.
- Milesi-Ferretti, Gian Maria, and Cédric Tille, 2011, “The Great Retrenchment: International Capital Flows during the Global Financial Crisis,” *Economic Policy*, Vol. 66, pp. 28–346.
- Ostry, Jonathan D., Atish R. Ghosh, Karl Habermeier, Marcos Chamon, Mahvash S. Qureshi, and Dennis B.S. Reinhart, 2010, “Capital Inflows: The Role of Controls,” IMF Staff Position Note No. 10/04 (Washington: International Monetary Fund).
- Ostry, Jonathan D., Atish R. Ghosh, Karl Habermeier, Luc Laeven, Marcos Chamon, Mahvash S. Qureshi, and Annamaria Kokenyne, 2011, “Managing Capital Inflows: What Tools to Use?” IMF Staff Discussion Note, *forthcoming* (Washington: International Monetary Fund).
- Prasad, Eswar, Kenneth S. Rogoff, Shang-Jin Wei, and Ayhan Kose, 2003, “Effects of Financial Globalization on Developing Countries: Some Empirical Evidence,” IMF Occasional Paper No. 220 (Washington: International Monetary Fund).
- Sarno, Lucio, and Mark Taylor, 1999, “Hot Money, Accounting Labels and the Permanence of Capital Flows to Developing Countries: An Empirical Investigation,” *Journal of Development Economics*, Vol. 59, No. 2, pp. 337–64.
- , 1999, “Moral Hazard, Asset Price Bubbles, Capital Flows, and the East Asian Crisis: The First Tests,” *Journal of International Money and Finance*, Vol. 18, pp. 637–57.
- Smith, Katherine A., and Diego Valderrama, 2009, “The Composition of Capital Inflows When Emerging Market Firms Face Financing Constraints,” *Journal of Development Economics*, Vol. 89, No. 2, pp. 223–34.

## VI. APPENDIX I. DEFINITION OF COUNTRY GROUPS

The sample of countries is classified into three economy groups--advanced, emerging, and other developing economies (see Appendix Table 1):

- Advanced economies correspond to the IMF 1990 WEO definition of industrial economies, or the member countries of the Organization of Economic Cooperation (OECD) before 1990, with the exception of Turkey.
- For emerging economies, we follow the definition used in IMF (2011b) for the classification of emerging economies. They are the non-advanced economies used in the regional analysis in IMF's World Economic Outlook under emerging Asia, emerging Europe, Latin America and the Caribbean, Commonwealth of Independent States (CIS), Middle-East and North Africa, and sub-Saharan Africa. However, this group excludes economies that are low-income (eligible for assistance under the IMF's Poverty Reduction and Growth Trust) or relatively small (with nominal GDP in U.S. dollars averaged over 1990 to 2009 less than the median GDP based on all emerging and developing economies in the sample).
- All other economies are defined as other developing economies (ODEs).

The above classification results in a sample of emerging economies that are largely covered by the universe of external sources, such as Morgan Stanley Capital International (MSCI), *The Economist*, and Dow Jones & Company. In addition, economies that are classified as advanced today but were not in 1990 are included in the sample of emerging economies. These include Cyprus, the Czech Republic, Malta, Estonia, the Slovak Republic, Slovenia, and the newly industrialized Asian economies. The analyses exclude offshore financial centers as defined by the Financial Stability Forum (Table 2 in IMF, 2000). These are Antigua and Barbuda, Bahrain, Barbados, Belize, Costa Rica, Cyprus, Hong Kong SAR, Lebanon, Luxembourg, Malta, Mauritius, Panama, Seychelles, Singapore, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Switzerland, and Vanuatu.

Appendix Table 1. Economy Groupings

<u>Advanced Economies</u>	<u>Emerging Asia</u>	<u>Emerging Latin America</u>	<u>Other Developing Economies</u>
Australia (193) *	China (924) *	Argentina (213) *	Albania (914)
Austria (122) *	Hong Kong SAR (532) *	Brazil (223) *	Antigua and Barbuda (311)
Belgium (124) *	India (534) *	Chile (228) *	Bahrain (419)
Canada (156) *	Indonesia (536) *	Colombia (233) *	Bangladesh (513)
Denmark (128) *	Korea (542) *	Costa Rica (238) *	Barbados (316)
Finland (172) *	Malaysia (548) *	Dominican Republic (243)	Bolivia (218)
France (132) *	Philippines (566) *	Ecuador (248) *	Botswana (616)
Germany (134) *	Singapore (576) *	El Salvador (253) *	Cameroon (622)
Greece (174) *	Sri Lanka (524)	Guatemala (258) *	Cape Verde (624)
Iceland (176) *	Taiwan Province of China (528) *	Mexico (273) *	Côte d'Ivoire (662)
Ireland (178) *	Thailand (578) *	Panama (283)	Dominica (321)
Italy (136) *		Peru (293) *	Ethiopia (644)
Japan (158) *	<u>Emerging Europe</u>	Uruguay (298) *	Fiji (819)
Luxembourg (137) *	Bulgaria (918) *	Venezuela (299)	Ghana (652)
Netherlands (138) *	Croatia (960) *		Grenada (328)
New Zealand (196) *	Cyprus (423) *	<u>Other Emerging Economies</u>	Haiti (263)
Norway (142) *	Czech Republic (935) *	Algeria (612)	Honduras (268)
Portugal (182) *	Estonia (939) *	Azerbaijan (912)	Jamaica (343)
Spain (184) *	Hungary (944) *	Belarus (913) *	Kenya (664)
Sweden (144) *	Latvia (941) *	Egypt (469) *	Lesotho (666)
Switzerland (146) *	Lithuania (946) *	Israel (436) *	Maldives (556)
United Kingdom (112) *	Malta (181) *	Jordan (439) *	Mauritius (684)
United States (111) *	Poland (964) *	Kazakhstan (916) *	Mozambique (688)
	Romania (968) *	Kuwait (443)	Nepal (558)
	Slovak Republic (936) *	Lebanon (446)	Nicaragua (278)
	Slovenia (961) *	Libya (672)	Nigeria (694)
	Turkey (186) *	Morocco (686) *	Papua New Guinea (853)
		Oman (449)	Paraguay (288)
		Pakistan (564)	Rwanda (714)
		Russia (922) *	Seychelles (718)
		Saudi Arabia (456)	Sierra Leone (724)
		South Africa (199) *	Solomon Islands (813)
		Syria Arab Republic (463)	St. Kitts and Nevis (361)
		Tunisia (744)	St. Lucia (362)
		Ukraine (926) *	St. Vincent and the Grenadines (364)
		United Arab Emirates (466)	Suriname (366)
			Swaziland (734)
			Tanzania (738)
			Uganda (746)
			Vietnam (582)

Note: \* indicates advanced and emerging market economies included in the analysis at a quarterly frequency.