Capital Flow Waves—or Ripples?
Extreme Capital Flow Movements in an Era of
Easy Monetary and Tight Macroprudential Policy*

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Abstract: Has the occurrence of "extreme capital flow movements"—episodes of sudden surges, stops, flight and retrenchment—changed during the last decade of easy monetary policy and tight macroprudential policy? This paper addresses this question by updating and building on the dataset and methodology introduced in Forbes and Warnock (2012) to calculate the occurrence of sharp capital flow movements by foreigners and domestics into and out of individual countries. The results suggest that the occurrence of these extreme capital flow movements has not increased since the Global Financial Crisis (GFC). The drivers of these episodes, however, appear to have changed since the GFC. Extreme capital flow movements are less correlated with change in global risk, and are more difficult to explain with basic global, regional and domestic variables. What used to be large global "waves" in international capital flows have more recently become idiosyncratic "ripples". These results do not support arguments that unconventional monetary policy and low interest rates have aggravated the global financial cycle, but are consistent with arguments that tighter regulatory requirements and the more active use of macroprudential policy could play a role in mitigating the effects of the global financial cycle on variables such as cross-border capital flows.

JEL Codes:

Key Words: capital flows, surges, stops, quantitative easing

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I. Introduction

The global financial landscape has changed fundamentally since the Global Financial Crisis (GFC)—from the widespread use of "unconventional" monetary policy tools, to the extended period of extremely low interest rates in advanced economics, to the greater use of prudential and macroprudential policies. Each of these changes could affect cross-border capital flows, either aggravating or mitigating the sharp movements in capital flows that can create an array of challenges. Concerns about capital flow volatility have motivated an extensive academic literature, with a seminal analysis in Calvo (1998) defining "sudden stops" as periods when net capital flows decline sharply. Forbes and Warnock (2012) extended this framework to focus on changes in gross capital flows, identifying sharp increases and decreases in capital flows by foreigners and domestics (instead of aggregating them), and showed that this more comprehensive identification strategy yielded important insights on the occurrence, patterns, and drivers of extreme capital flow movements.[1] This approach, and/or the corresponding data set of "capital flow waves", was subsequently used in a number of papers to address a variety of questions.[2] Extending this dataset, however, was complicated by a transition to new global standards for capital flow data over the subsequent years. This paper extends the dataset on capital flows and episodes from Forbes and Warnock (2012) and shows that over the last decade there have been noteworthy changes in the incidence, and especially the drivers, of these extreme capital flows episodes. Since the GFC, capital flows have moved more in "ripples" rather than "waves", and these ripples were driven less by changes in risk measures and other global developments.

Forbes and Warnock (2012) characterized four types of extreme capital flow episodes based on gross flows—surges, stops, flight and retrenchment—and showed important ways in which these episodes were fundamentally different than those based on net flows. More specifically, the incidence of episodes varies meaningfully depending on whether they are defined based on gross or net flows—with definitions based on net flows often counterintuitive. For example, during the height of the GFC, identification based on net flows suggested that there were a large number of *surge* episodes—i.e., that countries were receiving abnormally high amounts of net capital inflows during the worst financial crisis in generations—but very few *stop* episodes (i.e, that investor appetite to invest abroad was unaffected). This seemingly puzzling behavior makes sense, however, if episodes are defined based on

[1] For surveys of the empirical capital flows literature, see Koepke (2019) and Hoggarth, Jung and Reinhardt (2016).
[2] See, among others, Benigno et al. (2015), Cavallo et al. (2015), Bianchi and Mendoza (2018), Mercado (2019), Scheubel et al. (2019), Li et al. (2019), Malmendier et al. (forthcoming) and Bandaogo and Chen (forthcoming).

gross flows. Using this approach during the GFC, there were essentially no surges of inflows by foreigners and many sudden stops of inflows by foreigners, but in many cases these were masked by a "retrenchment" as many countries' residents brought previous investments home from abroad. In other words, the puzzling behavior of net capital inflows was driven more by the behavior of domestics than foreigners.[3] Another important insight from using gross capital flows (instead of net) to identify episodes is that it suggested different factors were associated with sharp capital flow movements. For example, global risk—a variable shown to play a pivotal role in a wide array of financial decisions—was associated with all types of extreme capital flow episodes based on gross flows, but not significantly related to either surges or stops based on the traditional approach using net flows.[4]

While a number of papers have built on Forbes and Warnock (2012) and used the corresponding flow data, episode definitions and broader approach, one challenge for more recent work is that the underlying flows dataset was created at a time when global standards for collecting capital flow data were transitioning from BPM5 to BPM6, making the underlying dataset quite difficult to extend.[5] That transition has now been completed, greatly improving the availability of long quarterly time series on gross flows. Moreover, almost a decade has passed since the analysis in Forbes and Warnock (2012), and the global economic environment has changed in many ways. To help motivate research on these changes, this paper compiles an updated data set on quarterly flows and calculates the corresponding extreme capital flow episodes. The new dataset includes revised data and extends the dataset by 10 years (previously from 1980q1 – 2009q1, now ending in 2018q4) for 28 advanced economies and 33 emerging markets, with a corresponding set of extreme capital flow episodes (beginning in 1985q4 because the methodology to identify episodes requires 24 quarters of flow data). The dataset is posted online and available at https://mitmgmtfaculty.mit.edu/kjforbes/research/. This paper also replicates parts of the analysis from Forbes and Warnock (2012), as preliminary evidence on what may have changed over the last decade.

There are many reasons to re-examine the incidence and drivers of extreme capital flow episodes—and several reasons why key relationships may have changed (see Avdjiev et al., 2017). "Sudden surges" of capital inflows can lead to substantial challenges, such as asset price bubbles, an inefficient allocation

[3] In fact, each country defined as having a surge episode based on the net flows data – but not using the gross data – had a retrenchment episode.

[4] For examples of the important role for risk found in subsequent work, see Rey (2013), Bruno and Shin (2015), Barrot and Servén (2017), and Goldberg and Krogstrup (2018). For an opposing view on the role of risk, see Cerutti, Claessens, and Rose (forthcoming).

[5] For a short primer on the transition from BPM5 to BPM6, see Warnock (2017).

of resources, and currency appreciation that hurts export competitiveness. Large increases in capital inflows also increase vulnerabilities to the inevitable "sudden stop" that follows--when the abundant capital inflows reverse and correspond to sharp falls in asset prices and currency depreciations, which in turn feed into high inflation and increased challenges repaying foreign borrowing.[6] These challenges from volatile capital flows are particularly imposing for countries with weaker institutions and financial systems. Understanding what variables drive capital flow volatility, and if those relationships have changed, is therefore of primary importance to countries around the world, particularly EMEs.

Moreover, over the last decade, many of the factors that are widely believe to affect the volumes and volatility of global capital flows have fundamentally changed. The volume of cross-border capital flows is meaningfully smaller than before the crisis and less dominated by bank flows—one of the more volatile types of flows. One factor behind this reduction in cross-border flows (particularly of banks) is tighter prudential requirements and a greater use of macroprudential policies.[7] Has this reduced the volatility of capital flows and incidence of sharp capital flow movements? At the same time, many AEs have reduced their policy interest rates to around zero and adopted "unconventional" monetary policies to provide additional stimulus and promote recovery from the GFC. Has this extended period of low interest rates and "unconventional" policies stimulated excessive volumes and volatility in global capital flows—a concern raised by senior policymakers?[8] Over the last decade commodity prices have been unusually volatile, emerging markets have become more important drivers of global growth, and many measures of uncertainty have been unusually elevated (Forbes 2019). Have the factors that drive capital flow episodes changed post-GFC? For example, Goldberg and Krogstrup (2019) suggest risk measures have played a less prominent role in driving capital flows over the last decade and that the global financial cycle has been dampened.[10]

To answer these questions, this paper begins by drawing on the data and methodology developed in Forbes and Warnock (2012). It begins by updating and extending the quarterly data on gross capital inflows and outflows by foreigners and domestics through 2018q4, supplementing IMF

[6] On the costs (and benefits) of capital flows, see Prasad et al. (2003) and Henry (2007).
[7] For evidence, see Aiyar et al. (2014) and Forbes et al. (2017).
[8] Examples of these concerns by senior policymakers are: the "currency wars" raised by Guido Mantega (former Finance Minister of Brazil), the "monetary tsunami" discussed by Dilma Rousseff (former President of Brazil), and the G-7 statement establishing ground rules to address the potential effects on exchange rates of different monetary policy tools (Group of Seven, 2013, "Statement by G7 Finance Ministers and Central Bank Governors," February 12, available at: www.g8.utoronto.ca/finance/fm130212.htm)
[10] This is supported by evidence in Cerutti, Claessens, and Rose (forthcoming), which focuses on evidence that risk has played a less prominent role over longer periods (and not just the last decade) than previously thought.

data from the Balance of Payments Statistics with country-specific sources and then addressing gaps when possible (as done in the initial data compilation). Then it uses the methodology in Forbes and Warnock (2012) to identify four types of "extreme" capital flow episodes (surges, stops, flight and retrenchment), based on when domestic or foreign investors substantially increase or decrease capital flows into or out of a country. This not only extends the dates for which episodes are available, but also provides updated episodes for the pre-crisis window (during which data revisions change the dating of episodes for some countries).[11] Next it follows Forbes and Warnock (2014) by identifying if these episodes were debt- or equity-led, and then also tests if they are led by portfolio flows (equity and debt) or banking flows.

Adding the new years, countries, and observations to the dataset in Forbes and Warnock (2012) also allows us to answer a new question that was not possible in the earlier work: have the patterns of extreme capital flow movements and their relationship with global variables (such as monetary policy) changed since the 2008 crisis? Do the patterns support arguments that a period of unprecedented easy monetary policy in advanced economies (both from low interest rates and a new set of unconventional policy tools) has driven "surges" of capital to emerging markets, and subsequently provoked "sudden stops" when the easy monetary policy began to be reversed? Or do the patterns support arguments that tighter prudential regulations and a wider use of macroprudential tools should reduce the volatility of cross-border capital flows and better insulate banks and broader economies from changes in risk measures and other global financial factors?

The results suggest that capital flow episodes continue to be bunched together during certain periods (in what were called "waves" in Forbes and Warnock, 2012), but that over the last decade there is a lower incidence of extreme capital flow movements for the sample as a whole. Episodes have been occurring more in "ripples" than "waves". The largest "ripples" that have occurred since 2009 were in 2015, when the U.S. Federal Reserve raised the Fed Funds rate for the first time in nearly a decade: 24% of countries experienced a sudden stop and 22% experienced a retrenchment. These incidence rates are much smaller than the peaks during the pre-crisis period (of 32% and 33%, respectively) and well less than the peaks during 2008-2009 (of 79% and 64%, respectively). When focusing just on EMEs, the incidence patterns are often higher and closer to those pre-2008 period, particularly during 2015. More

[11] There are some minor differences in the dating of the earlier episodes, primarily reflecting updated data on capital flows—and the transition to BPM6 standards—since the original analysis done in 2011. The main patterns on the incidence of different episodes across the sample, as well as the main regression results in Forbes and Warnock (2012, 2014), are robust to these updates.

specifically, in 2015 43% of EMEs experienced a sudden stop episode, less than the 79% during the peak of the 2008-2009 crisis, but more than the pre-crisis peak of 31%. If we compare the period from 2010-2018 with the 8 years before the crisis, we find no evidence of increased incidence of extreme capital flow events, and some evidence of a decrease. The waves of global capital flows, which turned into a tsunami during 2008-9, have been more ripples since then. Also, as in Forbes and Warnock (2014), the vast majority of all four types of episodes are "debt-led", with the episodes corresponding to large changes in debt rather than equity flows.

After examining changes in the pattern and types of capital flow episodes, the analysis shifts to understanding if the drivers of these episodes have changed since the GFC. These empirical tests should be interpreted cautiously as the window of only a decade is fairly short to assess financial cycles, but the results suggest that the relationship between extreme capital flow episodes and the global variables (particularly global risk measures) has weakened. In fact, it appears to be more difficult to explain extreme capital flow episodes over the last decade in general. Key results over the full sample period (1985-2018) are similar to those from Forbes and Warnock (2012) for 1985-2009), however, so that it is impossible to ascertain if the role of many factors has changed post-crisis or the post-crisis sample (just 32 quarterly data points per country) is too small to precisely estimate coefficients. Nonetheless, the results to date are more supportive of arguments that tighter prudential and macroprudential policy may have muted the volatility in cross-border capital flows and their sensitivity to changes in the global environment, even in an era of extremely accommodative monetary policy in advanced economies and sharp volatility in commodity prices.

The remainder of the paper is as follows. Section II discusses the updated data and reviews the methodology to calculate the capital flow episodes. Section III reports the updated set of episodes and then assesses if their incidence has changed in the era of unconventional monetary policy for the full sample, different types of capital flows, and different groups of countries. It also assesses if the types of capital flows driving these episodes has changed. Section IV estimates if the sensitivity of capital flows to changes in global variables (such as monetary policy and risk measures), regional contagion and domestic growth has changed since the crisis. Section V concludes.

II. Data, Methodology and Updated Episodes

In order to update the episodes of extreme capital flow movements, we begin by updating the underlying data in Forbes and Warnock (2012) on gross capital inflows and outflows, in aggregate and for four types of disaggregated flows (foreign direct investment, portfolio equity, portfolio debt, and bank/other). Since the data was initially compiled in 2010, the IMF has transitioned from BPM5 to BPM6 standards. The dataset used for this paper is entirely based on BPM6 standards.

For this analysis, we pulled quarterly BPM6 flow data on August 26, 2019 from Haver Analytics' IMF International Financial Statistics (IFS) database for a wide range of countries (86 in all). Then we excluded countries with large gaps or limited time series, leaving 58 countries. Where BPM5 data existed but BPM6 data did not—typically very early in the sample—we used BPM5 to plug holes; this occurred in about 500 instances (out of 10,000 observations), or roughly 10 times per country. Taiwan is excluded from the IFS, so we collected Taiwan data from its central bank's web site.[12] Two countries, Norway (1992-93) and Poland (1995-99), have gaps in quarterly data but complete annual data. For these countries and just for those years, we converted annual data to a quarterly frequency simply by placing one-fourth of the annual numbers in each quarter.

We also filled in gaps or removed suspect data for a number of countries. For example, for Slovenia's portfolio inflows in 1994, we used data from the Bank Slovenia website to replace NAs. We dropped data for several countries prior to certain dates because of too many gaps: Greece (dropped data prior to 1999), Bolivia (dropped data prior to 1988), Peru (dropped data prior to 1999), South Africa (dropped data prior to 1985), Taiwan (dropped data prior to 1987Q4) and India (dropped outflow data prior to 2000). Some countries had some NAs between strings of zeros; we filled those in with zeros. These include: FDI outflows for Guatamala (1995-96) and Bangladesh (2001Q3 and Q4); portfolio outflows for Thailand (1992) and Indonesia (1995Q2-Q4); and other outflows for Indonesia (1995Q2-Q4). We dropped Nicaragua completely because of gaps early in the sample and then also from 2009 to 2013; the resulting series was too short to be useful. Finally, to have as complete a dataset as possible through 2018Q4, in instances where recent data were not yet in IFS but were available from published

[12] See https://www.cbc.gov.tw/public/data/economic/statistics/bop/english/hist_eAQ.xls for quarterly historical data and http://www.cbc.gov.tw/public/data/economic/statistics/bop/english/eAQ.xls for more recent data.

national sources, we supplemented IFS using national sources. In this draft, this pertains only to inflows for Sri Lanka, which end in 2017 in the IFS data but are available for each quarter of 2018.[13]

Following this approach yields a quarterly sample of 58 countries covering the years from 1980q1-2018q4. Appendix Table 1 reports the sample and country coverage. This dataset has the same number of countries as Forbes and Warnock (2012), but the current sample no longer includes Nicaragua and has added Costa Rica. Relative to the original study, there is slightly better coverage of historic data on capital flows for several countries, plus an additional 9 years of data (2010-2018) for almost every country in the sample.[15] It is worth highlighting, however, that even though the sample coverage is similar (plus the additional years of data), there have been a large number of revisions to historic capital flow data. As will be discussed below, in some cases these revisions are large enough to affect the dates of different types of episodes for individual countries, although they do not appear to meaningfully affect any key results from the earlier analysis.

Next, we use this data on gross capital inflows and outflows to calculate periods of "extreme" capital flow movements. We follow the methodology developed in Forbes and Warnock (2012), which makes three advances on the earlier literature: (1) uses data on actual flows instead of current-account-based proxies for flows; (2) uses data on gross flows to identify episodes, rather than relying on proxies for net flows; and (3) analyzes both large increases and large decreases of both inflows and outflows, instead of just focusing on increases or decreases, in order to improve our understanding of all types of capital flow episodes. More specifically, it uses quarterly gross flows data to identify four types of episodes:

- "Surges": a sharp increase in gross capital inflows by foreigners;
- "Stops": a sharp decrease in gross capital inflows by foreigners;
- "Flight": a sharp increase in gross capital outflows by domestic investors; and
- "Retrenchment": a sharp decrease in gross capital outflows by domestic investors.

We calculate year-over-year changes in four-quarter gross capital inflows and outflows and define episodes using three criteria: (1) current year-over-year changes in four-quarter gross capital inflows or outflows is more than two standard deviations above or below the historic (5-year moving) average

[13] Data accessed at https://www.cbsl.gov.lk/en/statistics/statistical-tables/external-sector. We could not find Sri Lankan outflows data for 2018.
[15] The one exception is Venezuela, which does not have reported data for 2017 or 2018.

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 deviation above or below the historical average; and (3) the length of the episode is greater than one quarter.[16]

More specifically, consider the calculation of surge and stop episodes. Let C_t be the 4-quarter moving sum of gross capital inflows (GINFLOW) and compute annual year-over-year changes in C_t:

$$C_t = \sum_{i=0}^{3} GINFLOW_{t-i} \ , \qquad \text{with} \quad t = 1, 2, \ldots, N \quad \text{and} \qquad (1)$$

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

Next, compute rolling means and standard deviations of ΔC_t over the last 5 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, in order 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 its mean, provided it reaches two standard deviations below at some point. The episode ends when gross inflows are no longer at least one standard deviation below its mean. Episodes of flight and retrenchment are defined similarly, but using gross private outflows rather than gross inflows.

It worth highlighting that this methodology, used first for *net flows* by Calvo (1998), is one that highlights the tails of ΔC_t. Because the criteria used to identify an episode takes into account the volatility of a particular country's ΔC_t, it is not more volatile flows per se that would lead to more episodes. Rather, for a country to have more episodes than usual (in either the time series or cross-sectional sense), its ΔC_t must have more outliers (e.g., fatter tails).

This methodology yields a series of episodes of sudden surges, stops, flight and retrenchment, reported in Appendix Table 2.[17] These are the basis of the following analysis.

[16] Summing capital flows over four quarters is analogous to the traditional literature's focus on one year of flows and also eliminates the impact of seasonal fluctuations. The historical average and standard deviation are calculated over the last five years (20 quarters), which means that episodes are always defined relative to the recent past.

[17] Most of the episodes for the pre-2010 period are similar to those calculated in Forbes and Warnock (2012). For some countries, there are changes to the start and end dates of episodes, and in a few cases in the occurrence of episodes. These changes primarily reflect revisions to the capital flow data, with a few changes reflecting adjustments to the coding to calculate the episodes. In an earlier draft of this paper that used capital flow data

III. Extreme Capital Flow Episodes: Before and After the Crisis

This section examines if there has been a significant change in the incidence of surge, stop, flight or retrenchment episodes over the last decade as compared to previous periods. A significant change in the incidence in episodes could be driven by a number of factors—such as changes in monetary policy, changes in the types of capital flows, changes in macroprudential regulations, changes in relative growth rates of borrowing and lending nations, or any of the other changes that have occurred in the global or local economies since the crisis. This section will only document whether there have been changes in the frequency of episodes (for the full sample and then just emerging markets), while the next section looks more closely at whether the drivers of these episodes have changed. This section ends by extending the analysis to examine if the episodes are more common for specific types of capital flows (debt, equity, portfolio flow, or banking), which of these types of capital flows has tended to drive the episodes, and if any of these relationships has changed over time.

To begin, Figure 1a graphs the incidence of sudden surges, stops, flight and retrenchment over the full sample period from 1985q1 to 2018q4 for the full sample of countries, based on the episode definitions from Section II. It shows that capital flow episodes are not evenly distributed across time and continue to be bunched together in what Forbes and Warnock (2012) called "waves". There does not, however, appear to be any increase in the incidence of these extreme capital flow episodes since 2009. Instead, there seems to be a lower incidence of extreme capital flow episodes over the last decade—so that episodes occur more in "ripples" than "waves". The largest "ripples" of sudden stops and retrenchment that have occurred since 2009 were in 2015, when the U.S. Federal Reserve raised the Federal Funds rate for the first time in nearly a decade: the peak share of countries experiencing a sudden stop was 24%, and a retrenchment was 22%, in any quarter. This is smaller than the peaks during the pre-crisis period (of 32% and 33%, respectively) and far less than the peaks during 2008-2009 (of 79% and 64%, respectively). Figure 1a suggests that the incidence of extreme capital flow episodes is more muted since the GFC.

These graphs, however, include both AEs as well as EMEs, and EMEs may have experienced sharper movements in capital flows since the GFC as many AEs lowered interest rates to their effective lower bounds and adopted unconventional monetary policy. Therefore, Figure 1b repeats the same analysis as

accessed only five months before this draft, data revisions led to a number of changes in episode definitions, highlighting the role of revisions in the precise timing of episodes.

in Figure 1a, except now excludes AEs in order to show the share of EMEs in the sample that experienced sudden surges, stops, flight and retrenchment episodes.[18] The general pattern of "waves" for EMEs mimics the general patterns for AEs, except the share of countries experiencing episodes is often higher for the emerging economies and there is less evidence that the "waves" have become more muted since the GFC. More specifically, in 2015 43% of EMEs experienced a sudden stop episode, far less than 79% during the peak of the 2008-2009 crisis, but more than the pre-crisis peak of 31%. The occurrence of other episodes, however, looks very similar to that of the pre-2008 window.

To more formally examine if the incidence of different types of extreme capital flow episodes has changed since the crisis, the top block of Table 1 shows the average incidence for each of the four episodes, for the full sample and then just EMEs, over four windows: the full sample, from 1985-2009, 2000-2007, and 2010-2018. The last period captures patterns when many advanced economies lowered interest rates to around zero (and in many cases below) and adopted "unconventional" monetary policy. The table does not show any increase in the incidence of any of the four types of episodes in this later window relative to the full sample or pre-crisis period. There is also no meaningful increase in episodes relative to a roughly comparable 8-year window from 2000-2007, an era with large volumes of capital flows. In fact, focusing just on EMEs, there is a much lower incidence of surge and flight episodes over the post-crisis window than the 8 years before the crisis, and roughly the same incidence of stop and retrenchment episodes. In other words, there is no evidence of increased incidence of extreme capital flow events. The waves of global capital flows, which turned into a tsunami during 2008-9, have been more ripples since then.

Does this relatively calm period of capital flow waves reflect changes in the composition of capital flows? For example, if certain types of capital flows (such as bank flows) have decreased (as shown in Forbes et al., 2018), and these types of flows are an important driver of sharp movements in capital flows (as shown in Forbes and Warnock, 2014), then this relatively calmer period for aggregate global capital flows could still mask substantial volatility for certain types of flows. To test this and better understand the role of different types of capital flows in overall capital flow volatility, we perform two analyses: we evaluate if the types of capital flows driving these episodes of extreme capital flows movements has changed, and then if there are more (or less) episodes of extreme capital flows movements for specific types of flows since the crisis.

[18] Emerging markets are defined using BIS definitions.

To perform these tests, we use the set of extreme capital flow episodes calculated above combined with the methodology in Forbes and Warnock (2014) to calculate if the episodes are "led" by certain types of capital flows. We define an episode as being "led" by a type of capital flow if the change in the given type of capital flow is larger in magnitude than the change in the other types of capital flows (aggregated together). More specifically, consider a surge episode; if the increase in capital flows from foreigners (the ΔC_t in equation (2)) occurs primarily through debt flows (defined as portfolio bonds and banking flows), then the surge episode is defined as being "debt-led". In contrast, if the surge resulted mainly from an increase in equity inflows (specifically, portfolio equity and FDI), then it would be classified as an equity-led surge. We use the same approach to define equity- and debt-led stops, retrenchment, and flight. Forbes and Warnock (2014) documented that a majority of episodes before the GFC were debt-led (and not equity-led). To better understand what types of debt flows could be most important, and whether these relationships have changed, we also test if episodes are led by portfolio debt flows, banking flows, or total portfolio flows (equity and debt).

Table 2 shows the percent of each type of episode driven by these different capital flows over the same periods as Table 1: for the full period (1985-2018), for the period through the GFC (1985-2009), for a relatively tranquil 8-year period before the GFC (2000-2007), and for the post-crisis window (2010-2018). The table shows that the majority of all four types of episodes tend to be debt-led, as found in Forbes and Warnock (2014), and that this pattern has continued since the crisis. In fact, the share of surges and stops that are debt-led appear to have increased—for surges from 72% in the period through the crisis to 88% for the post-crisis period, and for stops from 60% to 81% for the same periods.

Is this prominent role for debt flows in leading extreme capital flow episodes primarily driven by portfolio debt or banking flows? To better understand the role of these two type of flows, the bottom of Table 2 repeats the same exercise, except now calculates what percent of episodes are bank-flow-led or portfolio-debt-led. The results suggest a substantially greater role for bank flows in driving extreme capital flows. For example, just over 41% of surges were bank-flow-led over the period from 2000-2007, and 44% from 2010-2018, as compared to only about 15%-of surge episodes led by portfolio debt in the comparable pre-crisis period, and only 23% since 2010. The role of banking flows in driving the different episodes, however, shows little consistent pattern—with the role fairly steady for surge and stop episodes since the crisis, but increasing for flight and retrenchment episodes (from 35%/36% to 48%/45%). Despite the decline in cross-border banking flows since 2008, these types of flows do not

appear to have played a significantly diminished role in causing sharp capital flow movements—at least for the remaining, more muted episodes.

As a final extension of this analysis, we examine the role of portfolio (equity and debt) flows in driving episodes, as these two types of flows are often believed to be more volatile than other types of flows. The right-top side of the table reports the share of episodes that are led by portfolio flows. A smaller share of extreme capital flow episodes are driven by portfolio flows (relative to for debt flows)—roughly a third for most episodes over the earlier periods. The share of surge and stop episodes driven by portfolio flows has increased since the GFC, however, reaching 45% of sudden stops and 39% of surges driven since 2010. Foreign direct investment continues to drive a small share of episodes, as would be expected given the more stable nature of this type of cross-border investment. This is far from conclusive, but this series of results is consistent with other evidence that tighter prudential and macroprudential regulations have caused some companies to shift away from bank financing and towards other forms of debt and equity funding.[20]

As a final test, we return to our standard definitions of capital flow episodes (as discussed in Section II), except now calculate if a surge, stop, flight or retrenchment occurred for the four types of disaggregated capital flows for each country in each quarter. More specifically, we calculate if there was an episode for foreign direct investment (FDI), portfolio equity, portfolio debt, or banking flows. It is then possible to graph the incidence of each type of episode for the full sample or EMEs (as in Figure 1 for aggregate capital flows), and calculate the incidence of each type of episode for each type of capital flow over different windows. These calculations are summarized in the middle and bottom of Table 1 and support the earlier conclusion that capital flows have been more "ripples" than "waves" since the crisis. The incidence of within-component surges, stops, flight and retrenchment is lower since the crisis for the full sample of countries compared to each of the earlier time periods for FDI, portfolio equity, portfolio debt, and banking flows.

The previous analysis, however, suggested that although capital flow waves have become more muted across the full sample, there is less change for EMEs. The corresponding estimates in the table show that the incidence of episodes for EMEs since the GFC is lower than or equal to the earlier periods for almost all types of capital flows and episodes. The only cells where the incidence increased by 2 percentage points or more is for surges in portfolio debt (whose incidence increased to 13% post-crisis,

[20] For example, see Ahnert et al. (2018).

as compared to 11% from 2000-2007 and 12% over the full period) and stops in banking flows (whose incidence increased to 9% in the post-crisis window, as compared to 7% from 2000-2007 and 11% over the full period). In most cases, however, the incidence of capital flow episodes decreased in the post-crisis window, including for just EMEs as well as the full sample.

IV. A Closer Look: Changing Role of Global, Contagion, and Domestic Variables

To better understand the factors behind these different types of capital flow episodes, this section tests if the relationship between key factors affecting capital flow episodes has changed since the crisis. More specifically, we build on the results in Forbes and Warnock (2012) and Rey (2013) that find a key role for global financial factors in driving global capital flows. Forbes and Warnock (2012) find a predominant role for changes in global risk and global growth, while Rey (2013) focuses on the role of global risk and changes in US monetary policy as drivers of the "global financial cycle".

Specifically, to assess the role of global, contagion, and domestic variables on the conditional probability of having a surge, stop, flight, or retrenchment episode each quarter, we follow Forbes and Warnock (2012) and estimate the model:

$$Prob(e_{it} = 1) = F\left(\mathbf{\Phi}_{t-1}^{\text{Global}}\mathbf{B}_{\text{G}} + \mathbf{\Phi}_{i,t-1}^{\text{Contagion}}\mathbf{B}_{\text{C}} + \mathbf{\Phi}_{i,t-1}^{\text{Domestic}}\mathbf{B}_{\text{D}}\right), \quad (3)$$

where e_{it} is an episode dummy variable that takes the value of 1 if country *i* is experiencing an episode (surge, stop, flight, or retrenchment) in quarter *t*; $\mathbf{\Phi}_{t-1}^{\text{Global}}$ is a vector of global factors lagged by one quarter; $\mathbf{\Phi}_{i,t-1}^{\text{Contagion}}$ is a vector of contagion variables; and $\mathbf{\Phi}_{i,t-1}^{\text{Domestic}}$ 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 (over 80 percent of the sample is zeros), $F(\cdot)$ is asymmetric. Therefore we 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:

$$F(z) = 1 - exp[-exp(z)] \ . \quad (4)$$

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.

IV.A Updated Forbes and Warnock (2012) Regressions

To begin, we use the same period that was the focus of Forbes and Warnock (2012) and, to maintain the largest sample possible, include five variables that are widely available: the same four global variables and a regional contagion variable (excluding the larger set of original domestic variables and other contagion variables). More specifically, we regress the incidence of capital flow episodes in each quarter from 1980-2009 on global risk (measured using the VXO), global liquidity (measured as the year-over-year percentage growth in the 'global' broad money supply, where global is the sum for the euro area, US, UK and Japan), global interest rates (measured as the average yield on long-term government bonds in the US, Euro area and Japan), and global growth (measured as year-over-year global GDP growth from the IMF's World Economic Outlook dataset).[21] To capture contagion effects, we also include a measure of geographic proximity, with a dummy variable equal to one if a country in the same region has the same type of episode.[22] All variables are lagged by one quarter, so the regressions assess how quarter *t-1* factors impact the probability of being in a particular type of episode (surge, stop, flight or retrenchment) in period *t*. Results are reported in Table 3 for different sample periods.

Beginning with the original sample period from Forbes and Warnock (2012), the key results (columns 1-4) are in line with the original estimates, despite several changes (revised and more complete capital flow data, corresponding changes in the episode definitions, and no controls for domestic variables or other contagion measures). The results continue to suggest that global risk, global growth, and regional contagion are significant drivers of all four types of episodes; lower risk and stronger growth are significantly correlated with surges and flight, while higher risk and weaker growth are significantly correlated with stops and retrenchment. A country is more likely to experience a specific type of episode if another country in the region is also experiencing one. Also consistent with

[21] We thank Gian Maria Milesi-Ferretti for providing the WEO data on a quarterly basis.
[22] The regions are North America, Western Europe, Asia, Eastern Europe, Latin America, and Other (which is South Africa and Israel).

the earlier results, changes in global liquidity and global interest rates are not significantly correlated with any of the four episodes in the 1985-2009 window.[23]

Next, in order to assess if the role of these global variables remains unchanged over the longer sample period now available, columns 5-8 of Table 3 report the same analysis with the additional decade of data, *i.e.,* extending the end-date from 2009 to 2018. The key role for global risk and global growth in driving the four types of episodes remains unchanged—with both global variables continuing to be significant (with the same sign and similar magnitudes) for all four types of episodes. The most striking change, however, is the estimated coefficients on the global interest rate variable. Instead of being insignificant for all types of episodes, and generally having negative coefficients for surges and stops and positive coefficients for flights and retrenchment, the coefficients on global interest rates are now positive and significant for all types of episodes. At first glance, this would be consistent with a hypothesis that higher interest rates are correlated with a greater probability of a country experiencing a sudden surge, stop, flight or retrenchment in capital flows—a counterintuitive result which is explored in more detail below.

To better assess these patterns—and especially if the estimated positive coefficients on global interest rates reflect changes across periods—columns 9-12 of Table 3 repeat the same estimates for the post-crisis window from 2010-2018. In this somewhat shorter window, coefficient estimates are strikingly different from the original (1980-2009) and longest samples. Global risk is only significant for stop and retrenchment episodes, global growth is no longer significantly correlated with any type of episode, and contagion is significantly associated with only surges at the 5 percent level (but not the other types of episodes). The coefficient on long-term interest rates remains positive, but is now insignificant, for surges and flight, and now negative and significant for stops and retrenchments. In other words, higher global interest rates are now significantly correlated with ***fewer*** stop and retrenchment episodes, and have no effect on surge or flight episodes.

At face value, these results do not support concerns that higher interest rates in advanced economies generate sudden stop episodes, or that lower interest rates in advanced economies generate large surges of capital inflows. There are, however, other possible explanations for these patterns. Moreover, these results ignore a number of changes in the global economy that have occurred over the last decade, such as the greater use of "unconventional" tools for monetary policy (which would not

[23] Using the US interest rate (instead of an average of long-term interest rates in the US, Euro area and Japan) yields the same result.

fully captured in our measure of monetary policy which focuses on interest rates) and the increased volatility in volatility in commodity prices (which tend to be correlated with capital flows, particularly for many emerging markets). Ignoring these developments and interactions could lead to omitted variable bias and generate some of the counterintuitive results found above.

IV.B A New Baseline

To better understand these patterns, Table 4 builds on the specification in Forbes and Warnock (2012) to create an updated "base case" that should better capture changes in how monetary policy has been conducted over the past decade, as well as the unusual volatility in commodity prices. More specifically, instead of measuring global monetary policy using interest rates, we use shadow short rates from Leo Krippner's RNBZ web site. These shadow rates should capture not only conventional monetary policy through changes in the central bank's main policy rate, but also changes in monetary policy through quantitative easing, forward guidance, or any other programs. We use the average shadow short rate in the US, Euro area, Japan and UK. Also, consistent with recent work which has highlighted the role of global oil prices (and commodity prices in general) in driving capital flows and prices, we add a variable measure the year-over-year change in oil prices.[24]

When this updated specification is used for the full period (columns 1-4) or pre-crisis window (columns 5-8), most of the key results agree with the baseline specification from Table 3 over similar windows. Risk, global growth and regional contagion continue to influence all types of episodes. Lower risk and stronger growth are significantly correlated with surges and flight, while higher risk and weaker growth are significantly correlated with stops and retrenchment. Global liquidity continues to be insignificant in each specification and monetary policy has the unexpected positive correlation with all types of episodes. In contrast to the earlier results, however, tighter monetary policy is significantly correlated with stop and retrenchment episodes in the pre-crisis window. This supports the evidence in other papers (such as Rey, 2013) that tighter US monetary policy often corresponds to sudden stops in in global capital flows. The results also provide support for a role for oil prices, with oil prices negatively and significantly correlated with stop episodes in both windows, and positively correlated with surges over the full period.

These results change notably, however, in the shorter post-crisis sample of 2010-2018 (columns 9-12). There is now no significant relationship between global risk or global growth in any of the four

[24] See Dreschsel, McLeay and Tenreryo (2019) and Forbes (2019).

episodes. This reduced role for global risk agrees with results in several papers looking at the relationship between different financial variables (including capital flows) and risk, such as Goldberg and Krogstrup (2019), Avdjiev et al. (2017) and Barrot and Servén (2017). Global monetary policy also has no significant relationship with any of the four episodes, and global liquidity usually has no significant relationship, with an occasional significant estimate not robust across specifications. Regional contagion also appears to be weaker—with only half of the coefficients significant at just the 10 percent level. The variable which is most often significant across specifications is oil prices – with higher oil prices significantly negatively correlated with stops and retrenchments—albeit oil prices are no longer significantly correlated with surges..

These key results continue to be robust across a range of sensitivity tests—including different measures of risk (changes in the VXO instead of the level, or using the Variance Risk Premium from Zhou (2018) instead of the VXO), measuring global monetary policy using an average of US, Euro area, Japan and UK rates) instead of the shadow rate, using changes in shadow rates (instead of levels), dropping growth in the global money supply (which should be captured in the shadow rates), using changes in global commodity prices instead of oil prices, including long-term interest rates as well as the shadow rates, or starting the sample in 2011 instead of 2010. Although some coefficients are occasionally significant in certain specifications, in most of the variants there appears to be no significant relationship between global risk and global growth and any of the four types of extreme capital flow episodes in the post-crisis window. This is a sharp change from a very robust relationship in the pre-crisis (and crisis) window.

IV.C Adding Local Variables

The set of results in Tables 3 and 4 suggests that the role of global variables in explaining extreme capital flow movements has diminished over the last decade. If so, are there other variables that determines the incidence of extreme capital flow episodes? Have country-specific characteristics become more important?

Testing for the role of domestic variables is challenging as many of the key country-specific variables that could affect the timing of sharp capital flow movements are not widely available across countries and/or not on a quarterly basis. Therefore, Table 5 provides an initial test with one measure that has

fairly good coverage—year-over-year economic growth.[25] Nonetheless, the sample size still shrinks meaningfully, with the number of observations about 20% smaller in Table 4 than in Table 5.

With these caveats, the regression results in Table 5 suggest that domestic variables can matter. More specifically. in the full and pre-crisis samples (columns 1-4 and 5-8), countries' with a pickup in economic growth are more likely to have a surge episode, and less likely to have a stop. In the post-crisis sample (columns 9-12), the only significant coefficient on domestic growth is for surge episodes (with faster growth correlated with more surges).

Moreover, including the variable for domestic growth has little impact on the other coefficient estimates. In the full and pre-crisis samples, the prominent role for risk, monetary policy and global growth in the different episodes is still largely intact (although growth loses its significance for pre-crisis stop and flight episodes). Very few variables, however, are significant in the post-crisis period; only oil prices are significantly correlated with stops at the 5 percent level, and domestic growth significantly correlated with surges. The "ripples" in capital flows since the GFC are difficult to explain with this set of global, contagion, and local variables.

V. Summary and Conclusions

This paper extends the popular dataset on capital flow episodes from Forbes and Warnock (2012, 2014), along with the underlying flow data, to examine if the characteristics and drivers of these episodes have changed over the last decade. There are a number reasons why the nature of international spillovers may have changed as monetary policy, financial regulation, global capital flows, and commodity price volatility have evolved over the last decade. Given that many of these changes may persist for an extended period and become "conventional", it has become increasingly important to understand if these changes are aggravating—or mitigating—the sharp movements in capital flows that can create substantial macroeconomic challenges.

This paper finds that the incidence of extreme capital flow episodes has not increased in the post-GFC period, and instead has decreased for most measures. Episodes are generally less frequent than they were pre-GFC for the full sample of countries, and there are only a small number of examples when

[25] Interpolating annual values to our quarterly frequency will not suffice in this setting, as our regressions are designed to capture, within a particular country, the conditions in quarter *t-1* on the probability of an episode in quarter *t*. Interpolated data cannot help explain that quarter-to-quarter variation.

there were more episodes for EMEs (such as of sudden stops in 2015). Moreover, the drivers of capital flow episodes appear to have changed, with global risk and global growth no longer significantly correlated with any types of extreme capital flow episodes in post-crisis samples.

These results over the last decade should be interpreted cautiously, however, as they are based on a short sample period (with only 32 post-GFC data points per country). Nonetheless, the results do provide initial evidence on how changes in the global financial system may be affecting international spillovers and the global financial cycle. The era of extremely accommodative monetary policy combined with unconventional tools does not appear to be driving increased volatility in cross-border capital flows. Instead, as tighter prudential and macroprudential regulations have reduced the volume of cross-border bank flows, this may be contributing to a reduction in extreme capital flow movements. Moreover, since cross-border bank flows tend to be highly correlated with changes in global risk measures (Shin, 2012), this could also explain the weaker relationship between extreme capital flow episodes and global risk measures. If these changes persist over time, economies may be less buffeted by the global financial cycle through its impact on global capital flows, albeit they should not expect calm waters.

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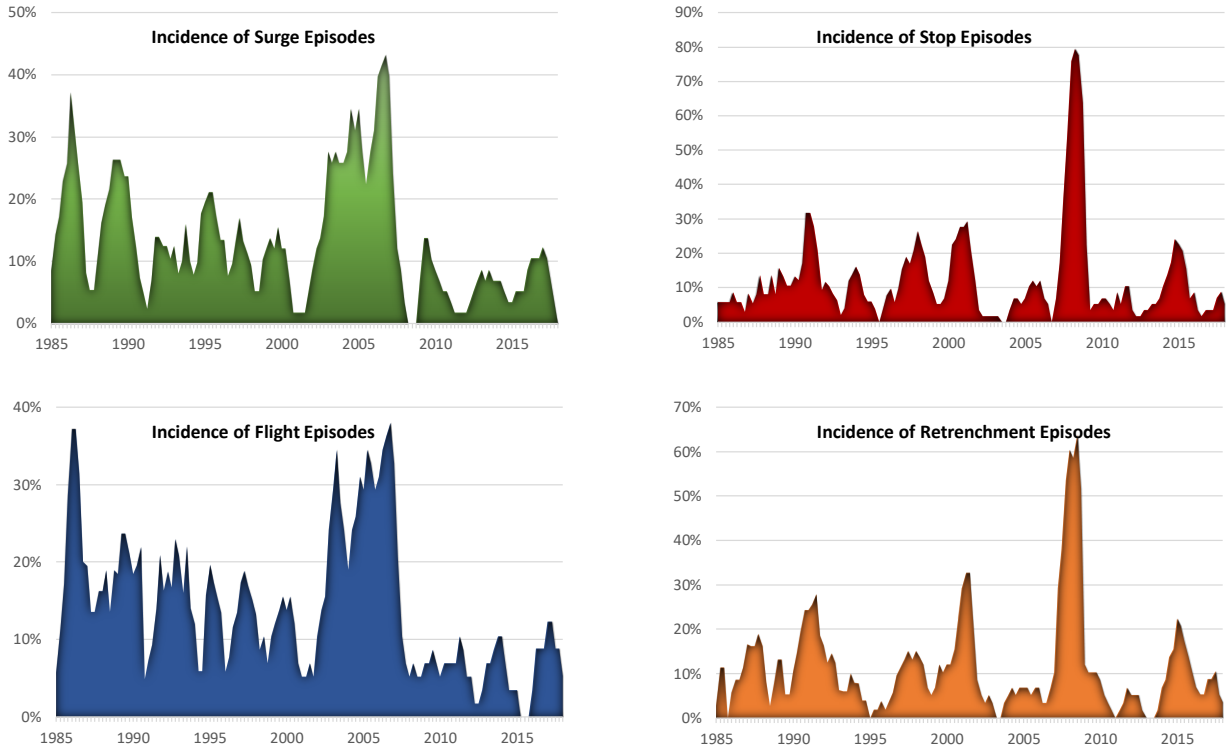
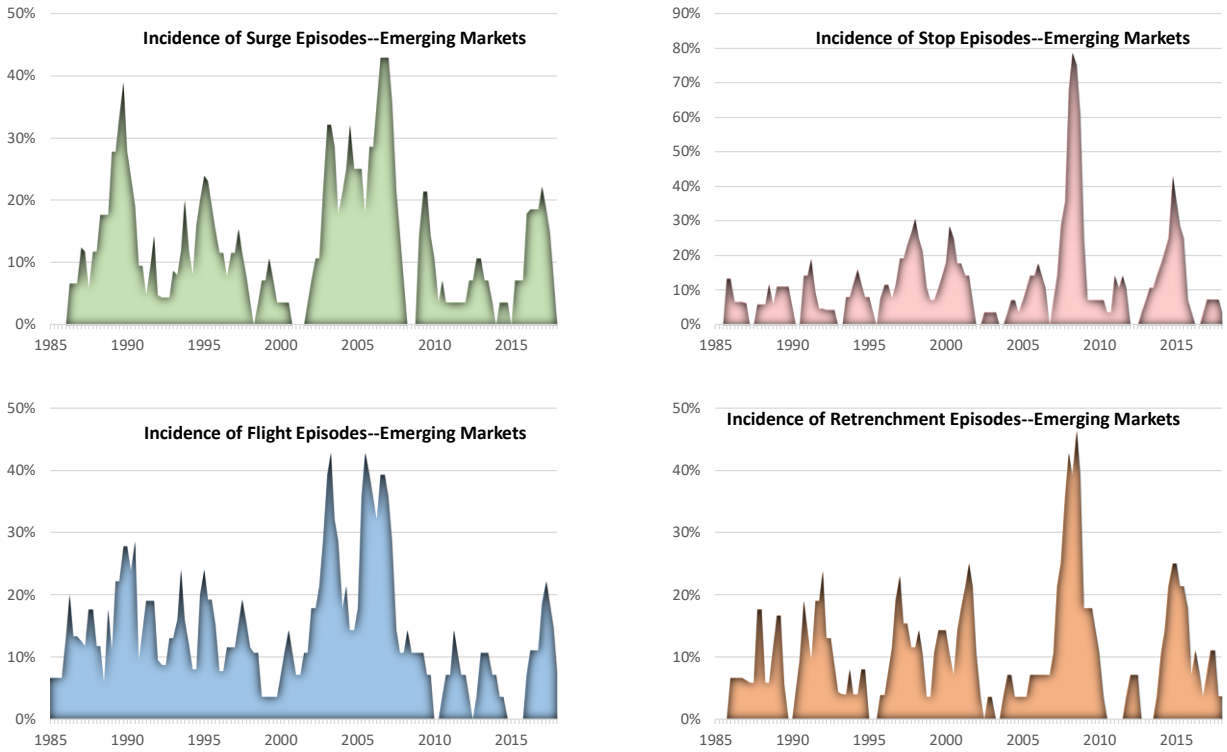
Figure 1a: Incidence of Surges, Stops, Flight and Retrenchment: Full Sample



Notes: Share of all countries in sample experiencing each type of capital flow episode each quarter from 1985Q1-2018Q4. Sample includes at most 58 countries. See Appendix Table 1 for details on start date for capital flow data by country.

Figure 1b: Incidence of Surges, Stops, Flight and Retrenchment: Emerging Markets



Notes: Share of emerging markets experiencing each type of capital flow episode each quarter from 1985Q1-2018Q4. See Appendix Table 1 for details on start date for capital flow data by country. Emerging markets defined based on BIS definitions.

Table 1. Share of Countries with Extreme Capital Flow Episodes

	Full Sample				Emerging Markets			
	Full Period	**1985-2009**	**2000-2007**	**2010-2018**	**Full Period**	**1985-2009**	**2000-2007**	**2010-2018**
All Flows								
Surges	14%	16%	21%	7%	13%	14%	18%	9%
Stops	12%	14%	9%	8%	12%	13%	10%	11%
Flight	14%	17%	22%	6%	14%	17%	22%	7%
Retrenchment	12%	13%	10%	7%	10%	11%	9%	9%
FDI								
Surges	18%	22%	21%	10%	18%	21%	21%	11%
Stops	11%	12%	12%	9%	10%	11%	10%	9%
Flight	18%	21%	25%	11%	15%	16%	25%	12%
Retrenchment	12%	12%	11%	10%	11%	10%	11%	11%
Portfolio Debt								
Surges	13%	14%	13%	10%	12%	12%	11%	13%
Stops	11%	12%	10%	9%	10%	10%	9%	10%
Flight	14%	16%	16%	8%	11%	12%	16%	8%
Retrenchment	12%	13%	12%	8%	9%	10%	11%	9%
Portfolio Equity								
Surges	13%	15%	13%	9%	12%	13%	13%	10%
Stops	10%	12%	12%	7%	8%	9%	8%	6%
Flight	14%	15%	16%	10%	10%	10%	17%	10%
Retrenchment	10%	11%	10%	7%	7%	7%	8%	7%
Bank/Other								
Surges	12%	14%	17%	7%	11%	12%	14%	10%
Stops	11%	13%	8%	7%	11%	11%	7%	9%
Flight	12%	14%	16%	8%	11%	12%	14%	8%
Retrenchment	12%	13%	11%	7%	11%	12%	13%	9%

Notes: Share of countries that have each type of extreme capital flow episode in each quarter over the given time period. Capital flow episodes calculated based on criteria for that flow as discussed in Section II. For example, the capital flow episodes for FDI are periods when FDI inflows or outflows are abnormally high (or low) and may not correspond to episodes for total capital flows.

Table 2. Components of Flows Driving Extreme Capital Flow Episodes

Episodes Driven by:								
	Debt Flows (Portfolio Debt & Bank)				Portfolio Flows (Portfolio Debt & Equity)			
	Full Period	1985-09	2000-07	2010-18	Full Period	1985-09	2000-07	2010-18
Surge	80%	79%	72%	88%	27%	25%	26%	39%
Stop	79%	78%	60%	81%	38%	36%	36%	45%
Flight	72%	72%	62%	70%	32%	32%	32%	29%
Retrench	72%	73%	64%	69%	34%	34%	46%	37%

	Portfolio Debt Flows				Bank Flows			
	Full Period	1985-09	2000-07	2010-18	Full Period	1985-09	2000-07	2010-18
Surge	17%	16%	15%	23%	51%	52%	41%	44%
Stop	22%	20%	25%	31%	48%	51%	32%	32%
Flight	22%	22%	23%	22%	46%	45%	36%	52%
Retrench	22%	22%	34%	20%	49%	50%	33%	45%

Notes: Share of each type of capital flow episode (defined in Section II) "led" by different types of capital flows. An episode is "led" by a type of capital flow if the change in the given type of capital flow is larger in magnitude than the change in the other types of capital flows (aggregated together). See Section III for details. Debt flows are defined as both portfolio debt and bank flows; portfolio flows are defined as portfolio debt and portfolio equity flows.

Table 3. Regression Results with Global and Contagion Variables, comparison to Forbes and Warnock (2012) results

	Original Period (1980-2009)				Full Period (1980-2018)				Post-Crisis (2010-2018)			
	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench
Global Vars	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Risk	-0.043**	0.028**	-0.034**	0.026**	-0.033**	0.033**	-0.021**	0.028**	-0.031	0.060**	-0.046	0.047**
	(0.008)	(0.004)	(0.008)	(0.004)	(0.008)	(0.005)	(0.008)	(0.004)	(0.025)	(0.022)	(0.028)	(0.021)
Liquidity	-0.005	-0.004	0.007	0.014	-0.012	-0.003	0.001	0.019**	-0.018	-0.014	0.000	0.035
	(0.013)	(0.012)	(0.012)	(0.011)	(0.013)	(0.010)	(0.012)	(0.010)	(0.043)	(0.040)	(0.036)	(0.034)
Interest	-0.007	0.011	-0.016	0.031	0.136**	0.061**	0.137**	0.056**	0.278	-0.669**	0.307	-0.625**
Rates	(0.038)	(0.040)	(0.039)	(0.033)	(0.024)	(0.028)	(0.022)	(0.025)	(0.247)	(0.266)	(0.211)	(0.306)
Growth	0.230**	-0.206**	0.126**	-0.184**	0.253**	-0.217**	0.146**	-0.187**	-0.041	0.224	0.244	0.065
	(0.048)	(0.036)	(0.049)	(0.033)	(0.053)	(0.034)	(0.055)	(0.034)	(0.170)	(0.171)	(0.208)	(0.219)
Regional	0.548**	0.871**	0.280**	0.388**	0.702**	0.797**	0.373**	0.439**	0.681**	0.571*	-0.152	0.411
Contagion	(0.200)	(0.171)	(0.129)	(0.160)	(0.166)	(0.141)	(0.121)	(0.126)	(0.339)	(0.333)	(0.271)	(0.294)
Obs.	***4,224***	***4,224***	***4,224***	***4,224***	***6,304***	***6,304***	***6,304***	***6,304***	***2,080***	***2,080***	***2,080***	***2,080***

Notes: The dependent variable is a 0–1 variable indicating if there is a capital flow episode (surge, stop, flight or retrenchment). Estimates are obtained using the complementary logarithmic (or cloglog) framework which assumes that F(·) 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 is the year-over-year change in the VIX. Liquidity is the year-over-year percentage change in the broad money supply of the US, UK, euro area and Japan. Long-term interest rates are the average for the US, UK, euro area and Japan. Growth is the year-over-year change in global growth from the IMF WEO database. Regional contagion is a dummy variable equal to one if a country in the same region has an episode.

Original Period is the same period as used in Forbes and Warnock (2012). Data for all columns is the updated capital flow database (as of August 2019), which incorporates data revisions and has more extensive coverage than the data used in Forbes and Warnock (2012). ** is significant at the 5% level and * at the 10% level.

Table 4. Regression Results with Global and Contagion Variables, new Baseline

	Full Sample (1980-2018)				Pre-Crisis (1980-2007)				Post-Crisis (2010-2018)			
	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench
Global Vars	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Risk	-0.040**	0.028**	-0.026**	0.025**	-0.040**	0.021**	-0.034**	0.034**	-0.026	0.002	-0.030	-0.020
	(0.009)	(0.005)	(0.009)	(0.004)	(0.009)	(0.009)	(0.008)	(0.008)	(0.029)	(0.025)	(0.033)	(0.018)
Liquidity	-0.016	-0.005	-0.003	0.016*	-0.008	-0.025*	0.008	0.008	-0.032	0.037	-0.016	0.082**
	(0.013)	(0.010)	(0.012)	(0.010)	(0.013)	(0.013)	(0.012)	(0.013)	(0.046)	(0.051)	(0.037)	(0.040)
Monetary	0.126**	0.074**	0.125**	0.064**	0.019	0.100**	-0.012	0.075**	0.133	0.265*	0.084	0.233
Policy	(0.018)	(0.018)	(0.015)	(0.016)	(0.040)	(0.039)	(0.039)	(0.036)	(0.138)	(0.148)	(0.160)	(0.163)
Growth	0.177**	-0.205**	0.116**	-0.184**	0.182**	-0.210**	0.143**	-0.273**	-0.019	-0.087	0.259	-0.208
	(0.054)	(0.037)	(0.058)	(0.038)	(0.071)	(0.085)	(0.059)	(0.087)	(0.157)	(0.171)	(0.178)	(0.196)
Oil Prices	0.005**	-0.006**	0.001	-0.003*	0.003	-0.006**	-0.003	-0.005*	0.008	-0.018**	0.008	-0.011**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.005)	(0.006)	(0.006)	(0.006)
Regional	0.598**	0.742**	0.307**	0.424**	0.583**	0.689**	0.251*	0.291*	0.640*	0.377	-0.168	0.477*
Contagion	(0.171)	(0.140)	(0.122)	(0.128)	(0.207)	(0.175)	(0.138)	(0.157)	(0.336)	(0.316)	(0.284)	(0.280)
Obs.	***6,304***	***6,304***	***6,304***	***6,304***	***3,760***	***3,760***	***3,760***	***3,760***	***2,080***	***2,080***	***2,080***	***2,080***

Notes: The dependent variable is a 0–1 variable indicating if there is a capital flow episode (surge, stop, flight or retrenchment). See notes to Table 3 for details on estimation. Variables are defined as in Table 3 with two changes: monetary policy is now defined as the year-over-year change in the average shadow short rate (from Leo Krippner's RNBZ web site) for the US, UK, euro area and Japan (in order to better capture changes in unconventional monetary policy) and oil prices are added and measured as the year-over-year percentage change in oil prices. ** is significant at the 5% level and * at the 10% level.

Table 5. Regression Results with Global, Contagion and Local Variables

	Full Sample (1980-2018)				Pre-Crisis (1980-2007)				Post-Crisis (2010-2018)			
	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench	Surge	Stop	Flight	Retrench
Global Vars	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Risk	-0.039**	0.034**	-0.033**	0.027**	-0.040**	0.029**	-0.041**	0.035**	-0.017	0.012	-0.037	-0.030
	(0.010)	(0.006)	(0.009)	(0.005)	(0.010)	(0.011)	(0.008)	(0.013)	(0.032)	(0.029)	(0.038)	(0.024)
Liquidity	-0.019	-0.002	0.002	0.014	-0.006	-0.019	0.016	0.006	-0.028	-0.011	0.046	0.058
	(0.018)	(0.010)	(0.014)	(0.012)	(0.019)	(0.014)	(0.014)	(0.019)	(0.055)	(0.049)	(0.046)	(0.043)
Monetary	0.132**	0.104**	0.144**	0.085**	-0.001	0.114**	-0.036	0.082	0.054	0.249	-0.013	0.349
Policy	(0.020)	(0.020)	(0.018)	(0.021)	(0.054)	(0.042)	(0.048)	(0.050)	(0.161)	(0.176)	(0.210)	(0.214)
Growth	0.219**	-0.095*	0.126*	-0.142**	0.225**	-0.085	0.157**	-0.250*	-0.074	0.004	0.244	0.095
	(0.068)	(0.049)	(0.068)	(0.069)	(0.076)	(0.114)	(0.072)	(0.128)	(0.187)	(0.211)	(0.235)	(0.286)
Oil Prices	0.004*	-0.006**	-0.000	-0.003	0.000	-0.007**	-0.005**	-0.007*	0.009	-0.016**	0.005	-0.012*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.004)	(0.006)	(0.006)	(0.007)	(0.007)
Regional	0.632**	0.718**	0.420**	0.498**	0.565**	0.662**	0.211	0.399**	0.700*	0.441	0.420	0.387
Contagion	(0.201)	(0.173)	(0.118)	(0.147)	(0.235)	(0.217)	(0.138)	(0.172)	(0.398)	(0.393)	(0.310)	(0.351)
Domestic Var												
GDP	0.024**	-0.084**	0.005	-0.030	0.020**	-0.114**	-0.000	0.003	0.093**	-0.029	-0.081	-0.079
Growth	(0.007)	(0.015)	(0.008)	(0.030)	(0.005)	(0.019)	(0.008)	(0.025)	(0.033)	(0.048)	(0.053)	(0.059)
Obs.	***4,779***	***4,779***	***4,779***	***4,779***	***2,763***	***2,763***	***2,763***	***2,763***	***1,632***	***1,632***	***1,632***	***1,632***

Notes: See notes to Tables 3 and 4 for details on estimation and variable definitions. Table replicates analysis in Table 4 except adds a local variable: domestic economic growth (year-over-year percent change). Sample sizes are smaller than in Table 4 because of the limited availability of this variable. ** is significant at the 5% level and * at the 10% level.

Appendix Table 1: Sample Coverage

Country	Start Year	End Year	Country	Start Year	End Year
Argentina	1980	2018	Korea	1980	2018
Australia	1980	2018	Latvia	1993	2018
Austria	1980	2018	Lithuania	1993	2018
Bangladesh	1980	2018	Malaysia	1999	2018
BelLux	1980	2018	Mexico	1980	2018
Bolivia	1988	2018	Netherlands	1980	2018
Brazil	1980	2018	NewZealand	1980	2018
Canada	1980	2018	Norway	1980	2018
Chile	1991	2018	Panama	1998	2018
Colombia	1996	2018	Peru	1991	2018
CostaRica	1999	2018	Philippines	1980	2018
Croatia	1993	2018	Poland	1985	2018
CzechRepublic	1993	2018	Portugal	1980	2018
Denmark	1980	2018	Romania	1991	2018
Estonia	1992	2018	Russia	1994	2018
Finland	1980	2018	Singapore	1995	2018
France	1980	2018	SlovakRep	1993	2018
Germany	1980	2018	Slovenia	1992	2018
Greece	1999	2018	SouthAfrica	1985	2018
Guatamala	1980	2018	Spain	1980	2018
HongKong	1999	2018	SriLanka	1980	2018
Hungary	1989	2018	Sweden	1980	2018
Iceland	1980	2018	Switzerland	1999	2018
India	1980	2018	Taiwan	1987	2018
Indonesia	1981	2018	Thailand	1980	2018
Ireland	1981	2018	Turkey	1984	2018
Israel	1980	2018	UK	1980	2018
Italy	1980	2018	US	1980	2018
Japan	1980	2018	Venezuela	1994	2016

Notes: Reports start and end dates for the capital flow data used to calculated the four types of episodes. To qualify as an episode, a country must have 24 quarters of flow data, so that the earliest possible episode for any country is five years after the start date of the flow data.

Appendix Table 2: Capital Flow Episodes (for total capital flows)

Note. Underlying flow data were pulled from IFS on August 26, 2019.

	Surge		Stop		Flight		Retrenchment	
	Start	End	Start	End	Start	End	Start	End
Argentina	1990q4	1992q3	1989q2	1990q3	1989q3	1990q1	1988q3	1989q1
	2015q1	2015q3	1998q4	1999q3	1991q2	1992q3	1992q4	1993q2
	2016q4	2018q2	2000q4	2002q2	2002q4	2003q1	1998q3	1999q2
			2008q2	2009q4	2006q3	2008q3	2009q2	2010q2
					2017q4	2018q4		
Australia	1988q4	1989q1	1989q4	1991q3	1987q4	1988q3	1989q3	1991q2
	1995q3	1996q3	1997q3	1998q1	1992q2	1992q3	2003q1	2003q3
	1999q3	1999q4	2005q1	2005q4	1995q4	1996q3	2005q1	2005q4
	2002q3	2002q4	2012q2	2012q3	2004q1	2004q3	2012q2	2012q3
	2003q4	2004q3	2016q3	2016q4	2006q2	2007q1	2016q1	2016q4
	2006q2	2007q1						
Austria	1992q2	1993q1	1996q4	1997q1	1992q2	1993q1	1986q1	1986q2
	1999q2	2000q1	2001q1	2002q1	1997q2	1998q1	1993q3	1993q4
	2005q1	2005q4	2006q1	2006q4	1999q2	2000q1	2001q2	2002q1
	2017q1	2018q1	2008q3	2009q3	2005q1	2005q4	2008q3	2009q3
					2017q1	2018q1		
Bangladesh	1989q1	1989q4	1991q3	1992q1	1987q1	1987q3	1992q2	1993q1
	1998q1	1998q3	2006q1	2006q2	1988q2	1989q3	2001q1	2001q4
	2003q4	2004q1	2009q2	2009q4	1995q3	1997q1	2012q3	2013q2
	2005q1	2005q2	2011q1	2011q4	2011q3	2012q2		
	2006q4	2007q1			2017q4	2018q4		
	2008q2	2008q4						
	2010q1	2010q2						
	2017q1	2018q3						
BelLux	1987q1	1987q4	1988q2	1989q1	1987q1	1987q4	1988q2	1989q1
	1999q3	2000q3	1994q1	1995q1	1999q3	2000q3	1994q1	1995q1
	2005q2	2006q1	2001q4	2002q3	2005q2	2006q1	2001q4	2002q3
	2015q3	2015q4	2008q2	2009q3	2015q3	2015q4	2008q2	2009q3
			2016q1	2016q4			2016q1	2016q4
			2018q2	2018q4			2018q2	2018q4
Bolivia	1996q1	1996q3	1999q2	2001q2	1994q1	1994q4	2004q3	2005q1
	1997q4	1998q4	2006q3	2007q2	2001q1	2001q2	2006q2	2006q3
	2007q3	2008q4	2014q3	2015q3	2003q3	2004q1	2010q2	2010q4
	2013q3	2013q4			2008q4	2009q3	2014q3	2015q3
					2012q1	2013q1		
Brazil	1990q2	1991q1	1993q1	1993q3	1987q4	1988q3	1992q1	1992q4
	1992q2	1992q3	1995q1	1995q2	1994q2	1994q4	1997q4	1998q2
	1994q1	1994q3	1999q1	1999q2	1998q3	1999q2	2008q1	2008q3
	1995q4	1996q2	2008q2	2009q3	2006q4	2007q3		
	2006q3	2007q4	2015q3	2016q2				
Canada	1996q4	1997q3	1991q2	1991q3	1986q2	1986q4	1993q2	1993q3
	2000q1	2001q1	1995q2	1996q1	1994q2	1994q4	1998q1	1998q3
	2006q2	2007q1	2008q4	2009q2	1996q4	1997q3	2008q4	2009q3
					2000q1	2001q1		
					2006q2	2007q1		
Chile	2005q4	2006q3	2000q2	2001q1	1998q2	1999q4	2000q2	2000q4
	2007q4	2008q3	2009q1	2009q4	2006q1	2006q4	2008q3	2009q3
	2017q4	2018q2	2013q3	2014q1	2007q3	2008q1		
					2010q1	2010q3		
Colombia	2005q4	2006q3	2015q2	2016q3	2006q2	2006q3	2002q2	2003q1
	2010q4	2011q2			2013q4	2014q2	2007q2	2007q3
	2013q4	2014q2					2012q4	2013q2
CostaRica	2005q4	2006q3	2008q4	2009q4	2006q1	2006q3	2014q4	2015q3
			2014q2	2015q3	2012q1	2012q4		
					2013q4	2014q1		
Croatia	2002q4	2004q1	1998q4	1999q2	2002q4	2003q4	2001q3	2002q1
	2006q3	2007q3	2004q4	2005q3	2006q4	2007q3	2004q4	2005q4
	2013q1	2014q3	2010q2	2011q1	2014q2	2014q4		
			2015q3	2016q2				
CzechRepublic	2002q3	2003q1	2003q2	2004q1	2003q3	2005q1	2000q1	2000q4
	2004q2	2005q3	2006q2	2006q4	2007q2	2008q3	2002q1	2002q3
	2016q1	2016q2	2008q4	2009q3	2017q3	2018q2	2008q4	2009q4
	2016q4	2017q4	2018q1	2018q4				
Denmark	1995q3	1996q2	1986q4	1987q2	1993q3	1994q2	1986q4	1987q2
	2005q1	2005q4	1989q2	1989q4	1999q4	2001q1	1992q2	1993q2
			1991q4	1993q2	2005q2	2005q4	1994q3	1995q1
			1994q3	1995q1			2001q2	2002q2
			2001q2	2002q1			2008q3	2009q4
			2008q4	2009q4				

	Surge		Stop		Flight		Retrenchment	
	Start	End	Start	End	Start	End	Start	End
Estonia	1997q4	1998q1	1998q3	1999q3	1997q4	1998q1	1998q4	1999q1
	2003q1	2005q1	2008q2	2009q3	2001q1	2001q2	2000q1	2000q2
	2006q4	2007q4	2015q1	2015q4	2003q3	2005q3	2008q2	2009q3
					2007q2	2008q1		
Finland	1987q1	1987q4	1985q4	1986q2	1986q3	1987q1	1985q4	1986q2
	1990q1	1990q4	1991q1	1992q2	1988q3	1989q1	1987q3	1987q4
	1998q4	1999q1	2001q1	2002q1	1993q1	1993q3	1992q1	1992q3
	2004q3	2004q4	2009q2	2009q3	1998q4	1999q1	2001q1	2002q2
	2008q2	2008q3	2012q3	2013q3	2000q1	2000q4	2009q2	2009q3
	2011q3	2011q4			2008q2	2008q3	2012q3	2013q3
					2010q2	2011q1		
France	1986q3	1987q4	1991q1	1992q1	1986q4	1987q4	1991q2	1992q1
	1989q1	1989q4	2002q1	2002q3	1992q3	1992q4	2001q4	2002q3
	1997q4	1998q3	2008q1	2009q3	1997q4	1998q3	2008q1	2009q3
	2001q1	2001q2			2001q1	2001q2		
	2005q3	2006q3			2005q3	2006q1		
Germany	1986q1	1986q4	1987q4	1988q3	1986q1	1986q4	1987q3	1988q2
	1989q2	1990q1	1994q1	1994q4	1988q4	1989q4	1990q4	1992q2
	1992q3	1993q3	2001q1	2002q2	1993q1	1993q4	2000q4	2002q2
	2000q1	2000q3	2008q3	2009q3	2005q1	2005q4	2008q2	2009q3
	2005q2	2005q4						
	2007q2	2008q1						
Greece	2005q1	2005q4	2006q1	2006q4	2005q1	2005q3	2006q1	2006q4
	2007q2	2007q4	2010q2	2011q2	2007q2	2007q4	2010q3	2011q2
					2012q1	2012q4		
Guatamala	1987q4	1988q1	1994q4	1995q3	1990q3	1991q2	1988q3	1988q4
	1991q1	1991q4	1999q4	2001q3	1997q1	1998q3	1989q2	1990q1
	2003q3	2004q2	2008q4	2009q3	2003q1	2004q3	2000q1	2001q1
					2011q2	2012q1	2008q4	2009q2
							2018q1	2018q2
HongKong	2007q3	2008q1	2008q3	2009q3	2007q2	2008q1	2008q3	2009q3
Hungary	2003q1	2003q4	1996q4	1997q1	1995q3	1995q4	2009q1	2010q2
	2005q1	2005q3	2002q2	2002q3	2001q2	2002q3	2017q4	2018q4
	2006q1	2006q4	2009q1	2010q2	2003q4	2004q2		
	2007q2	2008q1	2017q4	2018q3	2005q4	2008q1		
	2016q4	2017q3			2016q4	2017q3		
Iceland	1987q1	1987q4	1989q2	1990q1	1986q3	1987q2	1991q4	1992q3
	1995q4	1996q4	1993q3	1993q4	1993q2	1993q3	2000q2	2000q3
	1999q1	1999q4	2001q2	2002q1	1997q3	1998q2	2001q4	2002q2
	2003q4	2006q1	2008q2	2009q4	1999q2	1999q4	2008q1	2009q2
	2015q4	2016q3	2016q4	2017q3	2003q1	2006q1		
					2018q3	2018q4		
India	1987q1	1987q3	1989q4	1990q4	1990q3	1991q2	1992q1	1992q4
	1993q4	1994q4	1991q3	1992q1	1995q4	1996q4	1999q2	2000q2
	1996q2	1997q1	2008q3	2009q3	2000q4	2001q3	2002q1	2002q4
	2003q3	2004q2	2015q3	2016q4	2004q1	2004q3	2007q4	2008q2
	2004q4	2005q3			2008q4	2009q1		
	2006q4	2008q1			2013q3	2014q3		
Indonesia	1990q3	1991q2	1997q4	1998q3	1993q3	1994q3	1997q2	1998q3
	1995q2	1996q3	2006q4	2007q1	2002q3	2003q2	2003q3	2003q4
	2005q4	2006q1	2009q1	2009q3	2004q1	2005q1	2006q3	2007q1
	2010q1	2010q4	2011q4	2012q2	2005q3	2006q2	2016q2	2017q2
	2017q4	2018q1	2015q3	2016q2	2017q4	2018q3		
Ireland	1986q4	1987q3	1991q3	1992q2	1987q2	1988q1	1991q4	1992q2
	1989q3	1990q2	2008q2	2009q3	1989q3	1990q1	2008q2	2009q3
	1992q4	1993q4	2016q4	2017q1	1992q3	1993q1	2016q4	2017q1
	1995q3	1996q3	2018q2	2018q3	1995q4	1996q3		
	1997q4	1999q1			1997q4	1998q4		
	2003q3	2004q2			2003q3	2004q2		
	2005q2	2006q1			2005q3	2006q1		
	2007q1	2007q3			2007q1	2007q3		
	2014q3	2015q2			2014q3	2015q1		
Israel	1989q4	1990q3	1988q3	1989q2	1986q2	1987q1	1991q1	1991q3
	1995q3	1996q1	1998q2	1999q1	1990q1	1990q2	1995q2	1995q3
	1999q3	2000q1	2001q1	2002q2	1992q1	1992q3	2001q2	2002q2
	2006q3	2006q4	2007q4	2009q2	1998q1	1998q4	2007q3	2009q3
	2013q1	2013q3	2011q4	2012q3	2006q1	2006q4		
Italy	1990q4	1991q1	1991q4	1992q2	1991q1	1991q2	1986q1	1986q2
	1996q1	1997q1	1992q4	1993q3	2003q1	2003q4	1993q1	1993q3
	2003q1	2003q4	2000q4	2002q3	2005q1	2006q1	2000q4	2002q3
	2005q2	2006q1	2007q4	2008q4	2011q2	2011q4	2007q3	2009q2
	2011q1	2011q3					2015q4	2016q2

	Surge		Stop		Flight		Retrenchment	
	Start	End	Start	End	Start	End	Start	End
Japan	1986q2	1987q3	1990q4	1991q4	1986q1	1987q2	1987q4	1988q3
	1993q4	1995q1	1992q2	1993q1	1993q4	1994q4	1990q3	1991q3
	2000q2	2001q1	1998q1	1999q1	2000q2	2001q1	1998q2	1999q4
	2010q1	2011q1	2008q3	2009q3	2004q4	2005q2	2008q3	2009q3
					2010q2	2011q1	2017q2	2017q4
Korea	1988q3	1989q1	1986q3	1987q4	1986q4	1987q2	1989q3	1989q4
	1994q3	1995q4	1997q2	1998q4	1988q3	1989q1	1997q3	1999q1
	2009q4	2010q2	2008q2	2009q3	1990q2	1990q3	2008q2	2009q3
	2016q4	2017q3	2015q3	2016q2	1994q2	1995q4	2015q2	2016q3
					2002q4	2004q3		
					2006q1	2007q4		
					2016q4	2017q2		
Latvia	2003q2	2005q1	1998q4	1999q2	2006q2	2007q4	1998q4	1999q2
	2006q2	2007q4	2008q3	2009q3	2014q1	2014q4	2005q3	2006q1
			2015q2	2016q1			2008q3	2009q2
			2018q3	2018q4			2015q2	2015q4
Lithuania	2004q2	2004q3	1999q2	2000q1	1999q4	2000q3	2001q2	2001q3
	2005q4	2008q1	2000q4	2001q3	2004q1	2004q4	2008q3	2009q3
			2008q3	2009q4	2005q2	2006q1	2017q4	2018q3
					2007q3	2008q2		
					2015q1	2015q4		
Malaysia	2007q1	2008q1	2005q4	2006q3	2006q2	2007q4	2008q3	2009q2
	2009q4	2010q3	2008q3	2009q2	2009q4	2010q3	2015q1	2016q1
	2016q3	2016q4						
Mexico	1989q2	1991q2	1994q4	1995q4	1987q3	1988q2	1991q3	1991q4
	2005q1	2005q2	2006q4	2007q2	1990q1	1990q4	1992q2	1993q1
	2007q4	2008q3	2008q4	2009q3	2001q3	2002q2	1997q3	1997q4
			2014q4	2016q1	2004q3	2005q2	2006q4	2007q2
					2007q4	2008q2	2008q4	2009q3
							2017q4	2018q2
Netherlands	1985q4	1987q1	1990q4	1991q4	1986q2	1987q1	1990q4	1992q1
	1997q4	1998q4	2002q1	2002q4	1989q1	1989q2	2002q1	2002q4
	2004q3	2007q1	2008q2	2009q3	1989q4	1990q2	2008q1	2009q3
					1997q4	1998q4		
					2003q4	2005q3		
					2006q1	2007q1		
NewZealand	1986q3	1987q2	1987q4	1988q3	1986q4	1987q2	1986q1	1986q2
	2001q1	2002q2	1998q3	1999q2	1989q2	1990q2	1988q1	1989q1
	2004q3	2004q4	2005q3	2006q2	1993q3	1994q2	2000q2	2000q4
	2006q3	2007q3	2008q2	2009q2	2001q3	2002q2	2002q4	2003q4
					2006q3	2007q4	2005q3	2006q1
					2011q1	2011q2	2012q1	2012q3
Norway	1992q4	1993q2	1988q3	1989q2	1986q3	1987q3	1987q4	1988q4
	1996q2	1997q1	1991q3	1992q2	1994q3	1995q3	1992q2	1994q1
	2000q3	2001q1	1997q4	1998q1	2000q2	2001q2	1999q2	1999q3
	2002q4	2003q2	2001q3	2002q1	2005q4	2007q1	2001q4	2002q3
	2005q4	2007q1	2007q4	2009q4	2010q4	2011q1	2007q4	2008q2
	2010q3	2011q1					2009q2	2010q1
Panama	2014q4	2015q2	2008q4	2009q4			2008q4	2009q3
							2015q4	2016q4
Peru	2006q4	2008q2	1998q4	1999q3	2001q1	2001q2	2007q4	2008q3
			2005q4	2006q1	2003q2	2004q1	2015q4	2016q3
			2008q4	2009q3	2005q4	2006q3		
			2013q4	2014q3	2009q2	2009q4		
					2014q4	2015q2		
Philippines	1994q2	1994q3	1992q1	1992q2	1991q4	1994q2	1997q3	1998q2
	1996q1	1997q1	1997q3	1998q4	1999q1	1999q2	2006q1	2006q2
	2007q1	2007q3	2008q1	2009q1	2007q1	2007q2	2008q1	2008q4
	2017q4	2018q3					2015q4	2016q3
Poland	1997q3	1998q2	1996q3	1997q1	1990q4	1991q1	1991q3	1991q4
	2003q4	2004q4	2001q4	2002q1	1997q2	1998q2	1993q2	1993q3
	2007q1	2008q2	2008q4	2009q3	2004q2	2005q1	2002q3	2002q4
			2017q3	2017q4			2008q3	2009q3
Portugal	1988q4	1990q2	1992q3	1993q2	1990q2	1991q2	1987q4	1988q1
	1994q3	1995q3	1999q3	1999q4	1993q1	1993q4	1989q4	1990q1
	2003q4	2004q2	2002q4	2003q1	2003q3	2004q1	1992q1	1992q2
	2010q1	2010q2	2004q4	2005q2	2009q4	2010q2	1996q1	1996q3
			2010q4	2011q4			1999q3	1999q4
							2004q3	2005q2
							2010q4	2011q3
Romania	1996q4	1997q3	2008q3	2010q1	2003q4	2004q1	2010q3	2011q1
	2000q4	2001q2			2004q4	2005q3	2017q1	2017q3
	2004q1	2005q3			2007q1	2007q2		
	2006q4	2007q4			2018q1	2018q3		
	2016q1	2016q3						
Russia	2003q2	2004q2	2008q4	2009q3	2003q2	2004q2	2001q3	2002q2
	2007q1	2008q1	2014q1	2015q2	2007q2	2009q1	2009q3	2010q3

	Surge		Stop		Flight		Retrenchment	
	Start	End	Start	End	Start	End	Start	End
Singapore	2007q1	2008q1	2008q3	2009q3	2007q1	2008q1	2008q3	2009q3
			2015q4	2016q1			2015q4	2016q1
SlovakRep	2004q3	2005q2	1998q4	1999q4	2013q2	2013q4	1999q1	1999q2
	2013q2	2014q1	2012q2	2012q4			2006q3	2006q4
							2010q2	2010q3
							2015q3	2015q4
Slovenia	2002q3	2003q2	1997q4	1998q2	1998q3	1999q2	2008q1	2009q3
	2007q1	2007q4	2008q3	2009q3	2002q4	2003q3	2015q4	2016q1
	2014q2	2014q4			2005q3	2006q2		
					2007q1	2007q4		
					2014q3	2014q4		
SouthAfrica	1994q3	1995q4	1998q3	1999q2	1991q2	1993q1	1999q1	1999q2
	1997q2	1998q1	2000q3	2001q1	1995q3	1996q2	2000q3	2001q1
	2003q4	2004q4	2008q3	2009q2	1997q2	1998q2	2015q3	2016q2
	2005q2	2006q2	2015q3	2016q2	2003q4	2004q3		
					2006q1	2006q4		
					2017q1	2018q1		
Spain	1987q1	1988q2	1985q4	1986q2	1988q2	1989q1	1987q1	1987q3
	1990q4	1991q3	1994q2	1995q1	1990q1	1991q2	1994q2	1995q1
	1993q2	1993q4	2001q3	2002q2	1992q3	1993q4	2001q3	2002q2
	2000q3	2001q2	2008q1	2009q4	2011q2	2012q2	2007q3	2009q3
	2014q2	2015q1			2014q2	2015q1		
SriLanka	1989q4	1990q3	1994q2	1994q3	1990q3	1991q2	1990q1	1990q2
	2011q2	2012q4	1995q4	1996q1	1995q1	1995q3	1993q2	1994q3
			1998q3	1999q1	2007q3	2008q1	1998q4	1999q1
			2001q2	2002q1	2009q1	2009q3	2001q4	2002q3
			2008q1	2008q2			2010q1	2010q4
			2010q3	2010q4				
			2015q1	2015q4				
Sweden	1985q4	1987q3	1991q2	1992q2	1986q3	1988q1	1991q1	1992q1
	1989q2	1990q4	1997q1	1997q3	1988q4	1990q3	2001q1	2001q2
	1998q1	1998q4	2008q4	2009q3	1995q3	1996q3	2008q1	2009q3
	2004q4	2005q2	2014q4	2015q2	2006q4	2007q4	2014q4	2015q2
	2006q4	2007q4			2017q1	2017q4		
	2013q4	2014q2						
Switzerland	2005q3	2006q2	2008q1	2009q1	2005q3	2006q2	2008q1	2009q1
	2007q3	2007q4					2017q3	2018q2
Taiwan	1999q2	2000q2	1997q4	1998q3	1996q1	1996q3	1997q1	1997q4
	2003q3	2004q2	2001q1	2001q2	2000q1	2000q4	2002q2	2002q3
	2009q4	2010q3	2005q1	2005q2	2003q3	2004q1	2008q2	2009q2
			2008q4	2009q2			2014q4	2015q4
			2014q4	2015q4				
Thailand	1987q4	1990q3	1986q3	1986q4	1985q4	1986q1	1986q4	1988q4
	1995q2	1996q1	1992q1	1992q4	1989q3	1990q2	1991q2	1991q4
	2004q3	2006q1	1996q3	1998q2	1993q2	1994q2	1996q3	1997q2
	2009q4	2010q4	2007q1	2007q2	2005q1	2006q2	2008q1	2008q4
			2008q2	2009q1	2009q4	2010q1	2015q2	2016q1
			2011q4	2012q3				
Turkey	1990q1	1990q4	1991q3	1991q4	1991q1	1991q2	1989q4	1990q1
	1992q3	1993q4	1994q2	1995q1	1995q4	1996q3	1994q3	1995q3
	2000q1	2000q3	2001q1	2001q4	2006q4	2007q3	2009q2	2010q1
			2007q4	2008q2			2016q2	2017q1
			2008q4	2009q4				
UK	1985q4	1987q2	1991q3	1992q1	1985q4	1987q2	1991q3	1992q2
	1992q3	1993q2	1994q2	1994q4	1992q4	1993q2	1998q1	1998q4
	2000q3	2000q4	2001q3	2002q3	2000q3	2000q4	2001q3	2002q3
	2007q2	2007q4	2008q2	2009q2			2008q1	2009q2
US	1986q1	1987q1	1989q4	1990q4	1993q3	1994q2	1998q1	1998q4
	1993q3	1994q3	1998q1	1999q1	1995q3	1996q1	2001q3	2002q2
	1997q1	1997q3	2001q3	2002q2	1997q1	1997q3	2008q1	2009q2
	1999q4	2000q4	2008q1	2009q2	2004q1	2004q4		
	2004q2	2004q4			2006q4	2007q3		
	2006q4	2007q2						
Venezuela	2005q2	2005q4	2006q2	2006q4	2002q2	2002q4	2008q4	2009q3
	2007q2	2008q1	2012q2	2012q3	2005q2	2006q3		
					2007q4	2008q1		