Journal of International Money and Finance 116 (2021) 102394

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

Capital flow waves—or ripples? Extreme capital flow movements since the crisis ☆

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ARTICLE INFO

Article history:
Available online 20 April 2021

JEL Classification:
F3

Keywords:
Capital flows
Surges
Stops
Quantitative easing

ABSTRACT

Has the occurrence of "extreme capital flow movements"—episodes of sudden surges, stops, flight and retrenchment—changed since the Global Financial Crisis (GFC)? And was the period at the outset of the Covid Crisis any different? This paper addresses these questions 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 GFC, including during the early phases of the Covid Crisis (the first half of 2020). The drivers of these episodes, however, appear to have changed since the GFC. Extreme capital flow movements are less correlated with changes in global risk and more correlated with changes in oil prices. More generally, what used to be large global "waves" in international capital flows have more recently become more idiosyncratic "ripples".

1. Introduction

Concerns about capital flow volatility, and the corresponding drivers, have motivated an extensive academic literature. The global financial landscape has changed fundamentally since the Global Financial Crisis (GFC), however, 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.

This paper uses the approach in Forbes and Warnock (2012) to create an updated dataset of capital flows and their corresponding "episodes" of sharp movements through 2020Q2, thereby capturing the period of recovery after the GFC as well as the initial phases of the Covid Crisis. It 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 more by changes in oil prices.

Early work on sharp capital flow movements, such as the seminal analysis in Calvo (1998), defined "sudden stops" as periods when net capital flows decline sharply. Forbes and Warnock (2012) extended this framework to focus on changes in

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https://doi.org/10.1016/j.jimonfin.2021.102394
0261-5606/

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] The Forbes and Warnock (2012) approach and corresponding data set of "capital flow waves" were subsequently used in a number of papers to address a range of questions.[2]

More specifically, Forbes and Warnock (2012) characterized four types of extreme capital flow episodes based on gross flows—surges, stops, flight and retrenchment—and showed that the incidence and drivers of episodes varies meaningfully depending on whether they are defined based on gross or net flows. The definitions and drivers based on net flows are 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 instead defined based on 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 the sudden stops were masked by a "retrenchment" as many countries' residents brought 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—at least in IMF datasets—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 sample period by about 12 years[6]—and calculates a corresponding set of extreme capital flow episodes. 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., 2020, Friedrich and Guérin, 2020). "Sudden surges" of capital inflows can lead to substantial challenges, such as asset price bubbles, an inefficient allocation 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 debt in foreign currency.[7] 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 emerging economies.

Moreover, over the last decade many of the factors that are widely believed 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.[8] Has the post-GFC bank deleveraging 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?[9] Over the last decade commodity prices have been unusually volatile (Dreschsel et al., 2019; Forbes, 2020),

[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), Friedrich and Guérin (2020), Li et al. (2019), Mercado (2019), Scheubel et al. (2019), Malmendier et al. (forthcoming) and Bandaogo and Chen (forthcoming).

[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 (2019). For an opposing view on the role of risk, see Cerutti, Claessens, and Rose (2019).

[5] For a short primer on the transition from BPM5 to BPM6, see Warnock (2015).

[6] The flow data previously ended in 2009q4 and now ends in 2020q3.

[7] On the costs (and benefits) of capital flows, see Prasad et al. (2003) and Henry (2007).

[8] For evidence, see Aiyar et al. (2014) and Forbes et al. (2017).

[9] Examples of these concerns by senior policymakers are: the "currency wars" raised by Guido Mantega (former Finance Minister of Brazil), the "monetary tsunami" of capital inflows to emerging markets raised 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)

emerging markets have become more important drivers of global growth, and many measures of uncertainty have been unusually elevated. 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, while Burcu et al. (2020) suggest that fluctuations in the US dollar have become more important.

To better understand if capital flow volatility and its drivers have changed meaningfully over the last decade, this paper begins by drawing on the data and methodology developed in Forbes and Warnock (2012). It updates and extends the quarterly data on gross capital inflows and outflows by foreigners and domestics through 2020q3, supplementing IMF data from the International Financial 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).[10] 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 periods and observations to the dataset in Forbes and Warnock (2012) also allows us to address a series of new questions that were not possible in the earlier work. Have the patterns of extreme capital flow movements changed since the GFC? Has their relationship with global variables (such as monetary policy and risk measures) 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? Has the period of tighter macroprudential regulation reduced the volatility of capital flows and/or made them less sensitive to changes in global variables (such as risk)?

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. This is even true during the period of heightened market stress as Covid-19 spread quickly around the globe. Episodes of all types have been occurring more in "ripples" than "waves". The largest "ripples" that have occurred since 2009 were in 2015, as investors anticipated that the U.S. Federal Reserve would raise the Federal Funds rate for the first time in nearly a decade: 27% 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 34% and 32%, respectively) and well less than the peaks during 2008–2009 (of 80% and 63%, respectively). When focusing just on EMEs, the incidence of extreme capital flow episodes are often higher and closer to those in the pre-2008 period, particularly during 2015. More specifically, in 2015 48% of EMEs experienced a sudden stop episode, far less than the 79% during the peak of the 2008–2009 crisis, but more than the pre-crisis peak of 26%. Overall, if we compare the period from 2010 to 2020 with a comparable window before the crisis, we find no evidence of an increased incidence of extreme capital flow events, and some evidence of a decrease. This is particularly striking during the first half of 2020 as concerns about the spread of Covid-19 caused a sharp increase in market volatility, but only 8.6% of the sample and about 10% of emerging markets experienced a sudden stop—well below the incidence during pre-GFC periods of market stress. The waves of global capital flows, which turned into giant tidal waves 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 patterns 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 about a decade is fairly short to assess financial cycles. With this important caveat, the results suggest that the relationship between extreme capital flow episodes and many global variables (particularly global risk measures) has weakened, while oil prices appear to be playing a larger role.[11] Key results over the full sample period (1986q2-2020q2) are similar to those from Forbes and Warnock (2012), which ended in 2009, so that it isn't straightforward to ascertain if the role of many factors has changed post-crisis or if the post-crisis sample (of only 42 quarterly data points per country) is too small to precisely estimate coefficients. Nonetheless, the results to date are supportive of arguments that capital flow volatility and sensitivity to changes in the global environment might be muted post-GFC, even with extremely accommodative monetary policy in advanced economies and sharp volatility in commodity prices. These results are consistent with arguments that changes in the global financial system (such as tighter macroprudential regulation, a reduced share of bank flows in total capital flows, and slower growth in capital flows in advanced economies) have reduced the volatility of capital flows and sensitivity of these flows to many global factors.

The remainder of the paper is as follows. Section 2 discusses the updated data and reviews the methodology to calculate the capital flow episodes. Section 3 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 coun-

[10] 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, however, as well as the main regression results in Forbes and Warnock (2012, 2014), are robust to these updates.

[11] This agrees with recent analysis in Miranda-Agrippino and Rey (2020) and Burcu et al. (2020), which find a reduced correlation between the VIX and the global financial cycle, as well as Avdjiev et al. (2020), which finds a reduced correlation between the VIX and global bank flows since the GFC.

tries. It also assesses if the types of capital flows driving these episodes has changed. Section 4 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 5 concludes.

2. 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 Feb. 9, 2021 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 59 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] For China, quarterly flow data begin in 2005 in IFS, but is available starting in 1998 from the State Administration of Foreign Exchange (SAFE); we used SAFE data for the 1998q1-2004q4 period. 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), and South Africa (dropped data prior to 1985). Some countries had, for certain components, some NAs between strings of zeros; we filled those in with zeros. These include: portfolio inflows for Slovenia (1994) and Latvia (1993 and 1994); FDI outflows for Guatamala (1995–96), Lithuania (1993 and 1994), India (1991 and 1992) and Bangladesh (2001Q3 and Q4); portfolio outflows for Korea (pre-1988), India (pre-2000), 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 also from 2009 to 2013; the resulting series was too short to be useful. Finally, to have as complete a dataset as possible through 2020Q3, in instances where recent data were not yet in IFS but were available from published national sources, we supplemented IFS using national sources. In this draft, this pertains only to data after 2016 for Venezuela and 2020 data for Sri Lanka and Malaysia.

Following this approach yields a quarterly capital flows dataset for 59 countries covering the period from 1978q2 through 2020q3. (The start date for flows data was chosen so that our episodes indicator, which requires 28 quarters of flows data, starts in 1985q1.) Appendix Table A1 reports the sample and country coverage. This is the same sample as Forbes and Warnock (2012), except Nicaragua is dropped and China and Costa Rica are added. Relative to the original study, there is slightly better coverage of historic data on capital flows for several countries, plus an additional 10+ years of data (2010q1-2020q3) for most countries in the sample.[13] 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.

Before shifting to our main focus on extreme capital flow movements, Appendix Table A2 reports summary statistics on the underlying patterns in capital inflows and outflows for the sample. It shows the median growth in capital flows for each country group and type of capital flow over the periods that will be the focus of our analysis: the full period (from 1985 to 2020), the 1985–2009 period from Forbes and Warnock (2012), and two comparable windows before and after the crisis (1997–2007 and 2010–2020). The table shows the sharp slowdown in the growth of capital inflows since the 2008 crisis (with median annual growth in inflows of only 0.6%, relative to 7.8% in the pre-crisis period). This slowdown is most striking in advanced economies—which experienced sharp contractions in bank inflows and portfolio debt inflows. In contrast, emerging markets experienced growth in capital inflows in every category except portfolio equity flows since 2010, although at a slower rate than before the GFC in some categories.

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 made 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:

[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.

[13] The only country that does not have data through 2020Q2 is Venezuela (which ends in 2019q1).

- "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 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.[14]

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:

$$C_t = \sum_{i=0}^{3} GINFLOW_{t-i} \quad \text{with } t = 1, 2, \cdots, N \text{ and,} \tag{1}$$

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

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 several points about this methodology. First, the broader approach (used first for *net flows* by Calvo, Izquierdo and Mejía, 2004), 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-section), its ΔC_t must have more outliers (e.g., fatter tails). Second, and closely related, by defining episodes using volatility relative to a recent window, it will be relatively hard to qualify as an "extreme" episode immediately after a period of heightened volatility (such as after the Global Financial Crisis). Third and finally, the definition of episodes is based on quarterly data—which allows us to capture periods of heightened volatility that may be missed when using annual capital flow data, but may also miss shorter periods of heightened volatility.[15]

This methodology yields a series of episodes of sudden surges, stops, flight and retrenchment—listed by country in Appendix Table A3—for the period 1985q1-2020q2.[16] These episodes are the basis of the following analysis.

3. 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 flows, 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.

[14] Summing capital flows over four quarters is analogous to the literature's traditional 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. Because we require an episode to last more than one quarter, to identify episodes that started in 2020Q2 we pulled Q3 data; only Argentina, Bolivia and Panama (and Venezuela) did not yet have 2020Q3 data.

[15] Several other papers have used different variants of this methodology. For example, Scheubel et al. (2019) focus on private capital flows. Friedrich and Guérin (2020) use higher frequency (weekly) EPFR data on portfolio equity and debt, which has the advantage of providing more precise dating of episodes and capturing shorter-lived episodes, but the disadvantage of only including a subset of bond and equity flows and therefore missing the dynamics related to bank flows and FDI.

[16] 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 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.

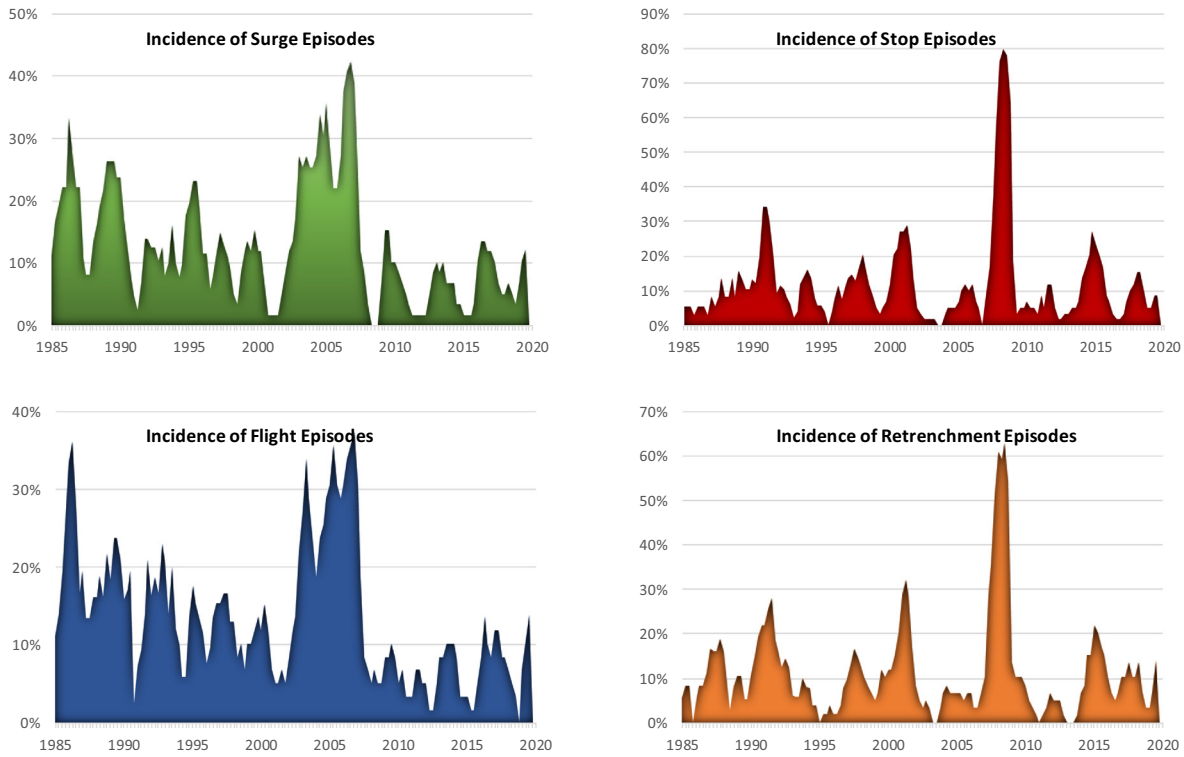

Fig. 1a. Incidence of Surges, Stops, Flight and Retrenchment: Full Sample. **Notes:** Share of all countries in sample experiencing each type of capital flow episode each quarter from 1985q1-2020Q2. Sample includes at most 58 countries. See Appendix Table A1 for details on dates for capital flow data by country.

To begin, Fig. 1a graphs the incidence of sudden surges, stops, flight and retrenchment over the full sample period from 1985q1 through 2020 for the full sample of countries, based on the episode definitions from Section 2. 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, as investors anticipated that the U.S. Federal Reserve would raise the Federal Funds rate for the first time in nearly a decade; the peak share of countries experiencing a sudden stop was 27%, and experiencing a retrenchment was 22%, in any quarter. This is smaller than the peaks during the pre-crisis period (of 34% and 32%, respectively) and far less than the peaks during 2008–2009 (of 80% and 63%, respectively).[17] Fig. 1a suggests that the incidence of extreme capital flow episodes is more muted since the GFC. This is even true during the period of heightened market stress in early 2020 as Covid-19 spread rapidly; only 8.6% of countries (and about 10% of emerging markets) experienced a sudden stop in the first half of 2020.

These graphs, however, include both advanced economies (AEs) as well as emerging market economies (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, Fig. 1b repeats the same analysis as in Fig. 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 a peak of 48% of EMEs experienced a sudden stop episode, far less than the 79% during the peak of the 2008–2009 crisis, but more than the pre-crisis peak of 26%. The occurrence of other episodes, however, looks more similar to that of the pre-2008 window.

[17] It is worth reiterating that the methodology used to identify extreme capital flow movements using country-specific thresholds over the past five years makes it more difficult for a given movement in capital flows to qualify as an episode immediately after more volatile periods (such as the GFC). If volatility from before the GFC (instead of 5-year rolling averages) is used to calculate these thresholds, then there would be a greater incidence of some types of episodes during the Euro Crisis in 2010 (especially surges and flight). Put another way, the Euro Crisis in 2010 would be an episode using pre-GFC metrics, but for most countries in our sample, it was not an outlier once the GFC occurred.

[18] Emerging markets are defined using BIS definitions.

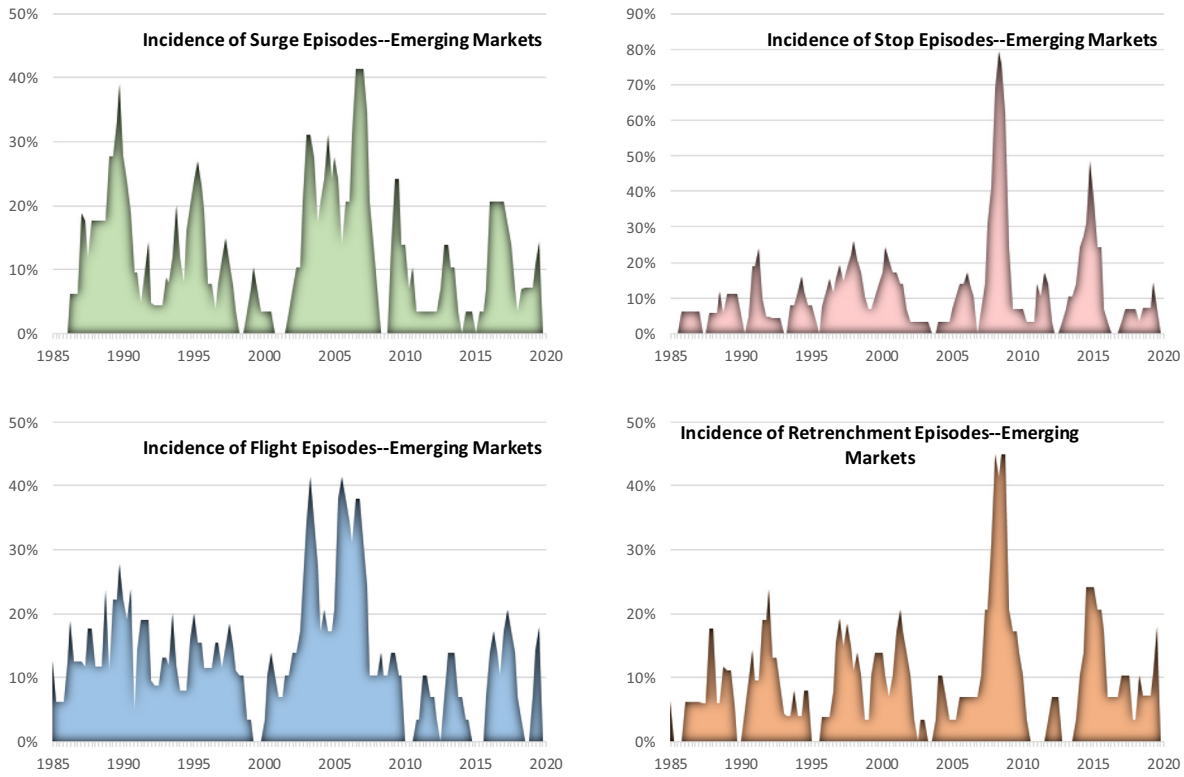

Fig. 1b. Incidence of Surges, Stops, Flight and Retrenchment: Emerging Markets. **Notes:** Share of emerging markets experiencing each type of capital flow episode each quarter from 1985q1-2020Q2. See Appendix Table A1 for details on dates for capital flow data by country. Emerging markets defined based on BIS definitions.

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 of each of the four episodes, for the full sample and then just EMEs, over four windows: the full sample, from 1985 to 2009, 1997–2007, and 2010-2020. The last period captures patterns when many advanced economies lowered interest rates to around zero (and in some cases below) and adopted "unconventional" monetary policy, as well as the initial phases of the Covid Crisis. 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 11-year window from 1997 to 2007, an era with large volumes of capital flows. In fact, focusing just on EMEs, there is a meaningfully lower incidence of surge and flight episodes over the post-crisis window relative to the pre-crisis window, and a moderately lower 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 giant tidal waves during 2008–9, have been more ripples since then.

Even if there are fewer extreme capital flow episodes since 2009, could the capital flow "waves" that do occur be longer lasting? To understand if the duration of episodes has changed, Fig. 2 graphs the average length in quarters of each type of capital flow episode for the full sample (at the top) and then the pre-crisis period (1985–2007) and the post-crisis period (2010-2020). Each section is also broken into patterns for all countries, AEs and EMEs. The graphs indicate that surge episodes have become shorter since the GFC and that stops, particularly for EMEs, have become longer. That said, episodes pre- and post-crisis tend to last about 4 quarters.

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 flow movements has changed, and then if there are more (or less) episodes of extreme capital flow movements for specific types of flows since the crisis.

To perform these tests, we calculate if extreme capital flow episodes are "led" by certain types of capital flows using the methodology of Forbes and Warnock (2014). 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

Table 1
Share of Countries with Extreme Capital Flow Episodes.

	Full Sample				Emerging Markets			
	Full Period	**1985–2009**	**1997–2007**	**2010–2020**	**Full Period**	**1985–2009**	**1997–2007**	**2010–2020**
All Flows								
Surges	13.2%	15.9%	17.4%	7.0%	12.5%	13.9%	14.3%	9.5%
Stops	12.3%	13.8%	10.1%	8.7%	11.9%	12.4%	11.1%	10.6%
Flight	13.8%	16.8%	18.4%	6.8%	13.5%	16.0%	18.2%	7.8%
Retrenchment	11.4%	12.9%	9.5%	7.9%	9.9%	10.3%	9.1%	8.8%
FDI								
Surges	17.8%	21.3%	22.0%	9.6%	17.6%	20.6%	20.9%	10.7%
Stops	10.8%	11.7%	10.4%	8.8%	10.1%	10.9%	9.7%	8.3%
Flight	17.7%	20.7%	24.2%	10.7%	15.3%	16.8%	22.7%	11.8%
Retrenchment	10.9%	11.4%	10.9%	9.7%	9.6%	9.4%	10.6%	10.0%
Portfolio Debt								
Surges	12.9%	14.1%	11.3%	9.9%	11.4%	11.2%	9.2%	11.7%
Stops	10.5%	11.0%	10.1%	9.1%	9.5%	9.4%	10.6%	9.7%
Flight	13.5%	15.6%	14.8%	8.5%	10.4%	11.5%	14.1%	7.9%
Retrenchment	11.4%	12.7%	10.5%	8.5%	9.6%	9.7%	9.7%	9.2%
Portfolio Equity								
Surges	12.8%	14.8%	12.9%	8.3%	12.0%	13.2%	12.3%	9.1%
Stops	10.0%	11.2%	10.7%	7.4%	8.3%	9.3%	9.4%	6.0%
Flight	13.4%	14.6%	15.9%	10.6%	10.7%	10.3%	14.8%	11.5%
Retrenchment	9.9%	10.4%	8.5%	8.8%	7.8%	7.3%	8.0%	9.1%
Bank/Other								
Surges	11.6%	13.5%	14.1%	7.3%	11.0%	11.6%	11.0%	9.4%
Stops	11.0%	12.6%	9.0%	7.4%	10.6%	11.3%	8.8%	9.2%
Flight	11.5%	13.4%	14.5%	7.1%	10.3%	11.8%	12.7%	6.8%
Retrenchment	10.8%	12.7%	9.9%	6.5%	10.4%	11.2%	11.0%	8.8%

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 2. 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.

primarily through debt flows (defined as portfolio bond 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 (1985-2020), for the period through the GFC (1985–2009), for the 11-year period before the GFC (1997–2007), and for the post-crisis window (2010-2020). The table shows that the majority of all four types of episodes tend to be debt-led, as found in Forbes and Warnock (2014), albeit by somewhat less since the crisis. More specifically, although the share of surges that are debt-led is only slightly less than before the crisis (69% as compared to 74% in the pre-crisis window), the share of stops that are debt led has fallen more sharply (from 77% to 62%).

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 somewhat weaker role for bank flows in driving extreme capital flows. For example, about half of surges and stops were bank-flow-led over the period from 1985-2009, as compared to only about one-third from 2010 to 2020. The role of portfolio debt flows appears to be fairly similar to the pre-crisis period, except a larger role for retrenchments in the post-GFC period.

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 Table 2 reports the share of episodes that are led by portfolio flows. A much smaller share of extreme capital flow episodes are driven by portfolio flows (relative to by debt flows)—roughly one-third for most episodes over the earlier periods. The share of all types of episodes driven by portfolio flows has increased since the GFC, however, reaching 42% of sudden stops and 47% of retrenchments since 2010. Foreign direct investment (not shown) 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.[19]

As a final test, we return to our standard definitions of capital flow episodes (as discussed in Section 2), except now calculate if a surge, stop, flight or retrenchment occurred for the four components of disaggregated capital flows for each coun-

[19] For example, see Ahnert et al., 2021.

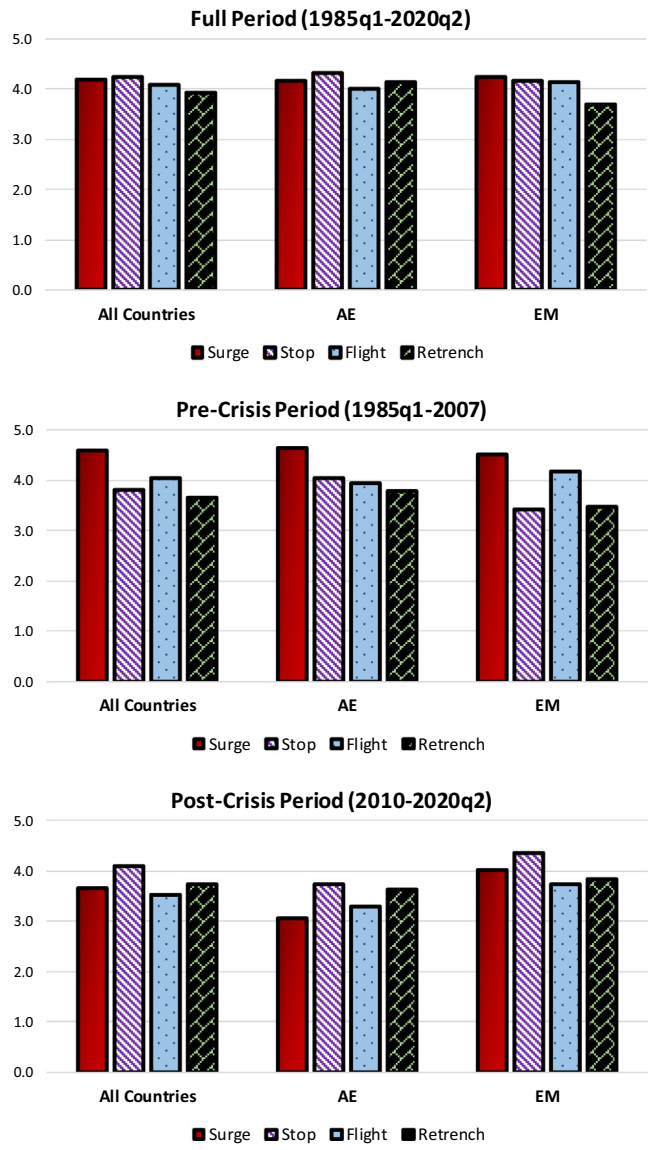

Fig. 2. Duration of Surges, Stops, Flight and Retrenchment Episodes (in quarters). **Notes:** Average length of each episode type in quarters for each country group over the given time period. AE is advanced economies and EM is emerging markets, with the groups based on BIS definitions.

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	**1985–2009**	**1997–2007**	**2010–2020**	**Full Period**	**1985–2009**	**1997–2007**	**2010–2020**
Surge	78%	79%	74%	69%	27%	24%	39%	27%
Stop	78%	79%	77%	62%	38%	36%	42%	42%
Flight	70%	71%	66%	60%	33%	34%	25%	37%
Retrench	72%	73%	68%	61%	34%	33%	35%	47%
	Portfolio Debt Flows				**Bank Flows**			
	Full Period	**1985–2009**	**1997–2007**	**2010–2020**	**Full Period**	**1985–2009**	**1997–2007**	**2010–2020**
Surge	17%	17%	18%	18%	49%	51%	39%	37%
Stop	24%	22%	30%	23%	48%	52%	34%	35%
Flight	21%	22%	14%	24%	47%	45%	54%	34%
Retrench	23%	22%	25%	32%	50%	53%	41%	36%

Notes: Share of each type of capital flow episode (defined in Section 2) "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 3 for details. Debt flows are defined as both portfolio debt and bank flows; portfolio flows are defined as portfolio debt and portfolio equity flows.

try 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 Fig. 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.[20]

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. For emerging markets, any increased incidence is small, the largest being for surges in portfolio debt (whose incidence increased to 12% post-crisis, as compared to 9% from 1997 to 2007). 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.

4. 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 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:

$$Prob(e_{it} = 1) = F\left(\Phi_{t-1}^{\text{Global}} \mathrm{B_G} + \Phi_{i,t-1}^{\text{Contagion}} \mathrm{B_C} + \Phi_{i,t-1}^{\text{Domestic}} \mathrm{B_D}\right) \quad (3)$$

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; $\Phi_{t-1}^{\text{Global}}$ is a vector of global factors lagged by one quarter; $\Phi_{i,t-1}^{\text{Contagion}}$ is a vector of contagion variables; and $\Phi_{i,t-1}^{\text{Domestic}}$ is a vector of domestic variables. The appropriate methodology to estimate equation (3) is determined by the distribution of the cumulative distribution function, $F(\cdot)$. Because episodes occur irregularly (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.

4.1. Updated Forbes and Warnock (2012) regressions

In Forbes and Warnock (2012), four variables—global risk, global GDP growth, contagion, and local GDP growth—were consistently associated with the incidence of all types of episodes (with the exception, at times, of flight episodes, which tend to be more idiosyncratic). Table 3 includes these variables, measured here using the VXO (global risk), year-over-year global GDP growth from the IMF's World Economic Outlook dataset (global growth), a dummy variable equal to one if a country in the same region has the same type of episode (to capture contagion through geographic proximity), and local real GDP growth.[21,22] We also include two other global variables used in Forbes and Warnock (2012): global liquidity (measured as the year-over-year percentage growth in 'global' broad money supply, where global is the sum for the Euro area, US, UK and Japan), and global long-term interest rates (measured as the average yield on long-term government bonds in the US, Euro area and Japan). Some variables (for example, the VXO) start in 1986q1; since we lag all explanatory variables one quarter, the earliest start date for our regressions is 1986q2.

To begin, we use the same period that was the focus of Forbes and Warnock (2012). More specifically, we regress the incidence of capital flow episodes in each quarter from 1986 to 2009. All variables are lagged by one quarter, so the regressions

[20] A caveat: within-component episodes will not necessarily align with overall episodes if, for example, there is a shift between components.

[21] We thank Gian Maria Milesi-Ferretti for providing the quarterly WEO global growth series. For regional contagion, the regions are North America, Western Europe, Asia, Eastern Europe, Latin America, and Other (which is South Africa and Israel).

[22] 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. For example, even quarterly real GDP—one of the more widely available domestic variables—shrinks the sample size by about 20%, with most of the lost observations being early in the sample. Interpolating annual values to our quarterly frequency may be not sufficient 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*.

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

	Original Period (1986–2009)				Full Period (1986–2020)				Post-Crisis (2010–2020)			
Global Vars	**Surge (1)**	**Stop (2)**	**Flight (3)**	**Retrench (4)**	**Surge (5)**	**Stop (6)**	**Flight (7)**	**Retrench (8)**	**Surge (9)**	**Stop (10)**	**Flight (11)**	**Retrench (12)**
Risk	−0.048**	0.032**	−0.043**	0.026**	−0.036**	0.036**	−0.028**	0.031**	−0.037	0.043*	−0.037	0.055**
	(0.010)	(0.004)	(0.009)	(0.005)	(0.008)	(0.004)	(0.009)	(0.005)	(0.023)	(0.023)	(0.027)	(0.021)
Liquidity	0.020**	−0.005	0.016**	0.009	0.023**	−0.015**	0.021**	0.005	0.033	−0.078**	0.034	−0.030
	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.021)	(0.030)	(0.026)	(0.031)
Interest	−0.030	0.062	−0.051	0.016	0.112**	0.125**	0.118**	0.076**	0.216	−0.504**	0.047	−0.728**
Rates	(0.037)	(0.039)	(0.039)	(0.044)	(0.024)	(0.027)	(0.027)	(0.031)	(0.235)	(0.224)	(0.194)	(0.247)
Growth	0.186**	−0.129**	0.126**	−0.137**	0.162**	−0.142**	0.109**	−0.146**	−0.250*	0.165	−0.171	0.229
	(0.052)	(0.042)	(0.055)	(0.040)	(0.047)	(0.039)	(0.052)	(0.040)	(0.138)	(0.129)	(0.147)	(0.145)
Regional	0.435**	0.668**	0.096	0.570**	0.483**	0.618**	0.278**	0.586**	0.135	0.426	0.038	0.351
Contagion	(0.203)	(0.186)	(0.139)	(0.180)	(0.146)	(0.145)	(0.126)	(0.137)	(0.246)	(0.309)	(0.258)	(0.279)
Domestic Var												
GDP	0.056**	−0.078**	0.024*	−0.052**	0.081**	−0.059**	0.041**	−0.039**	0.117**	0.000	0.023	−0.002
Growth	(0.015)	(0.016)	(0.015)	(0.015)	(0.013)	(0.018)	(0.012)	(0.015)	(0.033)	(0.041)	(0.036)	(0.034)
Obs.	***3403***	***3403***	***3403***	***3403***	***5787***	***5787***	***5787***	***5787***	***2384***	***2384***	***2384***	***2384***

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). All columns use the updated capital flow database (as of February 2021), 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.

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*.

The key results using the Forbes and Warnock (2012) sample period (columns 1–4) are in line with the original estimates, despite several changes (including revised and more complete capital flow data, corresponding changes in the episode definitions, and a smaller subset of control variables). The results continue to suggest that when global risk is high, global growth is low, and local GDP growth is low, a country is more likely to experience a sudden stop and a flight episode and less likely to experience a surge and retrenchment. In addition, contagion is significant for all types of episodes but flight; if a country in your region experiences a stop, surge, or retrenchment this quarter, you are likely to experience that type of episode next quarter. Consistent with the earlier results, changes in global interest rates are not consistently significant (at the 5% level) for the four episodes in the 1986-2009 window.[23] The one difference vis-à-vis the original results is that global liquidity is positively related to surge and flight episodes; when money supply increases in large AEs, surge and flight episodes are more likely. That said, overall the results are very similar to the baseline in Forbes and Warnock (2012).

Next, in order to assess if the role of these variables is unchanged over the longer sample period now available, columns 5–8 of Table 3 repeat the same analysis with the additional years of data, i.e., extending the end-date from 2009q4 to 2020q2. The key roles for global risk, global growth, contagion and local growth in driving the four types of episodes remain unchanged. The most striking changes are with the global long-term interest rate variable. In the original sample, global long-term interest rates were insignificant for all types of episodes. But in the extended sample the coefficients on long-term interest rates are now positive and significant for *all types* of episodes. We will explore this counterintuitive result in more detail below.

Finally, for an initial assessment of the period since the GFC, columns 9–12 of Table 3 repeat the same estimates for the post-crisis window from 2010 to 2020q2. In this shorter window, coefficient estimates are strikingly different from the original (1986-2009) and longest samples. The four variables that were important in the Forbes and Warnock (2012) sample and the full sample—global risk, global growth, contagion and local growth—all lose some significance. The coefficient on long-term interest rates is now negative and significant for stops and retrenchment episodes; in the post-GFC period, higher global long-term interest rates are significantly correlated with fewer stops and retrenchment episodes.

At face value, these results do not support concerns that the low post-GFC interest rates in advanced economies generate large surges of capital inflows. There are, however, other possible explanations for these patterns. The following section explores these issues further, such as by including a more direct measure of "unconventional" tools for monetary policy and commodity prices.

4.2. A new baseline

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 long-term 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. Our global monetary policy variable is the average shadow short rate in the US, Euro area, Japan and UK. Also, consistent with recent work highlighting the role of global oil prices (and commodity prices in general) in driving capital flows, we add a variable measuring the year-over-year change in oil prices.[24]

When this updated specification is used in Table 4 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 the comparable window.[25] Risk, global growth, regional contagion and domestic GDP growth continue to influence all types of episodes (except, at times, flight episodes, and during the pre-crisis period risk is marginally insignificant for stops). Monetary policy continues to have the counterintuitive positive coefficient for all types of episodes in the full sample, but in the pre-crisis sample it is positive and significant for stops and retrenchments (i.e., when AEs tighten monetary policy, there are more stop and retrenchment episodes) and is negative (but insignificant) for surges and flight. Global liquidity is significant in the pre-crisis period: prior to the GFC, when there was more global liquidity, surges and flight were more likely and stops and retrenchment were less likely. The results for oil prices are usually insignificant.

These results change notably, however, in the shorter post-crisis sample of 2010-2020q2 (columns 9–12). There is now no significant relationship between global risk and the incidence of any of the four 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. (2020) and Barrot and Servén (2017). Global growth has a less consistent relationship with extreme capital flow episodes and, when significant, has a counterintuitive sign. Indeed, in the short post-crisis sample period, the only variable that is often significant across specifications is oil prices; higher oil prices are associated with more surges and flight episodes and fewer stops and retrenchments.

[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.

[24] See Clark, Converse, Coulibaly and Kamin (2020).

[25] Note that the pre-crisis window ends in 2007 in order to avoid results being affected by the unusual movements in 2008–2009 and to provide a better comparison for the post-crisis window. The original analysis in Forbes and Warnock (2012), reported on the left in Table 3, included 2008–2009.

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

	Full Sample (1986–2020)				Pre-Crisis (1986–2007)				Post-Crisis (2010–2020)			
Global Vars	**Surge (1)**	**Stop (2)**	**Flight (3)**	**Retrench (4)**	**Surge (5)**	**Stop (6)**	**Flight (7)**	**Retrench (8)**	**Surge (9)**	**Stop (10)**	**Flight (11)**	**Retrench (12)**
Risk	−0.039**	0.033**	−0.030**	0.029**	−0.042**	0.021	−0.042**	0.033**	−0.028	0.006	−0.036	0.000
	(0.008)	(0.004)	(0.009)	(0.005)	(0.010)	(0.013)	(0.008)	(0.013)	(0.024)	(0.028)	(0.029)	(0.024)
Liquidity	0.019**	−0.020**	0.017**	−0.003	0.023**	−0.040**	0.017**	−0.021**	−0.006	−0.028	0.012	0.023
	(0.008)	(0.006)	(0.007)	(0.007)	(0.009)	(0.009)	(0.007)	(0.010)	(0.027)	(0.026)	(0.029)	(0.032)
Monetary	0.114**	0.129**	0.123**	0.100**	−0.027	0.178**	−0.059	0.121**	0.050	0.380**	−0.015	0.512**
Policy	(0.020)	(0.019)	(0.020)	(0.020)	(0.047)	(0.041)	(0.043)	(0.043)	(0.149)	(0.185)	(0.161)	(0.201)
Growth	0.134**	−0.187**	0.112**	−0.203**	0.160**	−0.209*	0.206**	−0.272**	−0.306**	0.048	−0.220	0.025
	(0.050)	(0.044)	(0.055)	(0.049)	(0.078)	(0.108)	(0.069)	(0.106)	(0.129)	(0.129)	(0.137)	(0.134)
Oil Prices	0.001	0.002	−0.002	0.003*	−0.001	−0.003	−0.006**	−0.000	0.011**	−0.016**	0.007*	−0.019**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)	(0.005)	(0.004)	(0.006)
Regional Contagion	0.422**	0.610**	0.229*	0.530**	0.500**	0.413**	0.055	0.421**	0.065	0.322	−0.014	0.294
	(0.146)	(0.145)	(0.130)	(0.138)	(0.214)	(0.200)	(0.146)	(0.183)	(0.256)	(0.299)	(0.280)	(0.273)
Domestic Var												
GDP	0.080**	−0.062**	0.038**	−0.041**	0.055**	−0.102**	0.019	−0.044**	0.123**	−0.001	0.024	−0.001
Growth	(0.013)	(0.017)	(0.012)	(0.015)	(0.015)	(0.020)	(0.015)	(0.019)	(0.034)	(0.040)	(0.036)	(0.033)
Obs.	***5787***	***5787***	***5787***	***5787***	***2956***	***2956***	***2956***	***2956***	***2384***	***2384***	***2384***	***2384***

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 Variables Interacted with Post-Crisis Dummy.

	Full Period (1986–2020)				Excluding Crisis Window (2008–2009)			
	Surge	**Stop**	**Flight**	**Retrench**	**Surge**	**Stop**	**Flight**	**Retrench**
Global Vars								
Risk	−0.046**	0.033**	−0.034**	0.028**	−0.042**	0.027**	−0.036**	0.035**
	(0.008)	(0.004)	(0.008)	(0.004)	(0.008)	(0.010)	(0.007)	(0.009)
Liquidity	0.015**	−0.019**	0.012**	0.001	0.018**	−0.040**	0.015**	−0.015*
	(0.006)	(0.007)	(0.005)	(0.007)	(0.007)	(0.008)	(0.006)	(0.008)
Monetary	−0.006	0.101**	−0.026	0.073**	−0.012	0.150**	−0.026	0.104**
Policy	(0.039)	(0.029)	(0.036)	(0.025)	(0.040)	(0.038)	(0.037)	(0.031)
Growth	0.248**	−0.316**	0.190**	−0.292**	0.204**	−0.223**	0.179**	−0.273**
	(0.052)	(0.048)	(0.056)	(0.046)	(0.068)	(0.088)	(0.062)	(0.088)
Oil Prices	−0.000	0.007**	−0.004**	0.006**	0.001	−0.005	−0.003	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Regional	0.439**	0.613**	0.133	0.367**	0.467**	0.492**	0.094	0.324**
Contagion	(0.149)	(0.142)	(0.117)	(0.143)	(0.153)	(0.147)	(0.121)	(0.145)
Interactions with post-crisis dummy								
Risk	0.015	−0.041**	−0.022	−0.032**	0.010	−0.028**	−0.021	−0.033**
	(0.015)	(0.011)	(0.017)	(0.012)	(0.017)	(0.013)	(0.018)	(0.013)
Liquidity	−0.025	0.002	−0.004	0.023	−0.029	0.025	−0.008	0.042
	(0.028)	(0.027)	(0.031)	(0.031)	(0.029)	(0.028)	(0.031)	(0.032)
Monetary	0.079	0.311*	0.074	0.359**	0.090	0.247	0.082	0.311*
Policy	(0.148)	(0.162)	(0.152)	(0.182)	(0.150)	(0.171)	(0.155)	(0.189)
Growth	−0.431**	0.439**	−0.349**	0.362**	−0.397**	0.381**	−0.345**	0.379**
	(0.099)	(0.095)	(0.099)	(0.106)	(0.104)	(0.112)	(0.098)	(0.115)
Oil Prices	0.011**	−0.022**	0.012**	−0.023**	0.009*	−0.011*	0.010**	−0.014**
	(0.005)	(0.005)	(0.005)	(0.007)	(0.005)	(0.006)	(0.005)	(0.007)
Obs.	***6629***	***6629***	***6629***	***6629***	***6157***	***6157***	***6157***	***6157***

Notes: See notes to Tables 3 and 4 for details on estimation and variable definitions. Table replicates analysis in Table 4 except adds an interaction term between each of the global variable and a post-crisis dummy (equal to 1 after 2009) and excludes local GDP growth. The columns on the left are for the full sample period from 1986q2-2020q2 and the columns on the right exclude the crisis years of 2008–2009. ** is significant at the 5% level and * at the 10% level.

Overall, Table 4 is consistent with the original Forbes and Warnock (2012) analysis for the pre-GFC period and full sample. In the short post-GFC sample, however, while oil prices play a larger role, many other variables are insignificant. The post-crisis "ripples" in capital flows are difficult to explain with this set of global, contagion, and local variables.

4.3. Sensitivity analysis

To test the robustness of these results, we have performed a series of sensitivity tests—only a subset of which are reported below as the key results are largely unchanged. To begin, we repeat the baseline analysis in Table 4 (excluding local GDP growth in order to maximize the sample size). Then, instead of estimating the regressions separately for a pre- and post-crisis window, we estimate the regressions for the full sample period (1986q2-2020q2) and interact a post-crisis dummy variable (equal to one after 2009) with each of the global variables. Table 5 shows the results. In order to adjust for any distortions created by the large movements during the GFC, and provide a more straightforward comparison with the results in Tables 3 and 4 that compare pre- and post-crisis windows (but exclude the GFC), the right hand columns of the table also repeat the analysis with the post-crisis dummy interactions for the full sample period excluding the volatile window of 2008–2009. We have also estimated the same regressions for the smaller sample with a control for domestic GDP growth (also including an interaction between domestic GDP growth and the post-crisis dummy).

A subset of these results is reported in Table 5 and continue to support the results from estimating the regressions in different sample periods. One global variable that has increased in importance since the GFC is oil prices. For other global variables, in the post-crisis period there has been a significant attenuation in the relationship with extreme capital flow episodes.[26] More specifically, in the pre-crisis period lower levels of risk and stronger global growth are significantly correlated with a higher incidence of surges and flight and lower incidence of stops and retrenchment, but in the post crisis window the size of these coefficients moves towards zero. For example, positive relationships (such as between global risk and sudden stops) become smaller, and negative relationship (such as between global growth and sudden stops) become larger (less negative). Moreover, not only are these relationships with the global variables attenuated in the post-crisis windows, but the changes are significant for each of the four episodes for global growth, and for stop and retrenchment episodes for risk.

As an additional series of sensitivity tests, we repeat the baseline regressions with several changes in the definitions of key variables: including different measures of risk;[27] dropping own-country data from calculations of the global interest rate and glo-

[26] Results including the control for domestic GDP growth are basically identical. The interaction between the post-crisis dummy and domestic GDP growth is positive for each of the four episodes, but only significant for surges.

[27] For example, we used changes in the VXO instead of the level, or used the Variance Risk Premium from Zhou (2018) instead of the VXO.

bal money supply;[28] measuring global monetary policy using only the US shadow rate (instead of an average of US, Euro area, Japan and UK rates); 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; excluding oil prices; and including long-term interest rates as well as the shadow rates. We also estimate several specifications that add additional variables, such as adding a control for institutional quality (using the ICRG composite measure of institutional quality) and including an out-of-region contagion variable (measured as a dummy equal to one if there is an episode outside of the region in the previous quarter). Finally, we have repeated the regression and excluded oil exporters, as changes in the structure of global energy markets or the sharp swings in energy prices over the post-crisis period could be affecting results. For this analysis, we define oil exporters as countries earning oil rents greater than 1% of GDP.[29] The results are reported in Table 6.

Across this series of sensitivity tests, there appears to be no significant relationship (at the 5% level) between global risk (and only occasionally global growth) and any of the four types of extreme capital flow episodes in the post-crisis window. In a few variants these relationships can become significant (albeit usually only at the 10% level), but these variants are not robust to small changes in specification or sample. This is a sharp change from a very robust relationship between global risk and growth in the pre-crisis (and crisis) window.

One possible reason for the changing nature of results between the pre-crisis and post-crisis windows is that sample sizes differ. To control for changes in sample size, Table 7 repeats the baseline analysis for similarly sized samples through time. Specifically, we use 10-year samples (10.5 years for the last window) that start in 1990, 1995, 2000, 2005 and 2010. The results indicate that risk starts to become important in the 1995–2004 period, especially in any sample that includes the GFC. Monetary policy has the expected effect, with looser AE monetary policy being associated with more surges (and flights) and fewer stops (and retrenchments) only during the 1995 to 2004 period. Oil prices become the most important variable in the most recent decade. Table 7 suggests that the drivers of extreme episodes are changing over time, and the results highlighted throughout this paper do not appear to be driven by changes in sample size.

5. 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 of 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 has decreased for most measures. This reduced incidence even persists during the period of heightened market volatility in the first half of 2020 as Covid-19 spread globally. Episodes in the post-GFC period (including in the first half of 2020) 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 there were more episodes for EMEs (such as of sudden stops in 2015). Moreover, the drivers of capital flow episodes appear to have changed; in post-crisis samples, global risk and global growth are no longer significantly correlated with extreme capital flow episodes and oil prices play a larger role.

These results over the last decade should be interpreted cautiously, however, as they are based on a short sample period (with only 42 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, perhaps because tighter prudential and macroprudential regulations have reduced the volume of cross-border bank flows. 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.

Future work could use the dataset and episodes identified in this paper to explore if the drivers of specific types of capital flow episodes have changed in ways that can explain these patterns in aggregate capital flows.[30] Academic research could also explore if changes in domestic policy, including macroprudential regulation, exchange rate policy, or capital controls, could be affecting these patterns of capital flows and their sensitivity to global developments.[31] If certain policies can explain these

[28] In other words, we drop Japan's interest rate from the calculation of the global interest rate and drop Japan's money supply in the calculation of global liquidity for the regression for Japan, and similarly for the US, UK and Euro area.

[29] Based on data for the year 2018 (the last widely available) from the World Bank's, *World Development Indicators*, October 2020. The countries excluded as oil exporters according to this criteria are: Bolivia, Brazil, Canada, Colombia, Indonesia, Malaysia, Mexico, Norway, Russia and Venezuela. We have also performed the same analysis using the criteria that a country is an oil exporter if fuel exports are more than 25% of total exports. This excludes 6 countries but yields very similar results to Table 6.

[30] For example, certain types of capital flows may be more affected by changes in global interest rates, and others by search for yield behavior (and therefore changes in global risk measures).

[31] For example, recent research examining the impact of macroprudential policy on capital flows include Aizenman et al. (2020), Bergant et al. (2020) and Gelos et al. (2019).

Table 6
Regression Results Excluding Oil Exporters.

	Full Sample (1986–2020)				Pre-Crisis (1986–2007)				Post-Crisis (2010–2020)			
Global Vars	**Surge (1)**	**Stop (2)**	**Flight (3)**	**Retrench (4)**	**Surge (5)**	**Stop (6)**	**Flight (7)**	**Retrench (8)**	**Surge (9)**	**Stop (10)**	**Flight (11)**	**Retrench (12)**
Risk	−0.044**	0.036**	−0.041**	0.033**	−0.045**	0.039**	−0.048**	0.043**	−0.049*	−0.003	−0.057*	−0.006
	(0.009)	(0.005)	(0.009)	(0.005)	(0.011)	(0.013)	(0.009)	(0.014)	(0.029)	(0.029)	(0.034)	(0.027)
Liquidity	0.028**	−0.020**	0.018**	−0.002	0.033**	−0.043**	0.018**	−0.025**	0.000	−0.030	0.018	0.046
	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.010)	(0.007)	(0.011)	(0.028)	(0.031)	(0.031)	(0.032)
Monetary	0.100**	0.141**	0.137**	0.103**	−0.065	0.204**	−0.041	0.141**	0.053	0.429*	−0.023	0.615**
Policy	(0.022)	(0.020)	(0.022)	(0.024)	(0.052)	(0.047)	(0.047)	(0.050)	(0.169)	(0.226)	(0.172)	(0.243)
Growth	0.141**	−0.211**	0.148**	−0.210**	0.173*	−0.313**	0.197**	−0.332**	−0.406**	0.120	−0.088	0.176
	(0.057)	(0.052)	(0.062)	(0.054)	(0.092)	(0.116)	(0.080)	(0.127)	(0.128)	(0.144)	(0.197)	(0.182)
Oil Prices	−0.000	0.004*	−0.003*	0.005**	−0.002	−0.003	−0.007**	0.003	0.011**	−0.012**	0.008	−0.023**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)	(0.008)
Regional Contagion	0.400**	0.517**	0.119	0.465**	0.457*	0.153	0.031	0.317	0.052	0.380	−0.340	0.244
	(0.173)	(0.139)	(0.155)	(0.150)	(0.277)	(0.198)	(0.190)	(0.218)	(0.286)	(0.305)	(0.302)	(0.318)
Domestic Var												
GDP Growth	0.078**	−0.066**	0.029**	−0.048**	0.058**	−0.116**	0.020	−0.050**	0.110**	−0.006	−0.016	−0.032
	(0.016)	(0.021)	(0.015)	(0.016)	(0.019)	(0.023)	(0.019)	(0.024)	(0.037)	(0.052)	(0.049)	(0.051)
Obs.	***4740***	***4740***	***4740***	***4740***	***2406***	***2406***	***2406***	***2406***	***1967***	***1967***	***1967***	***1967***

Notes: Table replicates results in Table 4 but excludes oil exporters. Oil exporters is defined as the 10 countries in the sample with oil rents greater than 1% of GDP in 2018, according to data in the World Bank's *World Development Indicators*. See notes to Table 4 for additional details on estimation and variable definitions. ** is significant at the 5% level and * at the 10% level.

Table 7
Rolling Regressions.

	1990–1999				1995–2004				2000–2009			
Global Vars	**Surge (1)**	**Stop (2)**	**Flight (3)**	**Retrench (4)**	**Surge (5)**	**Stop (6)**	**Flight (7)**	**Retrench (8)**	**Surge (9)**	**Stop (10)**	**Flight (11)**	**Retrench (12)**
Risk	−0.027	0.029	−0.014	0.022	−0.042**	0.039**	−0.018	0.036**	−0.046**	0.016**	−0.033**	0.010**
	(0.021)	(0.022)	(0.019)	(0.022)	(0.018)	(0.016)	(0.018)	(0.016)	(0.014)	(0.003)	(0.011)	(0.004)
Liquidity	−0.017	−0.005	−0.009	0.007	0.000	−0.024	−0.000	−0.028*	0.025	0.028*	0.002	0.037**
	(0.011)	(0.015)	(0.014)	(0.017)	(0.014)	(0.016)	(0.013)	(0.016)	(0.016)	(0.016)	(0.015)	(0.015)
Monetary	0.076	0.111*	0.057	0.141**	−0.138*	0.534**	−0.209**	0.263*	−0.067	0.886**	−0.130	0.722**
Policy	(0.062)	(0.063)	(0.061)	(0.058)	(0.081)	(0.177)	(0.101)	(0.159)	(0.099)	(0.160)	(0.109)	(0.165)
Growth	0.151	−0.078	0.006	−0.177	0.252*	−0.531**	0.434**	−0.630**	0.370**	−0.771**	0.340**	−0.686**
	(0.143)	(0.116)	(0.123)	(0.141)	(0.147)	(0.210)	(0.129)	(0.234)	(0.091)	(0.090)	(0.081)	(0.098)
Oil Prices	0.005	−0.011**	−0.003	−0.011**	−0.000	−0.001	−0.008**	0.004	−0.004	0.009**	−0.008**	0.008**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.006)	(0.003)	(0.002)	(0.003)	(0.002)
Regional	0.380	1.003**	0.201	0.303	0.583**	0.682**	−0.131	0.263	0.424*	0.606**	−0.054	0.019
Contagion	(0.232)	(0.270)	(0.217)	(0.230)	(0.255)	(0.287)	(0.216)	(0.239)	(0.254)	(0.251)	(0.199)	(0.247)
Obs.	***1500***	***1500***	***1500***	***1500***	***1814***	***1814***	***1814***	***1814***	***2183***	***2183***	***2183***	***2183***

	2005–2014				2010–2020			
Global Vars	**Surge (1)**	**Stop (2)**	**Flight (3)**	**Retrench (4)**	**Surge (5)**	**Stop (6)**	**Flight (7)**	**Retrench (8)**
Risk	−0.058**	0.040**	−0.030*	0.035**	−0.026	0.010	−0.031	0.004
	(0.018)	(0.005)	(0.016)	(0.006)	(0.024)	(0.025)	(0.026)	(0.022)
Liquidity	0.006	−0.002	−0.035**	−0.002	−0.007	−0.012	0.016	0.024
	(0.018)	(0.021)	(0.018)	(0.020)	(0.026)	(0.027)	(0.029)	(0.030)
Monetary	0.259**	0.228**	0.335**	0.309**	0.071	0.403**	0.029	0.437**
Policy	(0.051)	(0.060)	(0.046)	(0.069)	(0.137)	(0.171)	(0.155)	(0.184)
Growth	0.148	−0.435**	0.039	−0.528**	−0.168	0.096	−0.157	0.005
	(0.096)	(0.065)	(0.077)	(0.077)	(0.120)	(0.112)	(0.122)	(0.112)
Oil Prices	0.000	0.017**	−0.003	0.021**	0.011**	−0.017**	0.007*	−0.017**
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)	(0.004)	(0.006)
Regional	0.178	0.237	0.175	−0.362	0.184	0.283	−0.089	0.350
Contagion	(0.244)	(0.218)	(0.254)	(0.230)	(0.254)	(0.273)	(0.267)	(0.255)
Obs.	***2345***	***2345***	***2345***	***2345***	***2473***	***2473***	***2473***	***2473***

Notes: Table is similar to Table 4 but excludes local GDP growth and focuses on 10-year samples (with the last one being 10 and a half years). See notes to Table 4 for additional details on estimation and variable definitions. ** is significant at the 5% level and * at the 10% level.

more muted effects of global variables on extreme capital flow movements, economies may be less buffeted by the global financial cycle through its impact on global capital flows in the future, albeit they should not expect calm waters.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A1
Sample Coverage for Flow Data.

Country	Start Year_Qtr	End Year_Qtr	Country	Start Year_Qtr	End Year_Qtr
Argentina	1978_2	2020_2	Korea	1978_2	2020_3
Australia	1978_2	2020_3	Latvia	1993_1	2020_3
Austria	1978_2	2020_3	Lithuania	1993_1	2020_3
Bangladesh	1978_2	2020_3	Malaysia	1999_1	2020_3
Belgium-Luxembourg	1978_2	2020_3	Mexico	1979_1	2020_3
Bolivia	1988_1	2020_2	Netherlands	1978_2	2020_3
Brazil	1978_2	2020_3	NewZealand	1980_1	2020_3
Canada	1978_2	2020_3	Norway	1978_2	2020_3
Chile	1991_1	2020_3	Panama	1998_1	2020_2
China	1998_1	2020_3	Peru	1991_1	2020_3
Colombia	1996_1	2020_3	Philippines	1978_2	2020_3
Costa Rica	1999_1	2020_3	Poland	1985_1	2020_3
Croatia	1993_1	2020_3	Portugal	1978_2	2020_3
Czech Republic	1993_1	2020_3	Romania	1991_1	2020_3
Denmark	1978_2	2020_3	Russia	1994_1	2020_3
Estonia	1992_1	2020_3	Singapore	1995_1	2020_3
Finland	1978_2	2020_3	SlovakRep	1993_1	2020_3
France	1978_2	2020_3	Slovenia	1992_1	2020_3
Germany	1978_2	2020_3	SouthAfrica	1985_1	2020_3
Greece	1999_1	2020_3	Spain	1978_2	2020_3
Guatamala	1978_2	2020_3	Sri Lanka	1978_2	2020_3
Hong Kong	1999_1	2020_3	Sweden	1978_2	2020_3
Hungary	1989_4	2020_3	Switzerland	1999_1	2020_3
Iceland	1978_2	2020_3	Taiwan	1981_1	2020_3
India	1978_2	2020_3	Thailand	1978_2	2020_3
Indonesia	1981_1	2020_3	Turkey	1984_1	2020_3
Ireland	1981_1	2020_3	UK	1978_2	2020_3
Israel	1978_2	2020_3	US	1978_2	2020_3
Italy	1978_2	2020_3	Venezuela	1994_1	2019_1
Japan	1978_2	2020_3			

Notes: Reports start and end dates for the capital flow data used to calculate the four types of episodes. To qualify as an episode, a country must have 28 quarters of flow data, so countries for which capital flow data begin in 1978q2 can have their first episode in 1985q1. Note that because episodes must last at least two quarters, we also pulled 2020Q3 data so we could determine if an episode began in 2020Q2; only Argentina, Bolivia and Panama (and Venezuela) did not yet have 2020Q3 data.

Table A2
Median Growth in Capital Flows by Type of Flow and Country Group.

	Capital Inflows				Capital Outflows			
	Full Period	**1985–2009**	**1997–2007**	**2010–2020**	**Full Period**	**1985–2009**	**1997–2007**	**2010–2020**
Full Sample								
Total Flows	2.8%	4.2%	7.8%	0.6%	5.8%	8.6%	7.4%	3.5%
FDI	5.4%	7.5%	8.6%	3.5%	6.3%	7.8%	10.0%	3.0%
Portfolio Debt	0.2%	3.4%	5.5%	−4.4%	12.8%	19.3%	12.9%	4.9%
Portfolio Equity	−2.7%	7.6%	7.9%	2.5%	−0.7%	6.3%	15.1%	0.4%
Bank and Other	1.1%	6.3%	5.3%	4.0%	−1.8%	3.6%	9.9%	−9.5%
Advanced Economies								
Total Flows	3.5%	5.3%	8.5%	−3.9%	−1.0%	6.6%	7.5%	2.1%
FDI	4.6%	5.9%	10.2%	3.6%	4.6%	6.3%	9.2%	3.8%
Portfolio Debt	0.2%	11.0%	8.4%	−7.1%	11.5%	20.7%	8.0%	1.8%
Portfolio Equity	0.3%	10.5%	8.4%	7.6%	−0.7%	6.3%	14.8%	2.8%
Bank and Other	−3.1%	6.4%	8.4%	−6.8%	−17.3%	3.0%	17.2%	−30.8%
Emerging Markets								
Total Flows	−0.3%	0.2%	5.7%	2.5%	9.7%	14.7%	5.8%	4.0%
FDI	7.5%	7.5%	6.3%	3.5%	10.0%	12.6%	15.0%	2.6%
Portfolio Debt	−0.7%	−0.2%	−9.5%	1.1%	24.5%	16.0%	16.8%	10.3%
Portfolio Equity	−3.7%	3.2%	3.9%	−15.5%	7.0%	8.4%	15.1%	0.4%
Bank and Other	7.9%	4.3%	3.8%	8.8%	2.6%	5.4%	0.9%	−5.9%

Note: Capital flows measured over four quarters. Growth rate is calculated for each country relative to previous four quarters.

Table A3
Capital Flow Episodes (for Total Capital Flows).

	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
			2018q4	2020q1	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	2016q1	2016q4	2006q2	2007q1	2016q1	2016q4
	2006q2	2007q1	2019q1	2019q2				
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	2019q4	2020q2
	2006q3	2007q2	2019q2	2020q1	2017q4	2019q1		
	2008q2	2008q4						
	2010q1	2010q2						
	2017q1	2018q3						
Belgium-Luxembourg	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	2017q1			2016q1	2017q1
			2018q2	2019q1			2018q2	2019q1
Bolivia	1996q1	1996q3	1999q2	2001q2	2001q1	2001q2	2004q3	2005q1
	1997q4	1998q4	2006q3	2007q2	2003q3	2004q1	2006q2	2006q3
	2007q3	2008q4	2014q3	2015q3	2008q4	2009q3	2010q2	2010q4
	2013q3	2013q4			2012q1	2013q1	2014q3	2015q3
Brazil	1990q2	1991q1	1993q1	1993q3	1987q4	1988q3	1985q2	1985q4
	1992q2	1992q3	1995q1	1995q2	1994q2	1994q4	1992q1	1992q4
	1994q1	1994q3	1999q1	1999q2	1998q3	1999q2	1997q4	1998q2
	1995q4	1996q2	2008q2	2009q3	2006q4	2007q3	2008q1	2008q3
	2006q3	2007q4	2015q3	2016q2			2015q2	2015q4

(*continued on next page*)

Table A3 (*continued*)

	Surge		Stop		Flight		Retrenchment	
	Start	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**
Canada	1996q4	1997q3	1991q2	1991q3	1994q2	1994q4	1985q2	1985q3
	2000q1	2001q1	1995q2	1996q1	1996q4	1997q3	1993q2	1993q3
	2006q2	2007q1	2008q4	2009q2	2000q1	2001q1	1998q1	1998q3
			2020q2		2006q2	2007q1	2008q4	2009q3
							2020q2	
Chile	2005q4	2006q3	2000q2	2001q1	1998q2	1999q4	2000q2	2000q4
	2007q4	2008q3	2009q1	2009q4	2006q1	2006q4	2008q3	2009q3
	2017q4	2018q2	2013q3	2014q1	2007q3	2008q1	2018q4	2019q1
	2019q3	2020q2			2010q1	2010q3		
					2019q4	2020q2		
China	2007q2	2007q3	2008q3	2009q3	2005q4	2007q1	2008q4	2009q4
	2010q1	2011q2	2012q2	2012q4	2016q3	2017q1	2017q3	2018q2
	2016q4	2017q3	2014q4	2015q4				
Colombia	2005q4	2006q3	2015q2	2016q3	2006q2	2006q3	2002q4	2003q1
	2010q4	2011q2			2013q4	2014q2	2007q2	2007q3
	2013q4	2014q2					2012q4	2013q2
Costa Rica	2005q4	2006q3	2008q4	2009q4	2006q1	2006q3	2014q4	2015q3
	2020q2		2014q2	2015q3	2012q1	2012q4		
					2013q4	2014q1		
					2020q2			
Croatia	2002q4	2004q1	2004q4	2005q3	2006q4	2007q3	2001q4	2002q1
	2013q3	2014q3	2010q2	2010q4	2014q2	2014q4	2004q4	2005q4
			2015q3	2016q2	2020q1	2020q2		
Czech Republic	2002q3	2003q1	2003q2	2004q1	2003q3	2005q1	2000q1	2000q4
	2004q2	2005q3	2006q2	2006q4	2007q2	2008q3	2002q1	2002q3
	2016q4	2017q4	2008q4	2009q3	2017q3	2018q2	2008q4	2009q4
			2018q1	2018q4			2020q2	
Denmark	1985q4	1986q3	1986q4	1987q2	1985q4	1986q3	1986q4	1987q2
	1995q3	1996q2	1989q2	1989q4	1993q3	1994q2	1992q2	1993q2
	2005q1	2005q4	1991q4	1993q2	1999q4	2001q1	1994q3	1995q1
	2019q4	2020q2	1994q3	1995q1	2005q2	2005q4	2001q2	2002q2
			2001q2	2002q1	2019q4	2020q2	2008q3	2009q4
			2008q4	2009q4			2018q4	2019q2
			2018q4	2019q1				
Estonia	2003q1	2005q1	1998q4	1999q3	2001q1	2001q2	1998q4	1999q1
	2006q4	2007q4	2008q2	2009q3	2003q3	2005q3	2000q1	2000q2
			2015q1	2015q4	2007q2	2008q1	2008q2	2009q3
Finland	1987q1	1987q4	1985q4	1986q2	1985q1	1985q2	1985q4	1986q2
	1990q1	1990q4	1991q1	1992q2	1986q3	1987q1	1987q3	1987q4
	1998q4	1999q1	2001q1	2002q1	1988q3	1989q1	1992q1	1992q3
	2004q3	2004q4	2009q2	2009q3	1993q1	1993q3	2001q1	2002q2
	2008q2	2008q3	2012q3	2013q3	1998q4	1999q1	2009q2	2009q3
	2011q3	2011q4	2020q1	2020q2	2000q1	2000q4	2012q3	2013q3
					2008q2	2008q3	2020q1	2020q2
					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	2020q2		2001q1	2001q2	2020q2	
	2005q3	2006q3			2005q3	2006q1		
Germany	1986q1	1986q4	1987q4	1988q3	1985q1	1985q2	1987q3	1988q2
	1989q2	1990q1	1994q1	1994q4	1986q1	1986q4	1990q4	1992q2
	1992q3	1993q3	2001q1	2002q2	1988q4	1989q4	2000q4	2002q2
	2000q1	2000q3	2008q3	2009q3	1993q1	1993q4	2008q2	2009q3
	2005q2	2005q4			2005q1	2005q4		
	2007q2	2008q1						
Greece	2007q2	2007q4	2006q1	2006q4	2007q2	2007q4	2006q1	2006q4
			2010q2	2011q2	2012q1	2012q4	2010q3	2011q2
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
			2014q4	2015q3	2013q3	2014q2	2008q4	2009q1
							2014q4	2015q2
							2017q2	2017q3

Table A3 (*continued*)

	Surge		Stop		Flight		Retrenchment	
	Start	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**
Hong Kong	2007q3	2008q1	2008q3	2009q3	2007q2	2008q1	2008q3	2009q3
Hungary	2003q1	2003q4	1996q4	1997q1	2001q2	2002q3	2009q1	2010q2
	2005q1	2006q1	2009q1	2010q2	2003q4	2004q2	2017q4	2018q3
	2007q2	2008q1	2017q4	2018q3	2005q2	2006q1		
	2016q4	2017q3			2007q2	2008q1		
	2019q4	2020q2			2016q4	2017q3		
					2019q4	2020q2		
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	2009q3	1999q2	1999q4	2008q1	2009q2
	2017q1	2017q2	2016q1	2016q3	2003q1	2006q1		
	2018q3	2019q2			2018q3	2019q2		
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	1989q3	1990q2	1991q3	1992q2	1987q4	1988q1	1991q4	1992q2
	1992q4	1993q4	2008q2	2009q3	1989q3	1990q1	2008q2	2009q3
	1995q3	1996q3	2016q4	2017q1	1992q3	1993q1	2016q4	2017q1
	1997q4	1999q1	2018q2	2019q1	1995q4	1996q3	2018q2	2019q1
	2003q3	2004q2			1997q4	1998q4		
	2005q2	2006q1			2003q3	2004q2		
	2007q1	2007q3			2005q3	2006q1		
	2014q3	2015q1			2007q1	2007q3		
					2014q3	2015q1		
Israel	1989q4	1990q3	1985q2	1985q3	1986q2	1987q1	1991q1	1991q3
	1995q3	1996q1	1988q3	1989q2	1990q1	1990q2	1995q2	1995q3
	1999q3	2000q1	1998q2	1999q1	1992q1	1992q3	2001q2	2002q2
	2006q3	2006q4	2001q1	2002q2	1998q1	1998q4	2007q3	2009q3
	2013q1	2013q3	2007q4	2009q2	2006q1	2006q4		
	2020q1	2020q2	2011q4	2012q3				
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	2016q3
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	1985q2	1985q4	1989q3	1989q4
	1994q3	1995q4	1997q2	1998q4	1986q4	1987q2	1997q3	1999q1
	2009q4	2010q2	2008q2	2009q3	1988q3	1989q1	2008q3	2009q3
	2016q4	2017q3	2015q3	2016q2	1990q2	1990q3	2015q2	2016q3
					1994q2	1995q4		
					2002q4	2004q3		
					2006q1	2007q4		
					2016q4	2017q2		
Latvia	2003q2	2005q1	2008q3	2009q3	2006q2	2007q4	2005q3	2006q1
	2006q2	2007q4	2015q2	2016q1	2014q1	2015q1	2008q3	2009q2
			2018q3	2018q4			2015q2	2015q4
Lithuania	2004q2	2004q3	2000q4	2001q3	1999q4	2000q3	2001q2	2001q3
	2005q3	2006q2	2008q3	2009q4	2004q1	2006q1	2008q3	2009q3
	2006q4	2008q1	2018q4	2019q4	2007q3	2008q2	2017q4	2018q3
					2015q1	2015q4		
					2020q2			
Malaysia	2007q1	2008q1	2005q4	2006q3	2006q2	2007q4	2008q3	2009q2
	2009q4	2010q3	2008q3	2009q2	2009q4	2010q3	2015q1	2016q1
	2016q3	2016q4						

(*continued on next page*)

Table A3 (*continued*)

	Surge		Stop		Flight		Retrenchment	
	Start	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**
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	2015q4	2004q3	2005q2	2006q4	2007q2
					2020q1	2020q2	2008q4	2009q3
							2017q4	2018q2
Netherlands	1985q3	1987q1	1990q4	1991q4	1986q2	1987q1	1990q4	1992q1
	1997q4	1998q4	2002q1	2002q4	1989q1	1989q2	2002q1	2002q4
	2004q3	2007q1	2008q2	2009q3	1989q4	1990q2	2008q1	2009q3
	2019q4	2020q2	2017q2	2019q2	1997q4	1998q4	2018q1	2019q2
					2003q4	2005q3		
					2006q1	2007q1		
					2016q1	2016q2		
					2019q4	2020q2		
New Zealand	1986q4	1987q2	1987q4	1988q3	1986q4	1987q2	1988q1	1989q1
	2001q1	2002q2	1998q3	1999q2	1989q2	1990q2	2000q2	2000q4
	2004q3	2004q4	2005q3	2006q2	1993q3	1994q2	2002q4	2003q4
	2006q3	2007q3	2008q2	2009q2	2001q3	2002q2	2005q3	2006q1
					2006q3	2007q4	2012q1	2012q3
					2011q1	2011q2		
Norway	1985q1	1985q3	1988q3	1989q2	1986q3	1987q3	1987q4	1988q4
	1992q4	1993q2	1991q3	1992q2	1994q3	1995q3	1992q2	1994q1
	1996q2	1997q1	1997q4	1998q1	2000q2	2001q2	1999q2	1999q3
	2000q3	2001q1	2001q3	2002q1	2005q4	2007q1	2001q4	2002q3
	2002q4	2003q2	2007q4	2009q4	2010q4	2011q1	2007q4	2008q2
	2005q4	2007q1					2009q2	2010q1
	2010q3	2011q1						
Panama	2014q4	2015q2	2008q4	2009q4	2018q4	2019q2	2008q4	2009q3
	2018q4	2019q1					2015q4	2016q4
Peru	2006q4	2008q2	1998q4	1999q3	2001q1	2001q2	2007q4	2008q3
	2019q1	2019q3	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	2019q2	2020q1	2020q2			2015q4	2016q3
Poland	1997q3	1998q2	1996q3	1997q1	1997q2	1998q2	1993q2	1993q3
	2003q4	2004q4	2001q4	2002q3	2004q2	2005q1	2002q3	2002q4
	2007q1	2008q2	2008q4	2009q3			2008q3	2009q3
Portugal	1988q4	1990q2	1992q3	1993q2	1990q2	1991q2	1987q4	1988q1
	1994q3	1995q3	1999q3	1999q4	1993q1	1993q4	1989q4	1990q1
	2003q4	2004q2	2002q2	2003q1	2003q3	2004q1	1992q1	1992q2
	2010q1	2010q2	2004q4	2005q2	2009q4	2010q2	1996q1	1996q3
			2010q4	2011q4			1999q3	1999q4
							2004q3	2005q2
							2010q4	2011q3
Romania	2000q4	2001q2	2008q3	2010q1	2003q4	2004q1	2010q3	2011q1
	2004q1	2005q3			2004q4	2005q3	2019q1	2019q3
	2006q4	2007q4			2007q1	2007q2		
	2016q1	2016q3			2018q1	2018q3		
Russia	2003q2	2004q2	2008q4	2009q3	2003q2	2004q2	2001q3	2002q2
	2007q1	2008q1	2014q1	2015q2	2007q2	2009q1	2009q3	2010q3
Singapore	2007q1	2008q1	2008q3	2009q3	2007q1	2008q1	2008q3	2009q3
	2020q1	2020q2	2015q4	2016q1			2015q4	2016q1
			2019q1	2019q2				
Slovak Republic	2004q3	2005q2	2012q2	2012q4	2013q2	2013q4	2006q3	2006q4
	2013q2	2014q1					2010q2	2010q3
							2015q3	2015q4
Slovenia	2002q3	2003q2	2008q3	2009q3	1998q4	1999q2	2008q1	2009q3
	2007q1	2007q4			2002q4	2003q3	2015q4	2016q1
	2014q2	2014q4			2005q3	2006q2		
					2007q1	2007q4		
					2014q3	2014q4		

Table A3 (*continued*)

	Surge		Stop		Flight		Retrenchment	
	Start	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**
South Africa	1994q3	1995q4	1998q3	1999q2	1991q4	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	2019q4	2020q2
			2020q1	2020q2	2006q1	2006q4		
					2017q1	2018q1		
Spain	1987q1	1988q2	1985q2	1986q2	1988q2	1989q1	1987q1	1987q3
	1990q4	1991q3	1994q2	1995q1	1990q1	1991q2	1994q2	1995q1
	1993q2	1993q4	2001q3	2002q2	1992q3	1993q4	2001q3	2002q2
	2000q3	2001q2	2007q4	2009q3	2014q2	2015q1	2007q3	2009q3
	2005q1	2006q2						
	2014q2	2015q1						
Sri Lanka	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	1985q3	1987q3	1991q2	1992q2	1986q2	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	2005q4	2006q2	2008q1	2009q1	2005q4	2006q1	2008q1	2009q1
	2007q3	2007q4	2018q1	2019q1			2017q3	2019q1
Taiwan	1987q4	1988q4	1991q2	1992q1	1989q2	1989q3	1998q2	1998q3
	1990q1	1990q4	1997q1	1997q4	1996q4	1997q3	2004q4	2005q2
	1996q1	1996q3	2002q2	2003q1	2003q3	2004q2	2008q4	2009q3
	1999q4	2000q2	2008q2	2009q2	2009q4	2010q3	2019q1	2019q3
	2003q3	2004q2	2014q4	2015q4	2016q3	2017q2		
	2009q4	2010q2						
	2013q2	2014q2						
Thailand	1987q4	1990q3	1992q1	1992q4	1985q2	1986q1	1986q4	1988q4
	1995q2	1996q1	1996q3	1998q2	1989q3	1990q2	1991q2	1991q4
	2004q3	2006q1	2007q1	2007q2	1993q2	1994q2	1996q3	1997q2
	2009q4	2010q4	2008q2	2009q1	2005q1	2006q2	2008q1	2008q4
			2011q4	2012q3	2009q4	2010q1	2015q2	2016q1
							2020q2	
Turkey	1992q3	1993q4	1991q3	1991q4	1991q1	1991q2	1994q3	1995q3
	2000q1	2000q3	1994q2	1995q1	1995q4	1996q3	2009q2	2010q1
			2001q1	2001q4	2006q4	2007q3	2016q2	2017q1
			2007q4	2008q2			2020q1	2020q2
			2008q4	2009q4				
UK	1985q3	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	2016q3	2017q1	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		

Note that underlying flows data were collected through 2020Q3, so (i) any episode that ends in 2020Q2 truly does and (ii) any episode that starts in 2020Q2 extends into 2020Q3.

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