

Staff Discussion Paper/Document d'analyse du personnel 2016-10

# What to Expect When China Liberalizes Its Capital Account



by Mark Kruger and Gurnain Kaur Pasricha

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April 2016

# **What to Expect When China Liberalizes Its Capital Account**

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## **Acknowledgements**

We would like to thank Huiyang (Helen) Liu, Arthur (Min Jae) Kim and Marie (Yumeng) Chen for excellent research assistance, and Carolyn Wilkins, Dmitri Tchegotarev and Paul Chilcott for helpful comments and suggestions.

## Abstract

When China joined the World Trade Organization in December 2001, it marked a watershed for the world economy. Ten years from now, the opening of China's capital account and the financial integration that will unfold will be viewed as a milestone of similar importance. This paper discusses the benefits, to China and the rest of the world, of deepening China's capital account liberalization. We assess China's current level of de jure and de facto integration, in relation to other G20 economies. We update the Pasricha et al. (2015) data on capital control actions to 2015 for China, to assess China's international financial integration. We also look at its relative international investment position to gauge its de facto integration. We then estimate the size and composition of capital flows likely to ensue assuming that China's further capital account liberalization results in its gross international investment position converging to that of the G20 average. In addition, we discuss the risks involved with the further opening of China's capital account and how they can best be managed. We also emphasize the potentially stabilizing effects of residents' flows and the importance of liberalizing inflows and outflows in a balanced way and at the same time.

*JEL classification: F31; F32; G18*

*Bank classification: International topics; Exchange rate regimes; Balance of payments and components*

## Résumé

L'adhésion de la Chine à l'Organisation mondiale du commerce en décembre 2001 a marqué un véritable tournant dans l'économie mondiale. D'ici dix ans, l'ouverture du compte de capital et l'intégration financière de ce pays seront perçues comme une étape d'égale importance. Dans cet article, nous exposons les avantages que la Chine et le reste du monde peuvent tirer de la libéralisation accrue du compte de capital chinois. Nous évaluons l'ampleur actuelle de l'intégration de jure et de facto de la Chine par rapport à d'autres économies du G20. Nous actualisons les données de Pasricha et coll. (2015) sur les mesures de contrôle des capitaux en Chine jusqu'en 2015 pour mesurer l'intégration financière de ce pays dans l'économie mondiale. Nous examinons également la position extérieure chinoise pour chiffrer l'intégration de facto de la Chine. Nous évaluons ensuite la taille et la composition éventuelles des flux de capitaux dans l'hypothèse où la libéralisation accrue du compte de capital chinois générerait une position extérieure brute se rapprochant de la moyenne du G20. En outre, nous abordons les risques associés à cette ouverture accrue du compte de capital et étudions la meilleure façon de les maîtriser. Nous attirons également l'attention sur les effets potentiellement stabilisateurs

des mouvements de capitaux des résidents et sur l'importance de libéraliser de manière équilibrée et simultanée les entrées et sorties de fonds.

*Classification JEL : F31; F32; G18*

*Classification de la Banque : Questions internationales; Régimes de taux de change;*

*Balance des paiements et composantes*

## I. Introduction

When China joined the World Trade Organization in December 2001, it marked a watershed for the world economy. Over the decade that followed, China used its newfound market access to integrate its massive labour market with those of its trading partners. Ten years from now, the opening of China's capital account and the financial integration that will unfold will be viewed as a milestone of similar importance. Just as the global economy benefited from the integration of China's labour market, it also stands to gain from its greater financial integration. To be sure, the process has to be well managed. China has a very large economy. However, its financial integration with the rest of the world has been relatively limited to date. This means that further capital account liberalization will likely result in large, two-way flows and that the Chinese financial system needs to be ready to deal with larger volumes and potentially much greater volatility.

This paper assesses the size and composition of capital flows likely to materialize when China liberalizes. It also discusses the benefits of liberalization and ways in which the risks can be managed. The paper is organized into eight sections. Section II looks at the status quo – it measures the extent of China's openness in both de jure and de facto terms. We update the Pasricha et al. (2015) data on capital control actions through 8 September 2015 for China. Section III estimates the size and composition of capital flows likely to ensue assuming that China's further capital account liberalization results in its gross international investment position converging to that of the G20 average. Section IV discusses the benefits, to China and the rest of the world, of deepening China's capital account liberalization. Section V discusses the risks involved and how they can best be managed. A contribution of this paper is its emphasis on the potentially stabilizing effects of residents' flows and the importance of liberalizing inflows and outflows in a balanced way and at the same time. Section VI provides empirical support for the potential stabilizing role of resident outflows during crises, using a methodology adopted by Forbes and Warnock (2012). Section VII presents options for the rest of the world to manage the risks involved with the potentially very large flows. Section VIII concludes.

## II. How Financially Open Is China Compared to Its Peers?

Financial openness can be evaluated by de jure or de facto measures. De jure measures assess the types of transactions that are subject to capital controls as well as changes in the restrictiveness of such controls.<sup>1</sup> De facto measures assess the size of actual capital flows or of a country's foreign

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<sup>1</sup> A country's financial transactions with non-residents are recorded in three separate "accounts" in the balance of payments (BOPS): the "Current Account," which records transactions related to the sale or purchase of goods and services or the receipt of income; the "Reserve Account," which records the sale and purchase of foreign exchange reserves by central banks; and the "Capital Account," which records transactions related to financial assets and liabilities by residents other than the central bank. In this paper, we follow the standard terminology and refer to capital

asset and liability positions.<sup>2</sup> In this paper, we use both methods to assess China's financial openness.

Over the years, China has taken a number of steps to liberalize its capital controls. Figure 1, Panel a updates the Pasricha et al. (2015) dataset on changes in capital controls through 8 September 2015 for China. It plots the cumulative sum of the net inflow easing measures (i.e., the number of inflow easing measures less the number of inflow tightening measures, cumulated since 1 January 2001) and net outflow easing measures. Although we do not control for the relative importance of each of these measures, these data are useful indicators of the overall direction of policy. The figure shows that China's policy-makers have, on balance, liberalized both inflows and outflows since 2001.

The timing of the policy actions suggests that policy actively responded to the pressure of net capital flows.<sup>3</sup> Between 2004 and 2010, large net capital inflows as well as a sizable current account surplus put upward pressure on the renminbi (RMB). As a result, the authorities took several measures to tighten restrictions on inflows and ease restrictions on outflows – both of these measures discourage net capital inflows. Since 2011, with smaller current account surpluses putting less pressure on the currency to appreciate, the authorities have taken some important measures to further liberalize inflows:

- they allowed the RMB raised offshore to be invested in onshore financial markets;
- they made it easier for Chinese companies to obtain foreign currency bank loans or issue renminbi bonds abroad;
- however, since 2014, they have tightened controls on outflows somewhat, in the face of accelerating downward pressure on the currency.

Despite the longer-term trend toward greater liberalization, China's capital controls remain relatively restrictive, on a de jure basis, when compared to other major emerging-market countries. Fernández et al. (2015) have developed a measure that captures the presence of restrictions on 32 types of transactions covering 10 capital account asset classes. Although this measure does not capture the severity of restrictions for each asset class, the extensiveness of the restrictions suggests that China's capital account remains one of the most tightly closed among major emerging economies (Figure 1, Panel b).

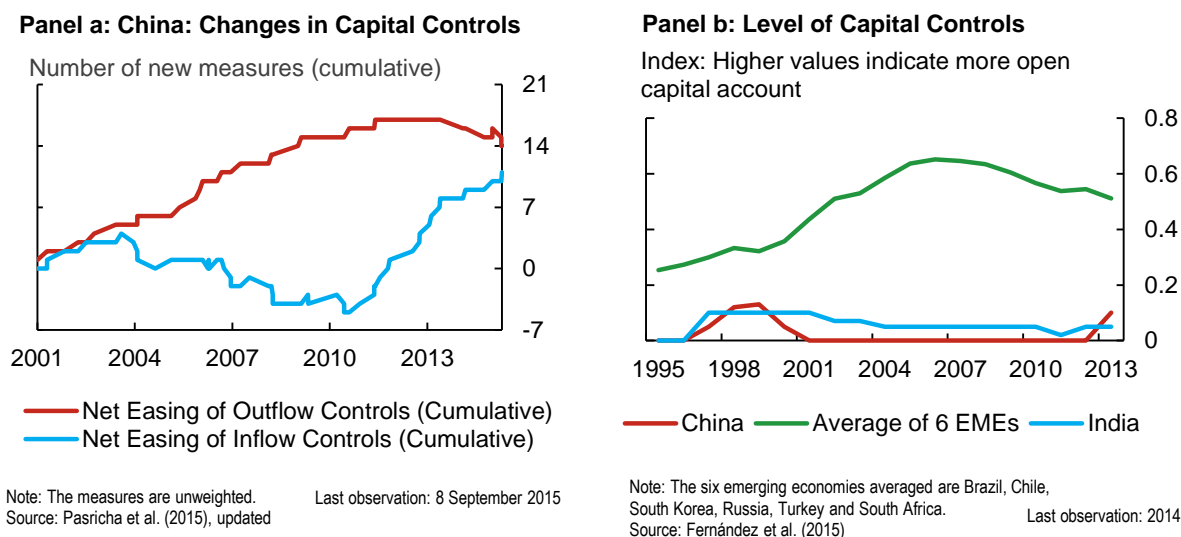
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flows as the transactions recorded in the capital account (which the International Monetary Fund (IMF) refers to as the financial account). Capital controls are restrictions on these transactions. Note that we ignore transactions that relate to unremunerated capital transfers, for example, debt forgiveness. Unless otherwise specified, we do not include errors and omissions in gross and net capital flows.

<sup>2</sup> A third type of de facto measure looks at the price differentials between domestic and foreign financial markets, for example, covered interest differentials of American depository receipt premiums. However, we do not use these measures in this note.

<sup>3</sup> For a full list of measures since 2010, see the appendix, Tables A1 (inflow controls) and A2 (outflow controls).

**Figure 1: Despite recent liberalization, China’s capital account policy remains among the most restrictive**



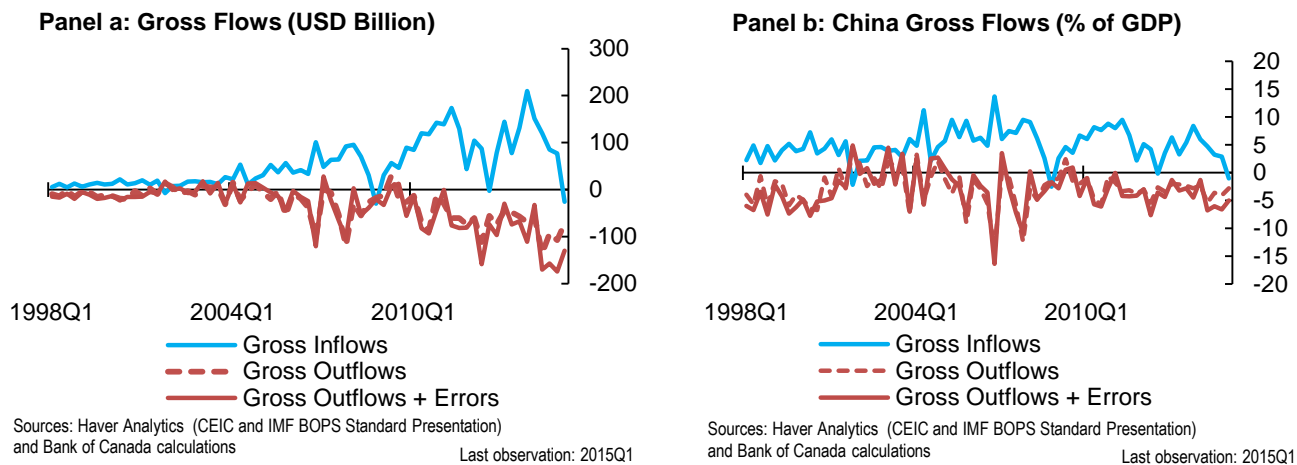
China’s capital controls appear to have restrained its cross-border financial activity: de facto measures show that China is less financially integrated than other major economies. China’s gross capital flows have grown substantially in US-dollar terms since 1998 (Figure 2, Panel a). However, the increase in gross flows has only kept pace with that of the economy, and relative to GDP, these flows have not shown an upward trend (Figure 2, Panel b). Over the past decade, China’s gross inflows and outflows, relative to GDP, have been lower than those experienced by advanced and other major emerging-market countries (Figure 3). China’s gross inflows averaged close to 6 per cent of GDP per year between 2004Q1 and 2015Q1, while gross outflows averaged 3 per cent of GDP over the same period. In contrast, the average for the 23 advanced and emerging economies in Figure 7 is close to 9 per cent of GDP for gross inflows and just over 8 per cent of GDP for gross outflows.

China’s stocks of international assets and liabilities, relative to GDP, are also small compared to those of other major economies (Figure 4). In 2014, foreign assets (excluding official reserves) and liabilities were only 21 and 32 per cent of the G20 average, respectively.

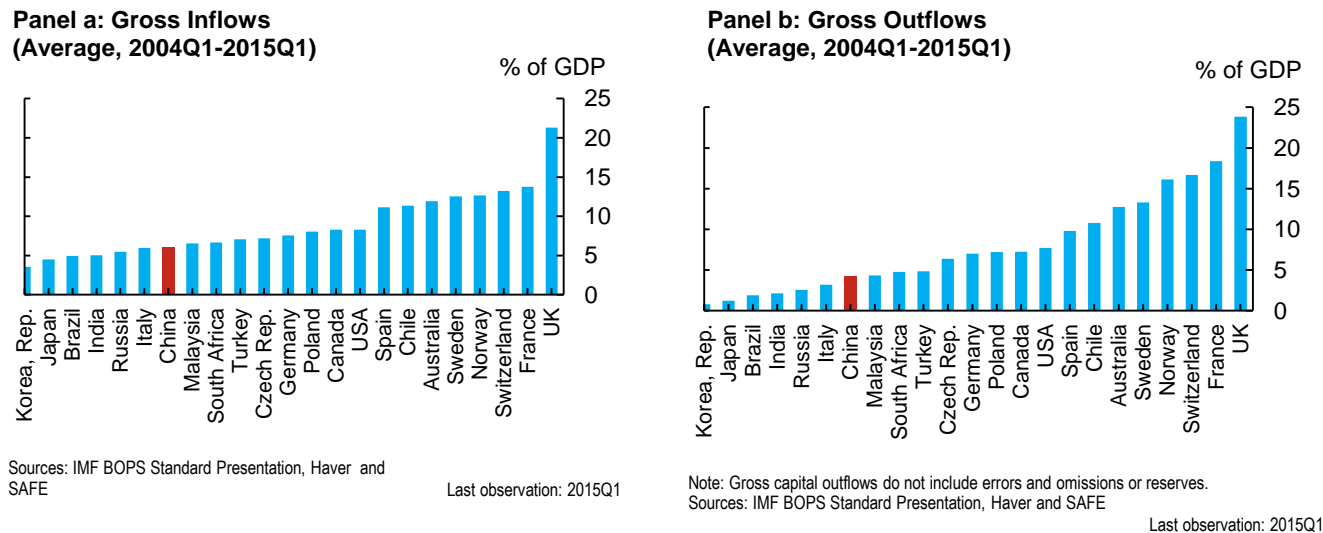
Both flow and stock measures show a relatively greater discrepancy between China and other major economies in terms of private outflows. This suggests that taking money out of China is harder than bringing it in.



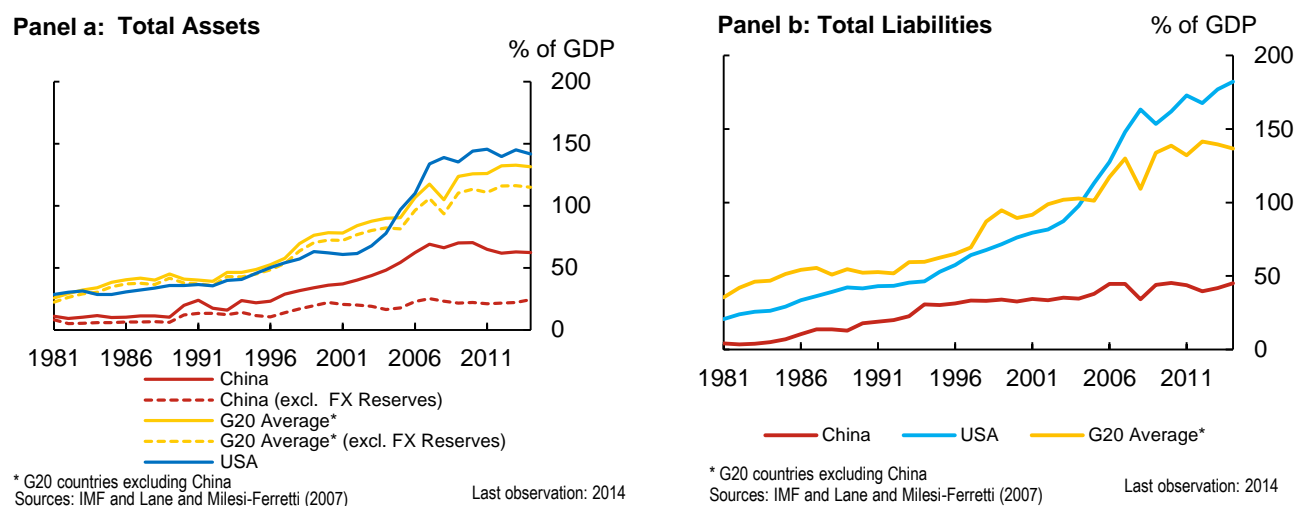
**Figure 2: China's gross flows have increased over time, in pace with GDP**



**Figure 3: China's gross flows are low relative to advanced and many emerging economies**



**Figure 4: China’s foreign balance sheet is relatively small**



### III. What Will Happen to Capital Flows When China Liberalizes Its Capital Account?

China’s capital flows will likely grow as a share of world GDP, even without further capital account liberalization. If China’s gross flows simply continue to grow at the same pace as its GDP, they will rise relative to the size of the global economy. This effect has been termed “catch-up growth” by Hooley (2013 Q4). If China does liberalize its capital account, as policy-makers have promised, then we can make three tentative predictions:<sup>4</sup>

1. Both gross inflows and gross outflows will grow rapidly

This prediction follows from the analysis in Section II, which showed that, as a per cent of GDP, China’s current levels of gross flows as well as its external balance sheet are small relative to other major economies (Figures 2 and 3). Assuming that Chinese financial integration converges to the average of the sample of countries shown in Figure 4, capital account liberalization will close this “openness gap,” and generate large gross inflows and outflows.

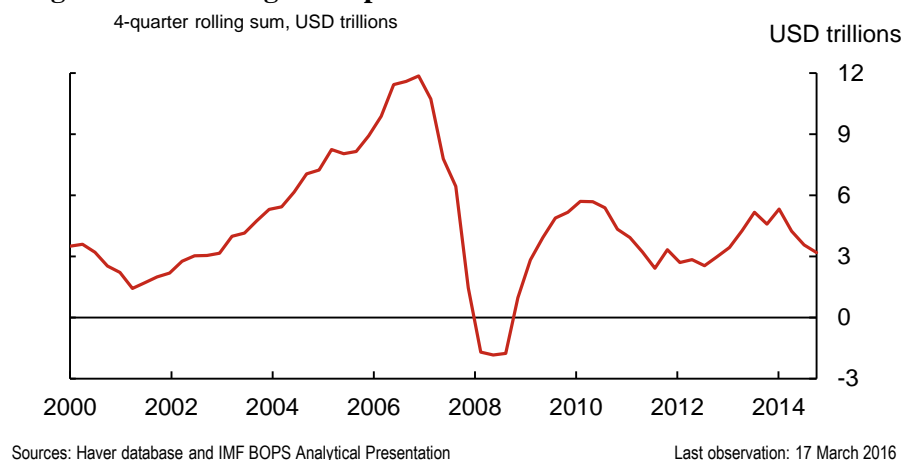
Previous research suggests that China’s capital account liberalization will likely have a large impact on international financial markets. Hooley (2013 Q4) estimates that China’s external assets and liabilities could each increase from less than 5 per cent of world GDP today, to over 30 per cent of world GDP by 2025 – a position similar to that of the United States today. Hatzvi et al. (2015) estimate that if China’s gross portfolio flows were equivalent to 5 per cent of GDP (the

<sup>4</sup> Similar conclusions are reached by Bayoumi and Ohnsorge (2013) and Sedik and Sun (2012) using an econometric model of portfolio allocation applied to a broad sample of advanced and emerging economies.

level of flows seen in South Korea and Malaysia), they would have amounted to US\$530 billion in the year to June 2015. This would have made China the third largest economy in terms of portfolio capital flows, behind the United States and the euro area.

Our back-of-the-envelope calculations confirm that additional Chinese capital account liberalization would result in a large volume of flows. We assume that, over time, with the reduction of capital controls, China’s stock over international assets and liabilities will converge, as a per cent of GDP, to those of other major economies. In particular, China’s non-reserve assets currently stand at 24 per cent of GDP, compared to 115 per cent of GDP for the G20 countries (excluding China). Over time, then, China’s international assets should grow by 91 per cent of GDP. Since China’s GDP is US\$11 trillion, this implies a stock adjustment of US\$9.8 trillion. If this stock adjustment process takes 20 years, capital “outflows” from China would increase by US\$0.5 trillion per year.<sup>5</sup> Figure 5 shows that since the crisis, world gross capital inflows were about US\$4 trillion per year. This implies that the liberalization of outflows from China would increase global inflows by 13 per cent per year for 20 years.

**Figure 5: World gross capital inflows**



We can conduct a similar exercise for China’s international liabilities. Chinese international liabilities are currently 45 per cent of GDP, while those of the G20 countries, excluding China, are, on average, 137 per cent of GDP. Over time, then, China’s international liabilities should grow by 92 per cent of GDP, or US\$10 trillion. Again, should this stock adjustment process take place over 20 years, the annual “flow” would be about US\$0.5 trillion. Between 2010 and 2014, China’s inflows averaged about 4 per cent of GDP, or US\$0.43 trillion based on 2015 GDP. Thus, the additional “flows” arising from capital account liberalization would more than double the existing volume of flows. Given that China’s GDP is close to US\$11 trillion and if we assume that this convergence takes place over 20 years, this implies an increase of just under US\$500 billion per year.

<sup>5</sup> Note that actual capital flows may be smaller than this, since at least part of the increase in liabilities was due to changes in values of existing claims rather than new claims. Nevertheless, we expect the flows to be substantial.

## 2. Private gross outflows will likely increase relatively more than gross inflows

China's gross international investment position and its composition in 2014 are shown in Figure 5. About two-thirds of China's external assets consist of official reserves, as controls on private capital outflows have been more stringent than those on inflows. As China liberalizes its capital account, there will be some reallocation from public sector outflows (reserves accumulation) to private outflows, leading to faster growth in private outflows than in private inflows.<sup>6</sup>

Excluding reserves, China's foreign assets in 2014 were half as large as its foreign liabilities, leaving considerable room for increase in private gross outflows, as controls on the outflows are liberalized and as home bias declines. Most of the gap between China's private foreign assets and foreign liabilities is due to the difference between the size of the stocks of its inward and outward foreign direct investment (FDI). Of all the components of its foreign liabilities, China's stock of FDI was closest to that in the United States and other G20 countries: 26 per cent of GDP in 2014, compared to 41 per cent for the United States and 39 per cent, on average, for G20 countries (excluding China and EU). This reflects more liberal FDI policy toward inward FDI, which was actively courted for many years. Now China's policy of "going out" will help close this gap. Indeed, this already appears to be happening as FDI outflows are rising, while FDI inflows have plateaued.

## 3. Portfolio flows, especially inflows, will grow faster than FDI

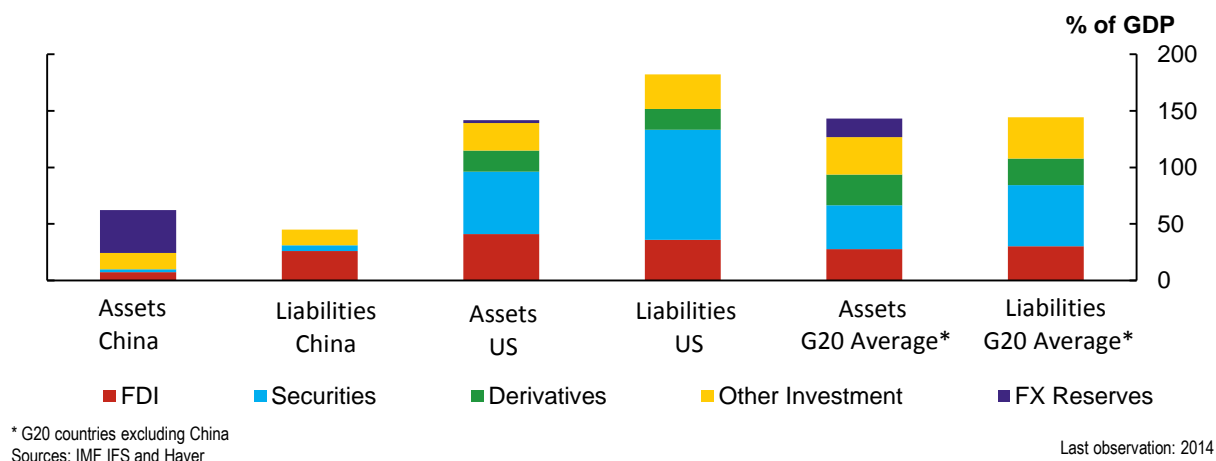
The biggest difference between China's liabilities and those of other countries is in the securities and derivatives components: only 5 per cent of GDP in China, compared to 116 and 77 per cent of GDP in the United States and the G20 countries (excluding China and the United States). This suggests that, should Chinese financial integration resemble that of the other G20 countries, portfolio flows will likely be the fastest-growing segment of foreign inflows.

China's foreign assets in 2014 consisted mostly of official foreign exchange reserves, with a low share of FDI and portfolio equity holdings compared to the United States and other G20 countries. This suggests that liberalizations of these flows would likely lead to faster growth of portfolio and FDI outflows from China relative to other types of flows.

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<sup>6</sup> China saw large net capital outflows between 2014Q2 and 2015Q4 (the last quarter for which data are available at the time of writing). However, these seem to be driven by the "other investment" component (as well as "errors"), rather than portfolio and FDI adjustment that we think will drive the longer-term adjustment to a more open capital account. China is also not seeing a retrenchment from residents.

**Figure 6: China had a high share of FDI in foreign liabilities in 2014, but a lower share of securities than the US and G20 countries' average**



#### IV. What Are the Benefits of Chinese Capital Account Liberalization?

We think capital account liberalization will benefit both China and the rest of the world. It will support Chinese economic growth, have “collateral benefits” of aiding Chinese financial market development and enhancing productivity, and enhance greater global risk sharing for China and the rest of the world.

##### 1. Supporting Chinese economic growth

China’s current growth model, which has relied on expanding labour and capital inputs, has been pushed close to its limit. After decades of steady increase, China’s working age population has begun to shrink. And with investment already accounting for close to half of GDP, it is hard to imagine that this ratio can continue rising. The way to generate more economic activity, then, is not to try to increase the inputs, but to allocate them more efficiently. The Third Plenum’s policies that allow the market to play a “decisive role” and that reorient government toward the provision of public goods are designed to promote this transition.<sup>7</sup>

One way the Chinese economy has improved its productivity over time is by shifting workers to higher value-added activities. Liberalizing the capital account will support this process. Industries will be able to use new sources of financing to transfer low-tech production, such as toys and clothing, to countries where labour is cheaper. This will enable mainland workers to produce

<sup>7</sup> The Third Plenum of the 18th Communist Party Congress, in November 2013, set out the new leadership’s economic and political blueprint.

more sophisticated goods. And with more investment opportunities abroad, Chinese firms will improve their access to resources, markets and advanced technologies.

Opening the capital account will also create high value-added jobs in the Chinese financial sector, stimulating the transition from an industrial- to a service-based economy. Building a globally competitive financial sector is in line with the government's goal of transforming Shanghai into an international financial centre by 2020.<sup>8</sup>

Capital account liberalization will also accelerate the internationalization of the renminbi. Greater international use of the renminbi will support stable Chinese growth in two ways.

First, it will reduce currency risk for Chinese entities.<sup>9</sup> Chinese exporters typically incur production costs in RMB but receive payments in US dollars. Importers pay for their goods in US dollars yet sell them in the Chinese market for RMB. Both importers and exporters are exposed to currency fluctuations. Settling foreign trade in RMB would benefit Chinese companies by reducing exchange rate risk as well as eliminating the cost of purchasing foreign exchange. Moreover, China runs balance of payments surpluses. It finances these surpluses by lending to the rest of the world. Currently, these loans are largely made via increased international reserves, which are denominated in foreign currency. If these loans to the rest of the world were denominated in RMB, then China would eliminate a major source of risk on its national balance sheet.

Second, greater international use of the renminbi will help maintain trade finance. During crises, there is typically a strong demand for high-quality US-dollar assets, typically in the form of government securities, and there is less of an appetite to hold riskier instruments. As US-dollar liquidity tightens, trade finance can dry up. The shortage of trade finance was very evident in 2008–09, and it had a detrimental effect on China's ability to export. Chinese financial institutions – whose funding base is in RMB – have only a limited ability to provide US-dollar trade finance before they incur sizable currency risks. However, to the extent that trade can be settled in RMB, Chinese banks' ability to fund trade increases. This would allow them to stabilize trade and production on the mainland.

## 2. Completing Chinese financial markets

Capital account liberalization is also seen as having “collateral benefits” by which it boosts domestic financial market development and enhances productivity. For example, the presence of foreign financial institutions can improve the quality of service and the efficiency of intermediation. An open capital account can also lead to improved corporate governance in response to foreign investors' demands.

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<sup>8</sup>In 2009, the State Council (China's cabinet) announced its plans to transform Shanghai into an international financial centre by 2020.

<sup>9</sup>The currency risk will be shifted to China's trading partners, in particular, the United States.

Some countries, including Poland, the Philippines, Thailand and Malaysia, have used foreign inflows as a tool to broaden the investor base, develop domestic equity and bond markets, and improve governance.<sup>10</sup>

While China's financial sector is large, great pockets of the economy have poor access to credit. Implicit guarantees mean that state-owned companies have preferred access to credit, while small- and medium-sized private firms often have to rely on retained earnings as a source of funds. Moreover, access to Chinese financial markets has been approval-based rather than disclosure-based, leading to an overreliance on bank loans.

When the Third Plenum speaks of "using opening up to promote reform," Chinese policy-makers are envisioning capitalizing on these "collateral benefits."

### 3. Enhancing global risk sharing

The third benefit of China's capital account liberalization is that it can improve global risk sharing. Increased financial integration between China and Canada is a perfect example. Canada is a net exporter of resources and China is a net importer. When commodity prices go up, Canada gains and China loses, and vice versa. This negative correlation means that Canadian and Chinese investors can offset market fluctuations, and smooth their consumption, by investing in each other's financial assets.

## V. How Can China Best Manage the Risks?

As discussed in section III, there's little doubt that capital account liberalization will boost two-way flows. The challenge for macroprudential authorities, in China and elsewhere, is to prepare their financial systems to properly allocate these flows and to manage a much higher volume of flows and increased volatility. Recent history offers lessons from successful and not-so-successful capital account liberalizations. In the 1990s, Chile and Poland leveraged their liberalization to boost economic growth, by reforming their financial systems and gradually opening them up. Thailand, on the other hand, liberalized inflows before it had sufficiently strengthened its financial system and its monetary policy framework, thus precipitating the 1997 currency crisis.

These and other experiences have generated a substantial economic literature on the policies most likely to underpin successful capital account liberalization. It points to three key prerequisites: (i) stable macro fundamentals; (ii) a floating currency and a nominal monetary policy anchor; and (iii) a sound and well-supervised financial system. In addition, our analysis in the next section suggests that the sequence in which restrictions on the capital account are lifted matters, too.

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<sup>10</sup> See Prasad and Rajan (2008); Johnston, Darbar and Echeverria (1997); Rodlauer and N'Diaye (2013).

## 1. Sound macroeconomic fundamentals

Investor confidence can evaporate suddenly in countries with macroeconomic vulnerabilities. The litany of potential vulnerabilities includes large fiscal and current account deficits, high inflation, elevated debt levels, low reserves, and an overvalued exchange rate. Opening the capital account before these vulnerabilities are addressed runs the risk of ending up in a costly crisis.

China's macroeconomic fundamentals appear sound, although there are some financial stability risks which suggest that a cautious approach to liberalization may be warranted. On the positive side, even if it is slowing, growth remains robust. Inflation is low and stable. Assessing China's fiscal position is difficult, since much spending at the local government level is undertaken off balance sheet by special purpose vehicles. However, according to recently released official data, China's consolidated government debt does not appear to be excessive, despite its rapid increase. China continues to run a current account surplus and has very large foreign exchange reserves, which limit external vulnerability.

However, on the financial stability side, there are some concerns (Wilkins 2016). The rapid expansion of credit in the aftermath of the global financial crisis means that its credit-GDP gap is now one of the highest among advanced and major emerging-market economies (BIS 2015). Much of the growth in credit has taken place in the non-financial corporate sector, mainly state-owned enterprises, and through the shadow banking sector.

## 2. A flexible exchange rate and a nominal anchor for monetary policy

We also know that a country that opens its capital account and desires monetary independence has to allow its exchange rate to float. This is a direct result of the famous trilemma, which states that a country cannot have, at the same time, a fixed exchange rate, open financial markets and an independent monetary policy. Ample evidence has confirmed the so-called impossible trinity.

Most countries that liberalized their capital accounts between 1995 and 2010 chose to make their exchange rates more flexible rather than forgo monetary independence (Sedik and Sun 2012). This allowed them to achieve stronger macro fundamentals through more stable output and reduced financial fragility (Aizenman, Chinn and Ito 2010; Magud, Reinhart and Vesperoni 2014; Obstfeld 2015; Ghosh, Ostry and Qureshi 2014). For countries like China, liberalizing the capital account will mean replacing the exchange rate peg with a new monetary anchor. Canada's experience may be instructive here.

After Canada floated the currency in 1970, it went through a long search for the appropriate monetary anchor. In 1975, the Bank of Canada adopted an M1 growth target. However, ongoing financial innovation made M1 growth an unreliable indicator of inflation and, in 1982, the Bank stopped targeting it. For almost a decade, the Bank implemented monetary policy by consulting an eclectic mix of economic and financial indicators. In 1991, the Government of Canada and Bank of Canada jointly adopted an inflation target as the monetary policy anchor. We have been targeting inflation ever since.



A floating currency gives the Bank of Canada greater influence over interest rates and the ability to run a monetary policy appropriate for domestic circumstances. In addition, the exchange rate acts as a buffer against terms of trade and other country-specific shocks.

China recently moved from pegging the renminbi against the US dollar to maintaining its stability against a basket of currencies (PBOC 2016). This will usefully increase the variability of the renminbi-US dollar exchange rate. However, in the absence of capital controls, if monetary policy is oriented to supporting the basket, it is not free to pursue domestic objectives. Moreover, the appropriateness of the level of the basket itself could change over time and lead to speculative flows if it is not adjusted on a timely basis. Ultimately, China may want to consider floating the exchange rate and orienting monetary policy to achieve a low and stable inflation rate.

### 3. Domestic financial sector development

Finally, we have learned that having well-developed domestic financial markets helps a country reap the benefits of capital account liberalization. If the financial sector is underdeveloped, capital flows may get misallocated, assets could be mispriced and bubbles – or even a crisis – may result.

A well-developed financial system lets the market set interest rates, based on the supply and demand for loanable funds. This helps ensure that liquidity flowing into the domestic financial system is responding to risk-adjusted returns, not to regulatory arbitrage. It also makes the transmission of monetary policy more effective.

A well-developed financial system is underpinned by sound, accountable and flexible regulation. Microprudential rules should be responsive to changing business practices. In Canada, the Office of the Supervisor of Financial Institutions follows a principles-based approach, which is harder to game than a rules-based approach (OSFI 1999).

And, last, a well-developed financial system has deep and liquid markets for bonds, currency and derivatives. Deep markets reduce volatility when shocks occur. They let investors hedge exposures and improve risk pricing. They also make the job of central bankers easier by transmitting policy changes along the yield curve and across financial instruments.

It is hard to know when a market has developed enough to handle a large influx of capital efficiently. Chinese financial markets have expanded rapidly in recent years. Moreover, interest rates have been gradually liberalized. However, recent stock market volatility exposed the illiquidity and lack of market depth. Also, some wonder whether China's asset managers are ready to cope with large flows. The shadow banking sector is also a source of concern, as in other countries, because it is opaque, and has expanded rapidly in recent years.

The Financial Stability Board recently released its peer review of China's financial system (FSB 2015). It noted that considerable progress has been made in addressing the Financial Sector Assessment Program's recommendations on the framework for macroprudential management and monitoring the risks of non-bank credit intermediation. It called for improved coordination among agencies and the development of an integrated risk-assessment framework to facilitate coherent policy actions and make regulations transparent.

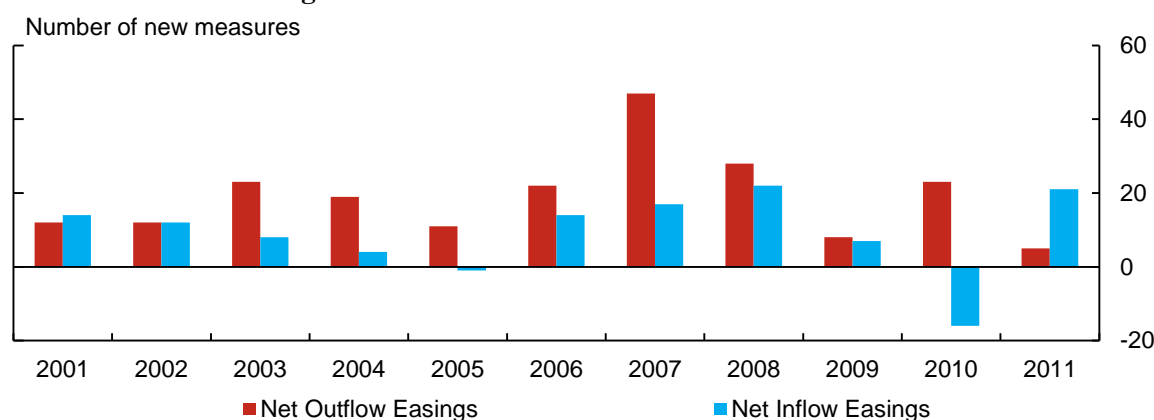
#### 4. Contemporaneous and balanced liberalization of inflows and outflows

The sequence in which constraints on foreign and resident flows are removed can also be helpful in managing the volatility arising from capital account liberalization. Recent literature has highlighted the systematic use of capital outflow liberalization by emerging-market economies (EMEs) during the 2000s to manage the volatility associated with waves of net capital flows (Aizenman and Pasricha 2013; Forbes, Fratzscher and Straub 2015).

Before 2000, many EMEs – India, Israel and Chile, for instance – liberalized their capital account by opening up to foreigners first, and only allowed their residents to send money abroad sometime later. Partly as a result of this sequencing, net capital inflows could be very sensitive to external shocks. Since 2005, emerging-market countries have loosened restrictions on resident outflows more often than on non-resident inflows (Figure 6). Our analysis in the next section shows that this may have created a safety valve: when inflows surged, resident outflows acted as a counterweight and tempered the rise in net capital inflows. It also helped smooth the effect of sudden stops in capital inflows. When foreign inflows suddenly reversed in 2008, emerging-economy residents behaved much like those in advanced economies, i.e. they repatriated capital when it was most needed.<sup>11</sup>

Contemporaneous liberalization of inflows and outflows has meant that emerging-market countries with strong fundamentals behave much like advanced countries: inflows and outflows largely offset each other. For China, where private sector outflows remain comparatively low, this research underscores the importance of liberalizing inflows and outflows in a balanced way and at the same time.

**Figure 7: Emerging markets liberalized resident outflows more frequently than non-resident inflows during 2003-08**



Note: The figure plots policy actions on the capital account by 18 EMEs. Net outflow easings are the number of easings of outflow controls less the number of tightening actions on outflow controls in a year. Net easing of inflow controls is analogously defined. The data include changes in capital controls on foreign direct investment.

Source: Pasricha et al. (2015)

Last observation: 2011

<sup>11</sup> The ability of residents' inflows to offset foreigners' outflows is usually seen only in emerging markets with strong fundamentals, underscoring the importance of addressing macroeconomic vulnerabilities.

## VI. The Stabilizing Effects of Residents' Flows

In this section, we explore the stabilizing effects of resident outflows during periods of sudden stops of non-resident inflows throughout the 2008 global financial crisis, comparing them to earlier contraction periods. Our analysis covers 36 advanced and emerging economies, over the period 1970Q1 to 2014Q4.<sup>12</sup> We follow the recent literature by focusing on gross flows rather than on net capital inflows, since these can provide additional information on the sources of stress, particularly with respect to the differences between advanced economies (AEs) and EMEs.<sup>13</sup>

We follow Forbes and Warnock (2012) in defining surges, stops, retrenchments and flights:<sup>14</sup>

- (i) **stops** are episodes in which quarterly gross inflows decline sharply relative to their recent history (by at least two standard deviations),
- (ii) **surges** are episodes in which quarterly gross inflows increase sharply,
- (iii) **retrenchments** are episodes in which quarterly gross outflows decline sharply, and
- (iv) **flights** are episodes in which outflows by domestic residents increase sharply.

### *Historical episodes of stops and retrenchments: How frequent and how severe?*

On examining the historical pattern of sudden stops and retrenchments of gross flows in the major economies, we find that, contrary to popular perceptions of sudden stops being an EME phenomenon, foreign gross inflow stops are more common in AEs. The difference between the two sets of countries lies in the fact that sudden stops are often accompanied by retrenchments in AEs, but not in EMEs. As for the frequency of episodes, there were 74 stop episodes in AEs between 1970Q1 to 2014Q4 (for an average of 3.9 stops per country) and 49 stop episodes in EMEs over the same period (an average of 2.9 episodes per country) (Table 1); 70 per cent of the stop episodes in AEs were accompanied by a retrenchment, whereas only 43 per cent of the stop episodes were in EMEs.

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<sup>12</sup> We do not include China in the 36 economies.

<sup>13</sup> Gross flows refer to net purchases of domestic assets (or claims on domestic residents) by foreign residents (gross inflows), or to net purchases of foreign assets by domestic residents (gross outflows). Gross inflows are defined as the sum of foreign direct investment, portfolio inflows, derivatives inflows and other investment inflows (which include trade credit and bank lending). Gross outflows are analogously defined. Our measure of gross outflows excludes official outflows through reserves accumulation. See Appendix B for details. We assume that gross inflows are driven primarily by non-residents and vice versa.

<sup>14</sup> Specifically, a “stop” episode is defined as starting during the first quarter that the 4-quarter moving sum of gross inflows declines more than one standard deviation below its 5-year rolling mean, and ends when it rises above one standard deviation below its mean. Further details on the methodology are provided in Appendix B.

**Table 1: Stop and Retrenchment Episodes, 1970Q1-2014Q4**

	Advanced Economies		Emerging Economies	
	No. of Episodes	Episodes per country	No. of Episodes	Episodes per country
Stops	74	3.9	49	2.9
Retrenchments	76	4.0	40	2.4
Together	52	2.7	21	1.2
Together, as % of stops	70		43	
Net capital inflow stops	70	3.7	48	2.8
Number of countries	19		17	

Note: "Together" counts episodes in which the stop and retrenchment episodes overlapped for at least one quarter.

Moreover, the stop and retrenchments episodes often occur simultaneously in several countries. Figure 8 shows the percentage of EMEs and AEs that experienced a sudden stop and a retrenchment during each quarter since 1970Q1.

Figure 8 shows that, for the advanced economies, the peak frequencies for sudden stops and retrenchments occurred during the early 1980s (i.e., the time of the Volcker recession), the 1991 recession, the post-9/11 period and the 2008 financial crash. For EMEs, sudden stops also occur during these episodes, but more generally episodes of stops and retrenchments are fairly well distributed over the decades, and, with the exception of the Asian crisis and the 2008 crisis, are not bunched together.

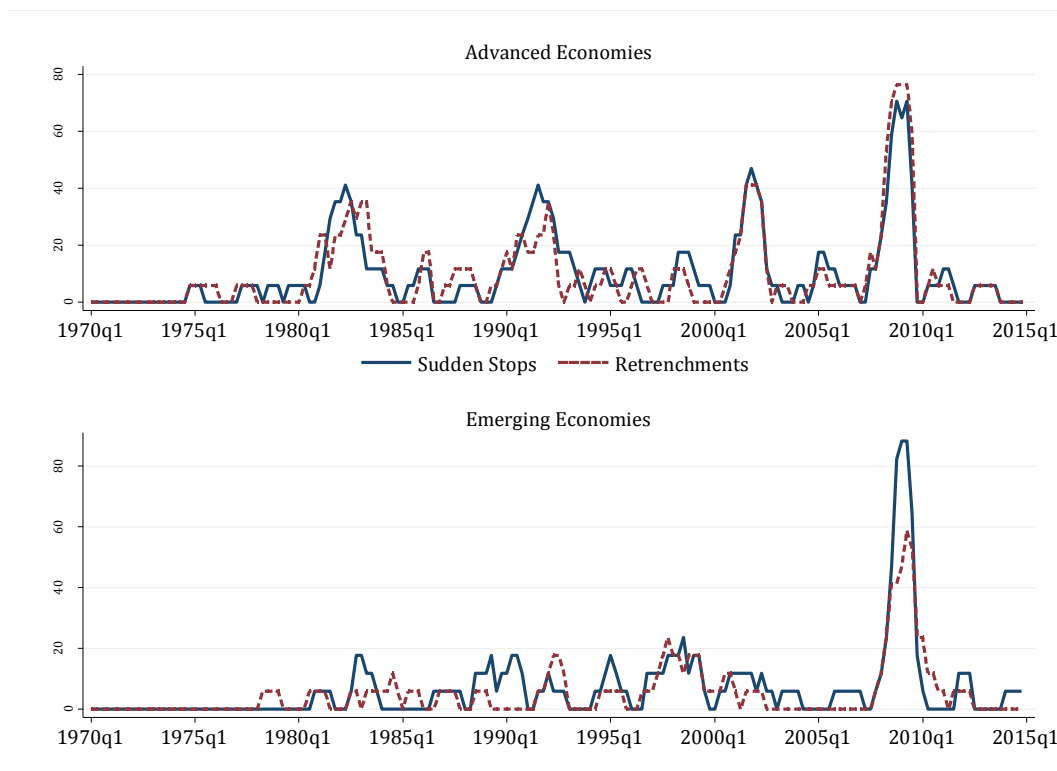
The high correlation of stop and retrenchment episodes in advanced countries is not surprising. If most investors retrench, most countries would likely experience a sudden stop in inflows by foreigners. Most of the largest joint stop/retrenchment episodes appear to be driven by common shocks, such as global recessions or system-wide financial crises. While these episodes may begin as initially localized shocks, the high degree of economic and financial integration of advanced countries means that the turmoil quickly spreads globally. One hypothesis is that these episodes lead to a generalized increase in home bias, where a rise in risk aversion provokes a capital retrenchment in most countries, or, in other words, a flight home.

The lower frequency of simultaneous retrenchment in EMEs may be a reflection of the lower level of outward investment from emerging economies in the past. As the level of private outflows by EMEs grows over time, one may expect retrenchments to more often accompany sudden stops in these economies. This may already be occurring, judging by the fact that during the 2008 crisis many EMEs behaved much like AEs, experiencing simultaneous capital stops and retrenchments.<sup>15</sup> However, this may also reflect the fact that the 2008 crisis was driven by

<sup>15</sup> These results are consistent with Broner et al. (2013), who show that the correlation between gross inflows and outflows is larger for high-income than for middle- and low-income countries, and that it increases over time both for advanced and middle-income economies. Pasricha et al. (2015) also find that the role of domestic residents' flows was important in determining the response of net capital inflows to capital control actions in emerging markets in the 2000s. Minor differences between our discussion of stops and retrenchments during the 2008 global financial crisis and that in

vulnerabilities in advanced economies, not emerging economies, and giving domestic residents in EMEs little incentive to flee but rather to repatriate money.

**Figure 8: Sudden stops and retrenchments**



Sources: IMF BOPS Analytical Presentation (July 2015 CD) and authors' calculations Last observation: 2014Q4

As for the determinants of these episodes, Forbes and Warnock (2012) studied episodes of gross capital flows in a broader sample of countries and found that contagion through bilateral exposure of banking systems is important in determining both stop and retrenchment episodes. Moreover, capital controls did not significantly reduce the occurrence of surges, stops or other capital flow episodes. If anything, lower financial openness was associated with a higher chance of the country facing capital flight.

These results suggest that countries with a lower private sector share in foreign assets (likely those with greater restrictions on capital outflows, and greater reliance on reserve accumulation)

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Forbes and Warnock (2012) arise because of differences in methodology. Specifically, we consider stops and retrenchments that overlapped in at least one quarter during 2007 to 2009, while Forbes and Warnock (2012) focus on stops and retrenchments during 2008Q4 and 2009Q1.

are more likely to face net capital outflows, since it is difficult for the retrenchments by domestic residents to match the stop in gross inflows.<sup>16</sup>

### *How was the 2008 crisis different?*

One result that stands out in Figure 8 is that the 2008 crisis was an outlier in terms of the number of countries experiencing sudden stops by foreign residents and retrenchments by domestic ones. In this section, we analyze the 2008 crisis in some detail and find that it was also more intense than past episodes in terms of the size of gross inflow and outflow declines, particularly for AEs.

Figure 9 focuses on episodes of capital inflow stops. It shows the average quarterly gross flows for the pre-2007 and the 2007–09 stop episodes in AEs and EMEs (Figures 3a and 3b, respectively).<sup>17</sup> Figure 10 shows these averages for the retrenchment episodes.

The figures for AEs are the starkest. In pre-2007 sudden stop episodes, although AEs suffered sharp falls in inflows, on average they still continued to see positive gross foreign inflows and resident outflows during periods of sudden stops. However, during the 2007–09 sudden stop quarters, the median AE episode saw average withdrawal by foreign residents of -1.47 per cent of trend GDP (expressed as an annual rate). However, this episode saw average positive net capital inflows of 4.8 per cent of trend GDP because domestic residents retrenched capital to a large degree. This behaviour is confirmed by the very similar figures for AEs when looking at capital outflow retrenchment quarters (Figure 10).

On the other hand, EMEs did somewhat better than usual over the duration of their stop episodes. The median stop episode in emerging economies saw average gross inflows of 0.35 per cent of GDP during 2007–09, which is better than during the pre-2007 stop episodes. This median stop episode saw strong average retrenchment by EME residents of 1.37 per cent of trend GDP, leading to positive net capital inflows during the episode. Perhaps more importantly, during periods identified as retrenchment episodes, the median EME episode saw larger retrenchments during 2007–09 than in earlier episodes (-0.66 per cent of GDP as compared to -0.01 per cent during pre-2007 retrenchments). This suggests that as EMEs become more integrated in the world, one may begin to see them behave more like advanced economies during crises.

These findings are not dependent on our definitions of stop and retrenchment episodes or using the median episode as the benchmark. As Table 2 shows, a simple mean over all stop episodes gives qualitatively similar results: AEs on average saw a greater retrenchment by their domestic residents, and therefore saw higher net capital inflows on average. But for EMEs, the retrenchment during 2007–09 stop episodes was stronger than in the pre-2007 stop episodes.

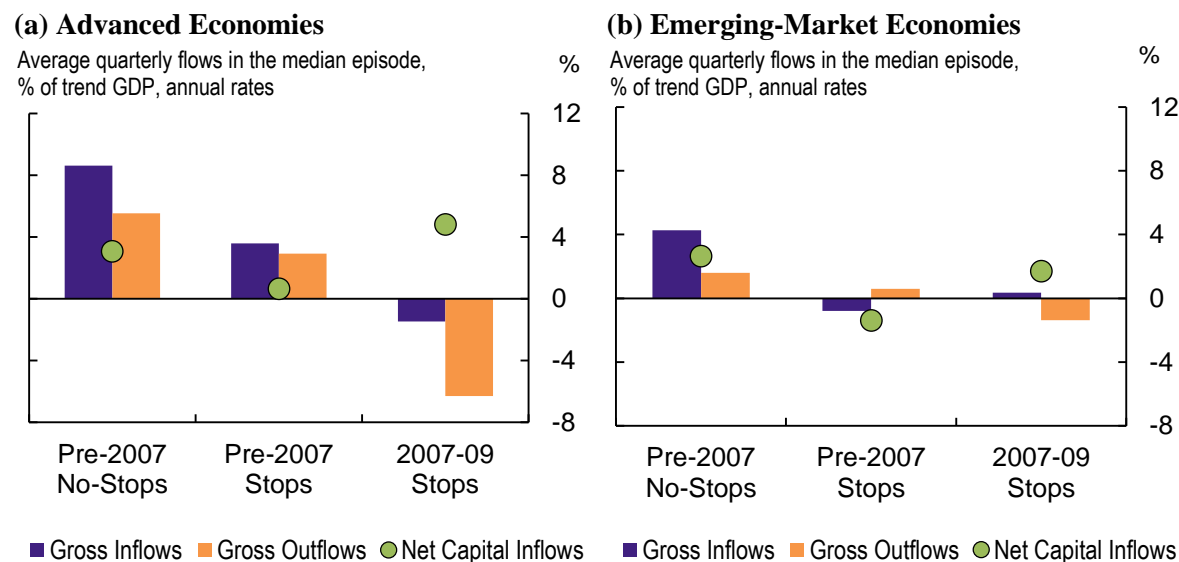
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<sup>16</sup> The net capital outflows could be offset by public retrenchment through reserves sales.

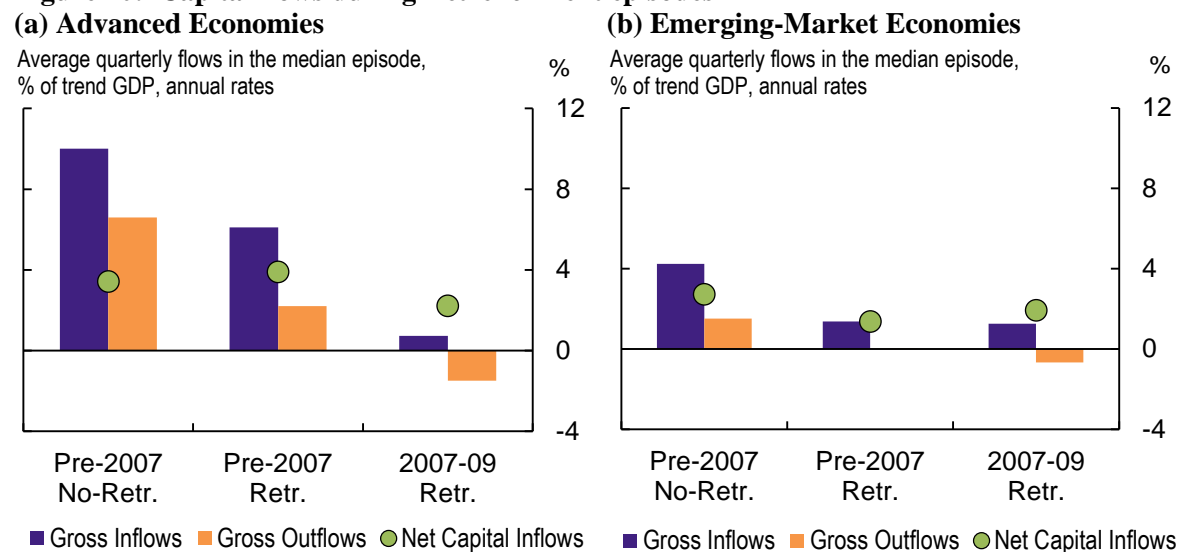
<sup>17</sup> Averages are calculated for the median stop episode; i.e., the flows are averaged over the quarters for each episode and then the median episode is taken.

To conclude, the 2008 crisis was a magnification of the stop and retrenchment episodes seen in the past. However, EMEs did relatively better than in previous episodes, as their residents repatriated capital to a larger extent than before.

**Figure 9: Capital flows during stop episodes**



**Figure 10: Capital flows during Retrenchment episodes**



Note: For each stop episode, the average (mean) gross inflows over the episode are computed. For example, the average gross inflows over 1988Q3–1989Q2, a sudden stop episode in Turkey, are computed. The median stop episode is then identified across all stop episodes in the country group (i.e., advanced or emerging markets). Figure 3 plots the average quarterly gross inflows, gross outflows and net capital inflows during the median stop episode. Median retrenchment episodes are similarly identified using average quarterly gross outflows.

Sources: IMF Balance of Payments Statistics (July 2015 CD) and authors' calculations

**Table 2: Mean capital flows during sudden stops**

	Pre-2007 No-Stop Periods	Pre-2007 Stops	2007–09 Stops	Drop from No-Stop Periods	
				Pre-2007 Stops	2007–09 Stops
(Mean over episodes, % of trend GDP, annual rate)					
Advanced Economies					
<b>Gross Inflows</b>	11.73	4.45	-4.37	7.28	16.10
<b>Gross Outflows</b>	10.26	3.84	-6.76	6.42	17.02
<b>Net Capital Inflows</b>	1.47	0.61	2.40	0.86	-0.93
Emerging Economies					
<b>Gross Inflows</b>	4.48	-0.72	-0.67	5.19	5.14
<b>Gross Outflows</b>	1.71	1.73	-0.11	-0.02	1.82
<b>Net Capital Inflows</b>	2.76	-2.45	-0.56	5.21	3.32

Note: The Pre-2007 No-Stop Periods column shows the average flows over all pre-2007 quarters not identified as a stop episode. The Pre-2007 Stops column shows the average quarterly flows for the pre-2007 stop episodes. The Drop from No-Stop Periods column shows the difference between the second column (the No-Stop Periods) and the relevant column, Pre-2007 Stops or 2007–09 Stops. The quarterly flows are expressed as a percentage of the country's trend GDP and at annual rates.

## VII. How Can the Rest of the World Manage the Risks?

It goes without saying that the rest of the world will be affected by the liberalization of the Chinese capital account. Globally, balance sheets will become more sensitive to movements in Chinese asset prices and the renminbi. Financial markets in Canada and elsewhere could face shocks as Chinese investors shift assets in response to domestic conditions.

This means that Canada and other countries must monitor exposures to China and the vulnerabilities they could create. Greater information sharing would facilitate vulnerability assessments and help identify and mitigate regulatory arbitrage. This information sharing needs to occur across three dimensions: the macro policy, regulatory and firm levels.

China's monetary policy framework is evolving. As we have seen with the recent reform of the exchange rate mechanism, changes to the framework can have a global impact. It is therefore important that the authorities clearly communicate the intent and the operational details of changes to the framework.

Similarly, we can expect that the rules governing financial institutions and markets will continue to evolve, especially as China's capital account becomes more open. Changes to the rules should be transparent and communicated in advance to allow firms to adapt.



Finally, as Chinese firms increasingly turn to foreign markets to borrow – and those from the rest of the world raise capital in China – credit rating agencies, accountants and auditors need to be able to fully understand and validate income statements and balance sheets. North American stock exchanges have had unpleasant experiences with Chinese listings in recent years, because of insufficient disclosure. Going forward, more transparency will be key.

## VIII. Conclusions

The liberalization of China's capital account offers great promise. If China and its partners manage the risks that come with open financial markets, we will all reap huge benefits.

China's financial markets will be deeper and more resilient. Households around the world will be able to better diversify their portfolios. And, best of all, China's economic growth will be more sustainable.

However, capital account liberalization is not without risks. Both China and its partners can help mitigate these risks. The Chinese must ensure that their macroeconomic fundamentals remain sound. Chinese monetary policy needs a new nominal anchor and both interest rates and exchange rates should be free to help ensure that monetary objectives are met. The sequencing of reforms should take account of the potential stabilizing benefits of residents' flows. China and its partners need to reinforce information sharing across the macro policy, regulatory and firm levels.

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## Appendix A

**Table A1: Recent changes in China's capital controls on inflows**

Date	Easing/ Tightening	Summary
17-Aug-10	E	The People's Bank of China (PBOC) said on Aug 17 it would let overseas financial institutions invest yuan holdings in the nation's interbank bond market to promote greater use of the yuan in global trade and finance.
09-Nov-10	T	SAFE said it will regulate Chinese SPVs overseas and tighten controls on equity investments by foreign companies in China.
09-Nov-10	T	SAFE said it will introduce new rules on currency provisioning and tighten management of banks' foreign debt quotas, to reduce hot money inflows by restricting how much forex banks can supply to the market in exchange for yuan. The new rules stipulate that a bank's daily net dollar positions, in expired forward contracts and spot greenback holdings, should not be less than yesterday's levels. Forcing banks to keep hold of U.S. currency will limit their ability to meet orders for yuan purchases, restricting the amount that can flow into local-currency assets.
15-Jan-11	E	QFII allowed to invest in stock index futures.
12-Oct-11*	E	Foreign investors were permitted to engage in direct investment activities in China using RMB legally obtained abroad.
13-Oct-11	E	China's regulators allowed foreign investors to use offshore renminbi (RMB) funds to make direct investments into China. Whilst foreign direct investment (FDI) in RMB was not previously prohibited, it was procedurally burdensome and lengthy, and required reviews and approvals from MOFCOM and PBOC at the central level. The issuance of new regulations provides transparency and certainty to this process.
16-Dec-11*	E	On the basis of the existing system, some QFIIs were further permitted by a pilot project to invest in the domestic securities market using RMB; the first group of pilot institutions was Hong Kong subsidiaries of qualified Chinese domestic fund management companies and securities companies, with certain percentage restrictions on asset allocation.
20-Mar-12	E	The Chinese government has begun making it much easier for foreign investors to put money into China's stock market and other financial investments, in a slight relaxing of more than a decade of tight capital controls. The move was not publicly announced but disclosed by some private money managers to NY Times.
03-Apr-12	E	The China Securities Regulatory Commission increased the quotas for qualified foreign institutional investors to \$80 billion from \$30 billion
17-Dec-12*	E	Non-residents may repatriate proceeds from real estate sales directly at the relevant bank, after registration with SAFE, i.e. the foreign currency approval procedures have been eliminated.
01-Mar-13*	E	The list of institutions eligible for RMB qualified foreign institutional investor (RQFII) status was expanded to include Hong

Date	Easing/ Tightening	Summary
		Kong subsidiaries of mainland banks and insurers and financial institutions registered and operating in Hong Kong SAR, in addition to Hong Kong subsidiaries of mainland fund management companies and domestic securities companies. Under the expanded RQFII program, Hong Kong subsidiaries of Chinese banks and insurers and financial institutions registered and operating in Hong Kong SAR may invest in domestic securities markets using RMB funds raised abroad. The restriction on asset allocation under the program was also loosened, permitting RQFIIs to invest in a wider variety of financial instruments, including stock-exchange-related securities and bonds in the interbank market.
06-Mar-13*	E	Under the expanded RMB qualified foreign institutional investors (RQFII) program, Hong Kong subsidiaries of Chinese banks and insurers and financial institutions registered and operating in Hong Kong SAR, may invest in domestic securities markets using RMB proceeds raised in Hong Kong.
21-Jun-13*	E	RMB qualified foreign institutional investors in the Taiwan region were allowed to invest in mainland securities markets.
12-Jul-13*	E	The overall investment limit for QFIIs was increased from US\$80 billion to US\$150 billion.
15-Oct-13*	E	RMB qualified foreign institutional investors in the United Kingdom were allowed to invest in mainland securities markets.
22-Oct-13*	E	RMB qualified foreign institutional investors in Singapore were allowed to invest in mainland securities markets.
04-Jul-14	E	Except for transfers in the original currency owing to equity investments, it is acceptable for FIEs with investment as their main business (including foreign-funded investment companies, foreign-funded venture capital enterprises, and foreign-funded equity investment enterprises) to transfer the foreign exchange capital funds after direct settlement into the accounts of the invested enterprises according to the actual scale of investment, provided that the domestic investment project is authentic and compliant with the regulations.
15-Sep-15	E	China's top planning agency, the National Development and Reform Commission, has made it easier for Chinese companies to obtain foreign currency bank loans or issue renminbi bonds with a term of more than one year, according to a statement on its website dated Tuesday.
13-Feb-15	E	Simplifying registration management for confirmation of capital contribution by a foreign investor under domestic direct investment; Cancelling filing of foreign exchange for overseas reinvestment; Cancelling annual check of foreign exchange for direct investment and replacing it with registration for accumulated equity.

Note: Dates with \* are the effective dates of the regulation; otherwise, they are the announcement dates.

Sources: Pasricha, Falagiarda, Bijsterbosch and Aizenman (2015), AREAER, State Administration of Foreign Exchange (SAFE), the People's Bank of China, Bloomberg, and New York Times

**Table A2: Recent changes in China's capital controls on outflows**

Date	Easing/ Tightening	Summary
06-Jan-11*	E	Resident enterprises in 20 provinces and cities on the mainland were allowed to use RMB for outward FDI in countries that accept such settlement. Previously, such payments had to be settled in convertible currency.
24-Oct-11	E	Settlement banks in China allowed to make RMB loans to domestic enterprises for overseas direct investment.
04-Jul-14	T	Domestic residents shall apply to the SAFE to register foreign exchange for overseas investments before contributing money to SPVs using legitimate domestic and overseas assets or rights and interests.
08-Sep-15	T	The State Administration of Foreign Exchange had ordered financial institutions to increase checks and boost controls on foreign exchange transactions, especially over-invoicing of exports which is used to hide capital outflows. Some of the country's largest lenders, including Bank of China Ltd. and China Citic Bank Corp., are beefing up their internal checks on large foreign-exchange conversions by corporate clients, according to Chinese banking executives. Chinese companies can exchange yuan for foreign currencies only for approved business purposes, such as paying for imports or approved foreign investments.
Mar-15	T	The State Administration of Foreign Exchange, which has approved 132 local institutions to put as much as \$89.99 billion in offshore assets via its Qualified Domestic Institutional Investor program, hasn't granted new allocations since March. Quotas for overseas investors to access domestic capital markets rose \$16.4 billion to \$140.3 billion in the period.
13-Feb-15	E	Cancelling two administrative approval items, namely, registration and verification of foreign exchange under overseas direct investment.
08-Sep-15*	T	The People's Bank of China (PBOC) announced that it would require banks to pay a 20 per cent deposit on forward sales of foreign exchange, saying the measure was aimed to curb speculative currency sales. A forward sale is a commitment to sell at a predetermined price and date.

Note: Dates with \* are the effective dates of the regulation; otherwise, they are the announcement dates.

Sources: Pasricha, Falagiarda, Bijsterbosch and Aizenman (2015), AREAER, State Administration of Foreign Exchange, the People's Bank of China, and Bloomberg

## Appendix B

In this appendix, we describe our data and methodology for identifying historical episodes of sharp movements in gross flows, which are then used to put the 2008 crisis into context. Our focus is on examining periods of volatile capital movements using data on gross flows. We focus on gross as opposed to net capital inflows, since the former are much more relevant for explaining movements of capital during AE crises.

The terms “gross inflows,” “gross outflows” and “net capital inflows” are defined as follows:

- (i) **“Gross Inflows”** refers to inflows by foreign residents into an economy, and are the sum of foreign direct investment, portfolio inflows, derivatives inflows and other investment inflows (which include trade credit and bank lending).<sup>18,19</sup>
- (ii) **“Gross Outflows”** refers to outflows by domestic residents and is analogously defined as the sum of foreign direct investment, portfolio inflows, derivative outflows and other investment inflows.<sup>20</sup>
- (iii) **“Net Capital Inflows”** are the difference between gross inflows and gross outflows.

All capital flows data in section VI are extracted from the analytic Presentation in IMF’s Balance of Payments Statistics database (July 2015 CD) and are measured at a quarterly frequency. Our data cover 19 advanced and 17 emerging economies. The data cover the period 1970Q1 to 2014Q4. Quarterly flows expressed as per cent of GDP are divided by trend annual GDP and multiplied by 4 to convert them to annual rates. Trend GDP is calculated by applying HP-filter (smoothing parameter 6.25) to annual nominal GDP in US dollars from the World Bank’s World Development Indicators.

### Methodology

We follow Forbes and Warnock (2012) in defining surges, stops, retrenchments and flights:

- (i) **stops** are episodes in which quarterly gross inflows decline sharply relative to their recent history (by at least two standard deviations),
- (ii) **surges** are episodes in which quarterly gross inflows increase sharply,
- (iii) **retrenchments** are episodes in which quarterly gross outflows decline sharply, and
- (iv) **flights** are episodes in which outflows by domestic residents increase sharply.

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<sup>18</sup> As such, the term “gross inflows” is a misnomer, since the quantities referred to are net inflows by foreign residents; i.e., they are net of the withdrawals by foreign residents during the same year. Net capital inflows are the difference between net inflows by foreign residents and the net outflows by domestic residents and are therefore net capital inflows. However, we follow the established convention in using the terms “gross inflows,” “gross outflows” and “net capital inflows.”

<sup>19</sup> A note is needed on the treatment of financial derivatives. Many countries do not report derivative assets and liabilities separately, but only report the net figure. Accordingly, we include positive values of net balance on derivatives trade in the gross inflows and negative values in gross outflows.

<sup>20</sup> Note that we use BPM6 conventions and define gross outflows with a positive sign; i.e., a positive number means a net outflow by domestic residents.

Let  $C_t$  be a 4-quarter moving sum of gross inflows (*GINFLOW*). We first compute annual year-over-year changes in  $C_t$ :

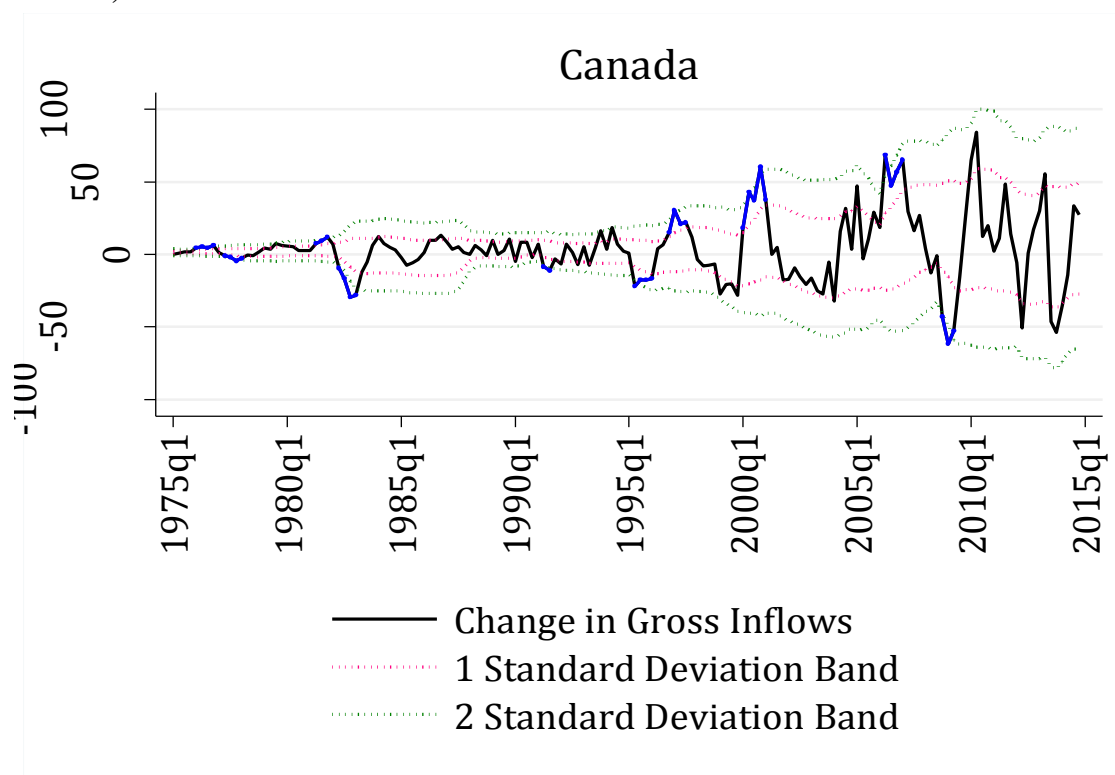
$$C_t = \sum_{i=0}^3 GINFLOW_{t-i}, \quad \text{for } t = 1, 2, \dots, N \quad (1)$$

$$\Delta C_t = C_t - C_{t-4} \quad \text{for } t = 5, 6, \dots, N \quad (2)$$

Next, we compute the rolling mean and standard deviations of  $\Delta C_t$  over the past five years. A “stop” episode is defined as starting in the first quarter that  $\Delta C_t$  declines more than one standard deviation below its rolling mean, and ends when it rises above one standard deviation below its mean. In addition, in order for a period to qualify as a “stop” episode, it must satisfy two additional criteria: (i)  $\Delta C_t$  must fall to at least two standard deviations below its rolling mean for at least one quarter during the episode, and (ii) the length of the episode must be more than one quarter.

Retrenchments are defined similarly using gross outflows. A retrenchment is defined as an episode during which the gross outflows series is at least one standard deviation below its mean provided it also falls at least two standard deviations below its mean at some point during the episode. Surges and flights are analogously defined as episodes that see a sharp increase in gross inflows and gross outflows, respectively.

**Figure B1: Surges (stops) are defined as large increases (decreases) in gross inflows (for Canada)**



Sources: IMF BOPS Analytical Presentation (July 2015 CD) and authors' calculations

Last observation: 2014 Q4



Figure B1 provides a visual explanation of the methodology for determining surges and stops for Canada. The solid line is the change in gross inflows, the dashed red lines are rolling one-standard deviation bands and dashed green lines are rolling 2-standard deviation bands around the mean. The blue highlighted segments of the solid line represent the identified episodes of surges and stops. According to our methodology, over the past two decades, Canada experienced three surges of capital inflows: in 1997, 2000 and 2006. Gross inflow stops occurred during mid-1991, 1995 and the 2008 global financial crisis.

**Table B.1 Countries in Sample**

**Advanced Economies**

Australia  
Canada  
Japan  
United Kingdom  
United States

**Core Euro Area**

Austria  
Belgium  
Estonia  
Finland  
France  
Germany  
Netherlands  
Slovak Republic  
Slovenia

**Peripheral Euro Area**

Greece  
Ireland  
Italy  
Portugal  
Spain

**Emerging-Market Economies**

**Emerging Asia**

India  
Indonesia  
Korea  
Malaysia  
Thailand

**Emerging Europe**

Czech Republic  
Hungary  
Poland  
Romania  
Russian Federation  
Turkey

**Latin America**

Argentina  
Brazil  
Chile  
Mexico

**Other EMEs**

Saudi Arabia  
South Africa

Note: The euro area also includes Cyprus, Luxembourg and Malta, which were dropped in the sample for they are offshore financial centres and/or tax havens. Latvia and Lithuania were dropped since they are recent entrants to the euro area.