LIVING WITH VOLATILITIES: CAPITAL FLOWS AND POLICY IMPLICATIONS FOR SEACEN CENTRAL BANKS

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Abstract

Economies with less developed financial markets might find their integration into global financial markets associated with volatility in capital flows. Such variability can prove to be disruptive to domestic economic and financial conditions, raising policy questions about how to realize the benefits from financial integration while minimizing adverse spillovers. In the first instance policy makers need to understand the dynamics of capital flows and the underlying sources of potential instabilities before enacting a response. We dissect the capital accounts of Asia-Pacific economies associated with SEACEN and explore some important trends and exposures.

The region has been subject to several financial shocks mainly reflected in bank-related capital flows. This is useful in understanding past crises but not necessarily helpful in looking out for the next bout of instability. We discuss the possible implications of monetary policy normalization in the United States but based on past cycles see little cause for concern. Having said that, this is a unique juncture for the global financial system and uncertainty is higher than usual.

The hierarchy of policy responses to concerns about capital movements ranges from longer-term structural economic and financial reforms to allow economies to accommodate volatility, to crisis responses which are more temporary in nature. All policy reactions have costs and benefits. Importantly, even in Asia Pacific there appear to be few regularities that would allow generalized policy advice other than to do what this paper attempts to do – dissect the capital account and exposures to make policy makers aware of looming vulnerabilities and appropriate responses.

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"…financial integration is a choice. Countries decide to become financially integrated because the perceived benefits of doing so outweigh the costs. Moving forward sustainably requires going beyond *coping* with capital flows to *living* with them."

Dr. P. Trairatvorakul, Governor of the Bank of Thailand (2015)

1.   Introduction

International capital flows confer substantial benefits. They assist in the efficient allocation of resources to their most productive employment, thereby allowing investment opportunities to be realized and economic growth to be higher than would otherwise be the case. In the right context, higher growth is consistent with enhancing the overall economic welfare and prosperity of both the economies that are recipients and those that are the sources of capital flows. This is a simple extension of the well understood gains from trade in goods and services, to the trade in financial capital.[2] Financial markets can also benefit from the participation of international investors. The process of price discovery can be enhanced significantly in economies where domestic participation is hindered by size or a lack of well-diversified participants.

However, with capital flows and financial integration come potential disadvantages or vulnerabilities. Economies that are financially connected are by definition exposed to the potential spillover of financial shocks that occur not only beyond their own borders but also outside the direct influence of domestic policy makers. For smaller economies, the sheer size of international financial markets is at times difficult to accommodate. Large inflows of foreign capital in reality might not aid the process of price discovery but, in fact, drive smaller economies away from fundamentals, resulting in misalignments in credit, debt, equity, and foreign exchange markets. This, in turn, might create vulnerabilities for financial and macroeconomic stability. Difficult questions arise about how best to transition toward integration with global financial markets, and how best to live with the inevitable bouts of volatility that originate, not only domestically, but also abroad.

All economies are subject to bouts of potentially destabilizing gross international capital flows. However, volatility in net flows and the overall capital account balance can be contained if a number of important prerequisites can be cultivated so that economies are able to accommodate even sudden adjustments. An important distinction between industrialized economies and emerging markets is that the former are in a much better position to deal with volatility. This has important policy implications in the context of the

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[2] Acceptance of the benefits from free trade in goods and services has been widespread in the international community for a long time and led to establishing the World Trade Organization and the General Agreement on Tariffs and Trade. There has been much more reluctance in accepting that free trade in financial capital might confer similar benefits, in part because trade in goods and services has developed much faster. Nonetheless, the general principles of the extension to freer capital flows are agreed by members of the Organization for Economic Co-operation and Development (see also OECD, 2009).

finding that while the sub-components of capital flows for industrialized economies are considerably more volatile than they are in emerging markets, they tend to be substitutable and hence smooth out net flows (Becker and Noone, 2009). The characteristics that help deliver such outcomes often stem from the implementation of sound macroeconomic and financial policies, deep and liquid domestic markets, a diversified investor base, as well as appropriate incentive structures and market signals. Once in place, these prerequisites more often than not ensure that volatile private sector outcomes more or less offset each other in such a way that little policy action is required. While emerging markets cannot easily replicate the size and depth of the largest financial markets, they can strive to foster similar economic outcomes. The first step toward this is to gain a fuller understanding of current trends and important characteristics of capital flows. This paper attempts to address this.

In 2008, the financial crisis that originated in north Atlantic economies had important reverberations for the rest of the world. Gross global capital movements had built up considerably in prior years and were particularly evident in cross-border bank and money market flows (Figure 1). While these flows were mainly the outcome of activities between the major industrialized economies, emerging markets and Asia-Pacific were also subject to larger than usual bank-related capital flows. During the financial crisis there was a significant unwinding of the international positions established by banks as well as repatriation of portfolio investments and a notable slowdown in foreign direct investment. This financial disintermediation was disruptive for real economic variables such as trade and economic growth while it was occurring and also hindered the recovery.[3] Capital flows recovered but were slow to do so and remained more tepid than during the pre-crisis boom. At this aggregated level of analysis, there appear to be few evident trends that would warrant the magnitude of disruptive capital account reversals that occurred in either 1998 or 2008.[4]

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[3] Recessions in world economic growth are rare because economic cycles are not perfectly synchronous. That is, while one economy might be in recession, other parts of the world are growing. This asynchronous outcome is at least in part aided by international capital movements. Economic slowdown in one region implies a decline in return on capital and there is a natural incentive for investors to seek higher yields where the outlook is better. As capital is reallocated between economies, some regions benefit from increased investment. This is in the interest of both the recipient and the source economy, as stronger global growth provides a fillip through trade and other linkages for recovery in those regions experiencing below-average growth. Disintermediation in international capital movements disrupts this process and exacerbates synchronous shocks by inhibiting the reallocation of resources. Consequently, financial crisis induced recessions tend to be longer and deeper than those that are part of the ordinary business cycle.

[4] Refer also to James et al. (2014) for a description of capital flows by type, geographical distribution and potential implications for financial stability.

Figure 1
Global Capital Flows*
Per cent of world GDP, annual

* Gross capital outflows excluding financial derivatives
** Includes flows related to international banking transactions
Source: IMF
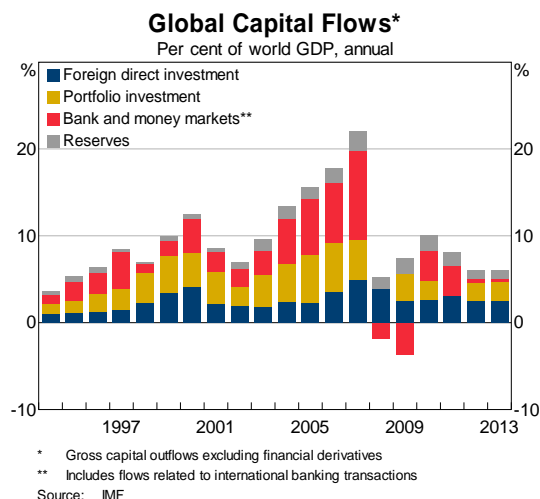
However, central banks in Asia-Pacific are currently asking what potentially destabilizing influences the normalization of monetary policy in the United States might have on regional capital movements, domestic asset prices, and exchange rates. Furthermore, since this is not an academic question, central banks are interested in tangible policy response options to capital flow reversals. The answers to these questions are difficult to calibrate. In 2008, the international financial system was subject to the largest shock in 80 years, rendering much of the usual econometric techniques either difficult to interpret or potentially misleading. The analysis presented here is accordingly based on observations that are not entirely predicated on the sharp swings observed in recent years – during which almost all variables are correlated.

Throughout this paper, we refer to Asia-Pacific being our main region of interest. In particular, we define Asia-Pacific in terms of the SEACEN region (see Appendix 6 for details about member central banks/monetary authorities and their participation in this work stream).

In Section 2, we examine the recent gross and net trends in capital flows, broken down by classification. This provides the essential background and starting point for further investigation. Appendix 1 is an important part of this paper. It defines the components of capital flows and explains the balance of payments identity. It also notes some important implications that arise from the relationship between a number of economic concepts and how they relate to the interpretation of capital flows. In Section 3 we probe a little deeper into aspects of bank and money market flows. Gauging the potential impact that normalization of US monetary policy interest rates might have, is addressed in Section 4. The relationship between investment returns and capital flows is discussed in Section 5. In Section 6, a number of policy implications are discussed, followed by concluding comments in Section 7.

2.   Recent Composition and Trends in Capital Flows

A high level overview of balance of payments developments indicates that current account surpluses have narrowed since the early 2000s in most Asia-Pacific economies. In net terms, the region therefore remains an exporter of capital to the rest of the world, albeit noticeably less than immediately prior to 2008. This is in line with the fundamental trend for saving to exceed investment in many of these economies. Despite this, the region has been a net importer of 'private' capital while at the same time exporting even more capital through 'official' channels (Figure 2).[5] That is, the activities of monetary authorities play an important role in the composition and evolution of capital flows.

Figure 2
South-East Asia Net Capital Flows
Per cent of GDP, 1-year centred average

Sources: IMF; national central banks
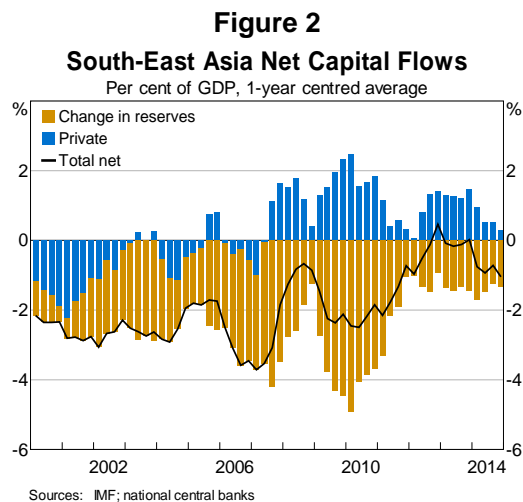
In Asia-Pacific, the gross inflow of capital (liabilities) came to a sudden stop during the 2008 financial crisis (Figure 3). The lull persisted through the first half of 2009. This pattern is observable across all liability flows, including foreign direct investment. The non-resident inflows that were repatriated from the region at this time were mainly related to portfolio equity investments as well as bank and money market flows. The reaction of residents to the crisis (assets) helped cushion the impact on the aggregate net flows. Domestic banks lent less to other jurisdictions and residents stopped investing in international equities. Most prominent, however, were the reactions of the regional central banks to the reversal in private capital inflows. On average, central banks in Asia-Pacific stopped their reserve accumulation (capital outflow) and some intervened significantly (capital inflow) to offset some pressure arising from private outflows. Notably, capital outflows driven by the investment decisions of residents slowed several quarters before non-resident inflows turned.

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[5] This churning of financial flows is interesting given the prominence of the official sector. All economies are gross importers and exporters of capital to some extent. However, in industrialized economies, this is more often than not, a private sector outcome. It is difficult to be confident about whether the role of the official sector is the consequence of private sector outcomes or at least in part the cause.

Figure 3
South-East Asia Gross Capital Flows
Per cent of GDP, quarterly

Foreign direct investment   Bank and money markets
Portfolio equity   Reserves
Portfolio debt

Sources: IMF; national central banks
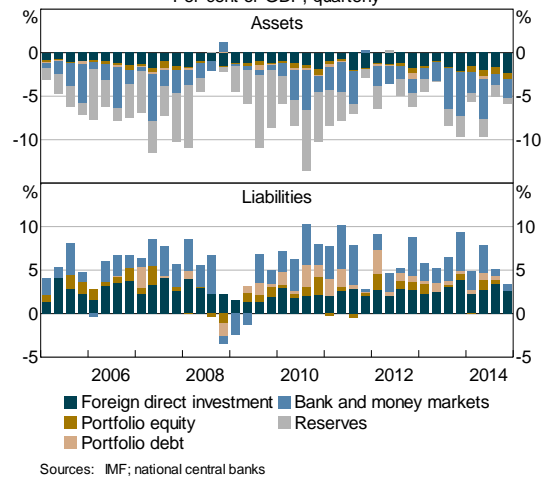
Regional capital flows have normalized since the crisis, and while there is little evidence of resurgence when looking at the average, some Asia-Pacific economies have experienced stronger gross inflows than others. In particular, non-resident investment inflows into the Indonesian stock market are notable, as are the sizable non-resident direct and portfolio flows for a small economy like Mongolia. Also of note in the post-crisis environment, is that the rapid reserve accumulation that marked the pre-crisis period appears to have slowed. Consequently, there are smaller official outflows from Asia-Pacific economies.

2.1   Size and Composition of Capital Flows

The average composition of capital flows in Asia-Pacific indicates that most international transactions made by residents (accumulation of assets) take the form of direct investment as well as bank and money market flows (Table 1). The large gross flows for financial centers like Hong Kong and Singapore are not surprising and given the prevailing exchange rate regimes, the importance of reserves is also readily understood. For many other economies in the region, transactions by monetary authorities in official foreign exchange reserves drive a wedge between private flows and the aggregate capital account balance. The least active economies on reserves are Australia, Indonesia, Japan, and Thailand. Other jurisdictions appear to be more active in the use of reserves to manage capital account and exchange rate outcomes. Additional notable asset flows relate to resident bank lending from Cambodia and Mongolia to other economies, and sizable flows from Chinese Taipei into foreign debt instruments. While the absolute values of these flows are not particularly large, they are significant in relation to those economies' GDP.

Table 1

Size of Capital Flows by Type and Economy

Per cent of GDP, average 2012-2014

	Assets							Liabilities							Net							
	FDI	PFE	PFD	BMM	DER	PKB	KAB	FDI	PFE	PFD	BMM	DER	PKB	KAB	FDI	PFE	PFD	BMM	DER	RES	PKB	KAB
Australia	0.0	-1.4	-1.5	-2.0	2.9	-1.9	-2.2	3.6	0.9	3.9	1.1	-3.8	5.7	5.7	3.6	-0.5	2.4	-0.9	-0.9	-0.3	3.8	3.5
Cambodia	-0.3	-0.4	0.0	-11.1	0.0	-11.8	-15.0	8.8	0.0	0.0	13.6	0.0	22.3	24.7	8.5	-0.4	0.0	2.5	0.0	-3.7	10.6	9.7
China	-1.8	0.0	-0.1	-2.4	0.0	-4.2	-6.6	3.7	0.4	0.4	0.9	0.0	5.4	5.4	1.9	0.4	0.3	-1.4	0.0	-2.4	1.2	-1.2
Hong Kong	-39.2	-6.9	6.3	-25.2	18.4	-46.5	-52.4	32.2	6.6	2.7	35.7	-15.8	61.4	61.4	-7.0	-0.3	9.0	10.5	2.6	-5.9	14.9	9.0
India	-0.3	0.0	0.0	-1.0	-0.4	-1.8	-2.5	1.5	1.0	0.3	2.4	0.4	5.5	5.5	1.2	0.9	0.3	1.4	0.0	-0.7	3.8	3.0
Indonesia	-1.1	-0.1	-0.1	-0.5	0.0	-1.8	-1.9	2.6	1.9	1.8	0.6	0.0	6.8	5.1	1.5	1.7	1.7	0.1	0.0	-0.1	5.0	3.2
Japan	-2.5	0.1	-1.2	-2.7	5.3	-1.0	-1.1	0.1	1.6	1.4	3.3	-6.0	0.5	0.5	-2.4	1.8	0.3	0.6	-0.7	-0.1	-0.5	-0.6
Korea	-2.3	-1.1	-1.3	-1.9	2.5	-4.2	-5.4	0.8	0.7	0.9	-0.4	-2.2	-0.2	-0.2	-1.5	-0.4	-0.4	-2.3	0.3	-1.2	-4.4	-5.6
Malaysia	-4.8	-1.8	-0.9	-5.2	0.0	-12.6	-10.9	3.2	1.0	2.6	2.0	0.0	8.7	8.7	-1.6	-0.8	1.7	-3.2	0.0	1.7	-3.9	-2.2
Mongolia	-0.5	-0.2	0.0	-13.1	0.0	-13.9	-11.6	18.9	0.0	6.8	7.7	0.0	33.5	33.5	18.4	-0.2	6.8	-5.4	0.0	2.2	19.6	21.8
Philippines	-0.2	0.0	-0.3	-1.1	0.1	-1.5	-2.9	1.8	0.4	0.2	0.4	-0.1	2.8	2.8	1.7	0.4	-0.1	-0.6	0.0	-1.4	1.3	-0.1
Singapore	-9.3	-27.5	0.0	-23.4	6.9	-59.1	-64.8	21.0	0.6	0.0	16.8	-2.4	35.9	35.9	11.7	-26.9	0.0	-6.6	4.5	-5.7	-23.1	-28.9
Sri Lanka	-0.1	0.0	0.0	-0.4	0.0	-0.5	-2.2	1.4	0.3	3.0	2.4	0.0	7.1	7.3	1.3	0.3	3.0	1.9	0.0	-1.8	6.6	5.1
Chinese Taipei	-2.9	-3.3	-6.8	-4.4	1.2	-16.2	-19.1	0.7	1.9	-0.1	5.6	-1.1	7.0	7.0	-2.2	-1.4	-6.9	1.2	0.1	-2.9	-9.2	-12.1
Thailand	-2.8	-0.6	-0.9	-1.7	1.6	-4.3	-4.3	3.3	-0.7	1.1	1.8	-1.6	3.8	3.8	0.4	-1.3	0.2	0.1	0.0	0.1	-0.5	-0.4
Average	-1.7	-0.3	-0.1	-2.6	0.2	-4.2	-5.2	2.8	0.6	0.7	2.2	-0.1	6.2	6.1	1.3	0.1	0.1	0.0	0.0	-1.4	2.0	0.7

1	2	3	4	5	7	8

Smaller ⟵————⟶ Larger
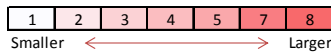
Source: author's calculations

On the liability side, Asia-Pacific remains a major destination for foreign direct investment and non-resident banks actively lend to the region. Cambodia stands out as being a recipient of large direct investment and bank-related capital flows. Chinese Taipei is also a destination for bank and money market flows from non-resident sources. Shallow debt and inter-bank markets in Mongolia and the boom in mining-related foreign investment are evident in the liability flows for that economy.

2.2   Volatility in the Capital Account

Abstracting from the notable idiosyncratic features of volatility among the member economies, we observe that for Asia-Pacific bank and money market flows are the most volatile inflows, outflows and net flows for the majority of economies (Table 2). Since the region is a natural destination for foreign direct investment, the data confirm that this component was observed to be the most stable over the data sample presented below.[6] For some economies, portfolio flows are also shown to be volatile and might move in a compounding manner to exacerbate the fluctuations in other components. In other words, we find that gross private capital flows (PKB) are more volatile on both the asset and liability side than the gross sub-components, suggesting that the gross flows are positively correlated.

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[6] Note, however, that this is not always the case and that the result is not necessarily true for industrialized economies. The conventional wisdom related to being able to distinguish 'hot and cold' flows based on their labels is questionable. See for example Becker and Noone (2009) and Bluedorn et al. (2011).

Note also that the net flows are less volatile than the gross capital movements in the region, indicating that there is a degree of negative correlation between the investment behavior of residents and non-residents. Nonetheless, flows of non-residents tend to be

Table 2

Volatility of Capital Flows by Type and Economy

Per cent of GDP, average 2012-2014*

	Assets							Liabilities							Net							
	FDI	PFE	PFD	BMM	DER	PKB	KAB	FDI	PFE	PFD	BMM	DER	PKB	KAB	FDI	PFE	PFD	BMM	DER	RES	PKB	KAB
Australia	1.3	1.4	1.0	2.7	2.3	2.9	3.2	1.6	1.3	2.8	3.8	2.4	3.1	3.1	1.7	1.7	2.8	2.4	1.5	0.9	1.2	1.1
Cambodia	0.1	0.3	0.0	5.7	0.0	5.7	5.8	2.2	0.0	0.0	6.4	0.0	6.5	7.6	2.2	0.3	0.0	5.7	0.0	2.0	5.0	5.0
China	0.5	0.1	0.2	1.4	0.0	1.5	2.9	0.7	0.3	0.2	2.2	0.0	2.4	2.4	0.8	0.4	0.2	2.6	0.0	3.4	3.0	1.2
Hong Kong	16.6	14.2	18.2	37.3	4.2	46.4	46.8	10.5	10.5	2.8	42.5	3.4	47.3	47.3	13.9	18.8	17.4	20.6	2.0	5.0	36.4	36.1
India	0.5	0.1	0.0	0.6	0.3	0.8	1.9	0.4	1.0	0.9	1.6	0.3	1.8	1.8	0.6	1.0	0.9	1.6	0.3	1.5	1.7	1.6
Indonesia	0.7	0.5	0.6	1.4	0.0	2.0	3.4	0.6	1.3	1.3	0.9	0.0	2.8	2.0	0.7	1.3	1.3	1.8	0.0	2.8	2.3	3.5
Japan	0.9	1.2	3.6	2.5	2.3	5.2	5.1	0.1	2.4	2.8	4.0	2.4	4.6	4.6	0.9	2.9	3.9	3.9	0.8	1.8	2.6	2.3
Korea	0.5	0.7	0.8	1.7	1.0	2.6	2.6	0.4	1.8	1.1	2.5	1.2	2.5	2.5	0.5	1.8	1.7	3.0	0.3	1.8	3.4	2.8
Malaysia	2.6	1.0	1.1	4.7	0.3	6.2	11.2	1.9	2.1	6.7	3.0	0.5	8.4	8.4	2.9	2.5	6.5	6.1	0.3	8.3	7.3	5.4
Mongolia	0.7	0.2	2.2	8.9	0.0	7.8	18.2	16.6	7.0	11.6	8.6	0.0	23.9	23.9	16.8	7.0	12.0	13.1	0.0	15.1	19.8	13.4
Philippines	0.8	0.0	0.7	2.1	0.4	2.6	3.9	0.6	0.5	1.9	2.2	0.1	3.1	3.1	0.9	0.5	2.1	3.1	0.4	4.4	4.3	2.5
Singapore	4.1	18.7	0.0	27.4	9.0	32.5	36.0	3.5	3.6	0.0	28.7	5.3	30.1	30.1	4.2	17.9	0.0	17.0	4.5	7.0	5.1	10.3
Sri Lanka	0.0	0.9	0.8	4.8	0.0	6.3	9.4	0.4	0.6	2.6	6.7	0.0	6.8	10.2	0.4	0.5	2.8	2.8	0.0	3.5	2.2	3.5
Chinese Taipei	0.6	2.7	2.8	7.9	0.2	9.2	9.1	0.8	4.8	1.0	5.6	0.2	8.4	8.4	0.8	4.3	2.7	6.6	0.1	3.7	5.0	2.6
Thailand	2.0	0.6	1.4	2.6	1.0	4.3	6.6	2.8	1.4	2.0	4.1	1.1	7.2	7.2	2.9	1.6	2.3	3.9	0.6	4.8	6.4	4.3
SEACEN	0.7	0.7	0.8	2.7	0.3	5.2	5.8	0.8	1.4	1.9	4.0	0.3	6.5	7.2	0.9	1.7	2.3	3.9	0.3	3.5	4.3	3.5

1	2	3	4	5	7	8

Lower ←——————————→ Higher
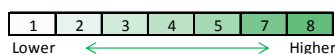
* Volatility is measured as the standard deviation of the quarterly flows as a per cent of GDP.

Source: author's calculations

more volatile than what can be offset by residents. This is likely to be attributable to the international investment position of residents being smaller than that of non-residents and should be an area of interest for policy makers in the region.

The two large financial centers of Hong Kong and Singapore display much higher volatility than others (attributable to the sizable gross flows that pass through their balance of payments). The Malaysian experience with non-resident inflows also indicates a considerable degree of volatility, and the underdeveloped state of Mongolian financial markets in combination with large international mining projects make the capital account very variable when scaled by GDP. On the other hand, there is little variability in the composition of the capital account in China and India. This stability might be a reflection of a lack of openness to financial flows and deliberate imposition of restrictions on the movement of capital (see also Appendix 2).

Another noteworthy general finding is that in net terms, the overall capital account balance (KAB) is less volatile than private flows (PKB). The implication is that the monetary authorities, to varying degrees, use reserves to offset shocks to the capital account and

hence smooth the overall balance.[7] A useful illustration is the evolution of volatility in Korean capital flows (Figure 4). Prior to the financial crisis, the volatilities in capital account asset, liability and net flows were broadly in line at a standard deviation of around 2 to 3% of GDP. During the 2008 financial crisis, Korea experienced a reversal of liability inflows, mainly bank and money market flows, and portfolio debt flows. This increase in volatility on the liability side was offset by resident asset flows in the form of banking-related flows and official reserve transactions. That is, there was no noticeable effect on overall net capital flows as the volatility resulting from gross non-resident outflows was matched by volatility in the opposite direction from residents and intervention by the monetary authorities. Following the turmoil of the crisis, the variability in the capital account settled back to around the average rates observed prior to the crisis.

Figure 4
Korea - Capital Account Volatility
Standard deviation as per cent of GDP


Source: Bank of Korea
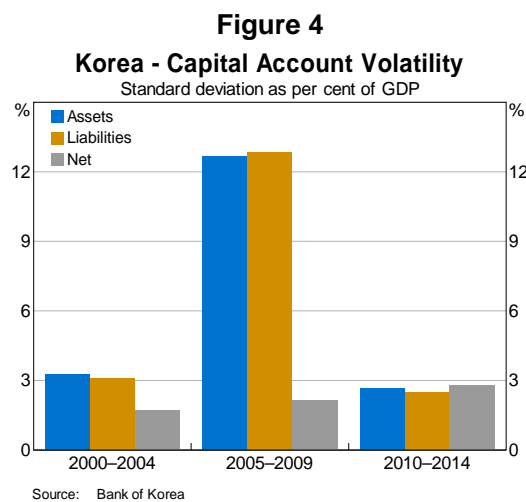
Note also that, for Korea, volatility in the private capital account balance has exhibited several cycles since the 1980s. Using the methodology employed by Balakrishnan et al. (2012), we identify surges and retrenchments in Korea's capital flows (not shown). Notably these can be characterized as relatively volatile throughout the 1980s, the Asian Crisis in the late 1990s, and then the more recent financial crisis in 2008. An interesting question for further research would be whether or not the more flexible exchange rate regime and policy responses have, over time, allowed the economy to accommodate these episodes with smaller economic costs such as loss in output, unemployment and inflation.

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[7] Those economies that were identified as being less active in the use of reserves – Australia, Japan and others – on average do not exhibit the phenomenon where volatility in the balance on private flows is mitigated by the change in reserve assets. Hence, shocks to private flows are more directly reflected in the volatility of total net capital flows. This does not mean that monetary authorities in these jurisdictions do not resort to foreign exchange intervention from time-to-time but might indicate a higher degree of tolerance for allowing exchange rate adjustments.

## 3.   Aspects of Bank and Money Market Capital Flows

Bank and money market flows can be a major determinant of the capital account in Asia-Pacific. Foreign banks lend to the region and resident banks lend abroad, reflecting various degrees of regional and global financial integration. The three major industrialized economies alone report to the Bank for International Settlements (BIS) claims amounting to US$2.4 trillion on SEACEN member economies (Figure 5 and Appendix 3). In particular, European banks are notable as a major source of these bank-related investments, making up a considerable portion of the total at around US$1.5 trillion.

Figure 5
International Bank Claims on SEACEN Economies

Consolidated foreign claims, ultimate risk basis

Source: BIS
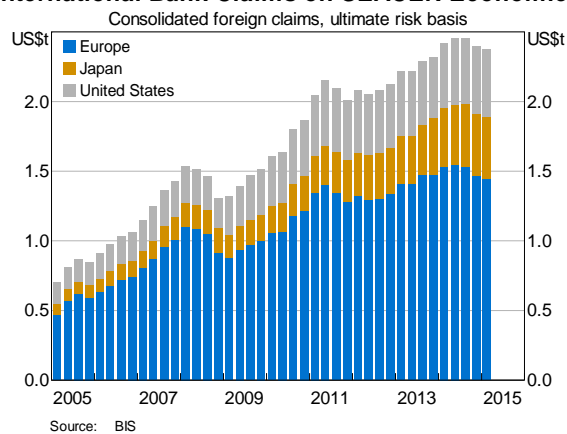
In the lead up to the most recent financial crisis, continental and banks based in the United Kingdom were roughly of equal importance (Figure 6). However, while lending from continental Europe (notably Germany and France) leveled off in 2009, banks in the United Kingdom continued to lend into the region. The stock of claims that UK banks currently have on Asia-Pacific economies in our sample amounts to almost US$1 trillion.[8]

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[8] Even though the BIS statistics are on a globally consolidated ultimate risk basis, these positions might reflect that large Asian banks with London-based operations re-intermediate funds between savers and investors that are both residents in SEACEN member economies.

Figure 6
European Claims on SEACEN Economies
Consolidated foreign claims, ultimate risk basis


Source: BIS
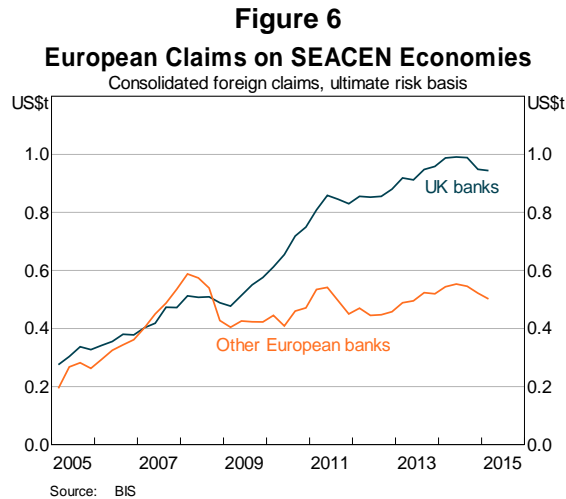
Given the size of these positions and the potentially disruptive consequences from a rapid reversal, they are of considerable policy interest. While there is no *a priori* reason to believe that bank and money market flows are inherently less stable than other types of capital flows, they might require policy action at times when they do behave in a destabilizing way. Furthermore, there are a number of reasons why banks might be more susceptible to adverse shocks than other parts of the financial system. For instance, foreign currency exposures and highly leveraged positions can result in vulnerabilities that are quickly reflected in bank and money market flows when conditions deteriorate.

We do not make an explicit attempt to model banking claims but note one key feature of the flows over the most recent decade. First, we proxy the actual flows by taking the year-ended change in the stock of outstanding claims European banks have on the region. Due to a number of methodological reasons, this does not directly correspond to the flows recorded in the balance of payments but is nonetheless indicative of inflows originating in Europe. Next, we derive a measure of risk appetite from the point of view of the source of the flows using the implied volatilities of European stock markets.[9] It is apparent that the degree of risk appetite is directly related to how European banks lend and subsequently repatriate their investments (Figure 7). That is, European banks lend to the region when they have appetite for taking on risk and reverse their positions as they become more risk averse. The most notable reversals occurred in 2008 when Lehman Brothers collapsed and again in 2011 as European banks experienced a further bout of instability. The relationship might even have some leading attributes, which makes it a useful indicator for policy makers to monitor on an ongoing basis. These findings are consistent with the conclusions about bank-related flows to emerging markets described by the IMF in Bluedorn et al. (2011).

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[9] The risk appetite index is derived using the implied volatilities of equity markets in Europe (VSTOXX) and the United Kingdom (FTSE). The measure is an equally weighted aggregation of implied volatilities in the two markets, re-indexed so that the average value is equal to 100 over the period from 2005 to 2014. Values below 100 are associated with risk aversion and retrenchment while values of the index greater than 100 are to be interpreted as consistent with risk appetite.

Figure 7

**European Bank Flows to
SEACEN Economies and Risk Aversion**

Sources: BIS; Bloomberg
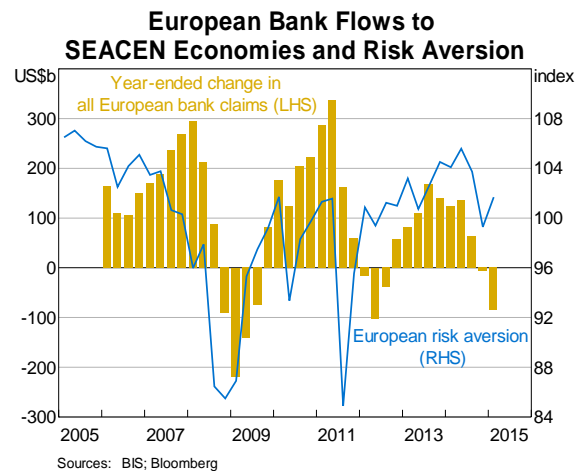
It is notable that of the bank-related inflows (liabilities) to Asia-Pacific, a non-trivial amount remains denominated in foreign currency (Table 3). The 'original sin' of borrowing in foreign currency was a major contributing factor in the Asian financial crisis as well as crises in a number of other economies. At the same time, however, there might be mitigating factors that make borrowing offshore in foreign currency less of a concern. For example, economies might have an offsetting asset position in foreign currency that can be set against these liabilities, or as is the case in Australia, the foreign exchange risk in the banking sector is fully hedged through off-balance sheet transactions in derivatives that are not reflected in the balance of payments (see also Becker and Fabbro, 2006).[10]

4.   Direct Financial Exposures to the United States and Policy Normalization

The normalization of monetary policy settings in the United States is one source of uncertainty for developments in international capital movements. In Asia-Pacific, there is a risk that the resumption of capital inflows following the end of the financial crisis could once again be reversed as foreign rates of return begin to rise. Such an outcome could be disorderly and disruptive for domestic markets and exchange rates in the region.

While modeling the drivers of capital flows is inherently complicated, we calculate a number of useful metrics to assess each economy's financial exposure to the United States. For example, US residents who have invested in Asia-Pacific (capital inflow) might reverse that position (capital outflow) as the federal funds rate increases from its trough. The economies which are most susceptible to a reversal of flows are those that have been large

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[10] The argument that offsetting asset and liability positions are a mitigating factor is somewhat diminished when we consider that at the sectoral or firm level, this natural hedge might not exist if the holders of assets are not the same as those with foreign currency liabilities.

recipients of inflows in the past. At the same time, residents in SEACEN economies might choose to invest more abroad (capital outflow) which would act to compound the pressure.[11]

Table 3

Foreign Currency Exposures of Banks in South-East Asia
As at April 2015

	Liabilities*	Liabilities*	Net position***	Net position***	Risk	Mitigating factors
	US$ billion	% of IIP**	US$ billion	% of IIP****		
Australia	531	23.4	-329	44.2	Above ave	Hedging
Chinese Taipei	170	34.7	129	26.3	Above ave	Net assets
Hong Kong	731	24.4	333	44.0	Above ave	Net assets
India	65	8.4	-33	10.2		
Indonesia	23	4.1	-11	2.9		
Japan	1,065	23.7	1,367	44.3	Above ave	Net assets
Korea	184	18.4	-44	118.3	Above ave	Small net
Malaysia	52	12.2	-2	17.3		
Singapore	761	34.3	-11	-1.9	Above ave	Small net
Memorandum Items:						
Median	--	23.4	--	26.3		

 * *BIS-reporting banks' foreign currency denominated liabilities*
 ** *As a percentage of total economy's non-resident liabilities*
 *** *BIS-reporting banks' net foreign currency position*
 **** *As a percentage of total economy's non-resident net position*

Sources: BIS, IMF and SEACEN

Using data on the stock of US residents' portfolio investment position in Asia-Pacific and the portfolio position of SEACEN economy residents in the US, we calculate four indicators of financial exposure to the US. The calculation of these indicators is detailed in Appendix 4, and briefly outlined below.
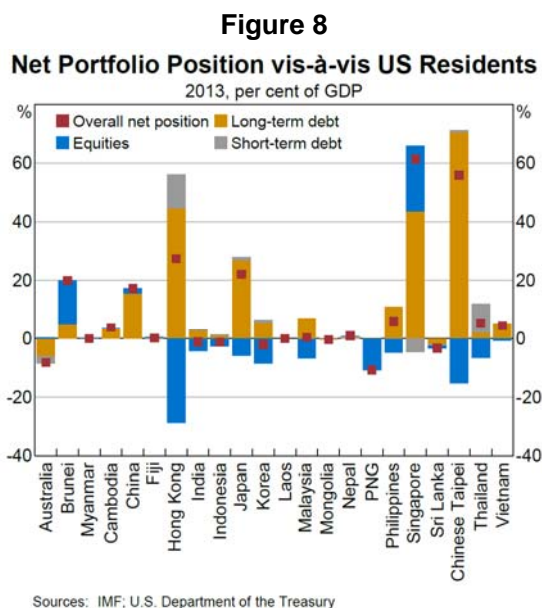
4.1   Measures of Exposure

Each economy has some degree of bilateral financial integration with the US in portfolio assets (Figure 8). Not surprisingly, the degree of integration is directly related to the openness of the capital account and depth of domestic financial markets. Hence, economies like Japan, Hong Kong, Singapore, and Chinese Taipei have much larger gross positions as a share of GDP than Myanmar, Cambodia, Mongolia, Nepal, and the pacific islands. Most notable is that almost all Asia-Pacific economies have a net asset position in debt instruments with the US. This reflects relatively large official foreign exchange reserve holdings invested in US Treasury securities and the lack of depth in Asian bond markets for

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[11] The obvious over-simplification that has been made is to omit the possible response to US monetary policy from investors in other economies. For example, what we show here does not capture that some European investors are likely to repatriate their position in Asia-Pacific to invest in the United States once the relative rate of return begins to change.
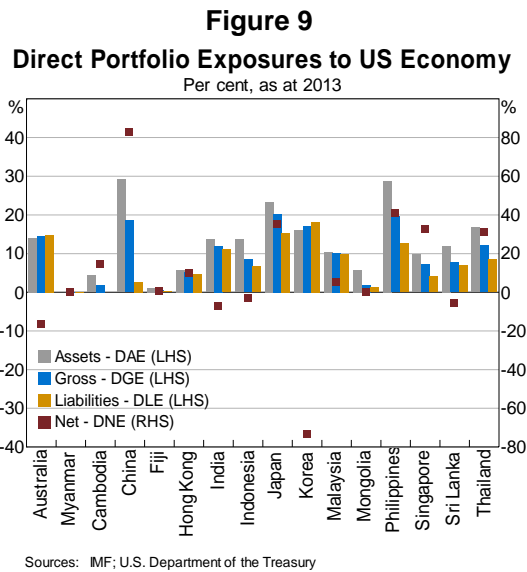
US residents to invest in. On the other hand, much of the aggregate capital outflow from the United States is in the form of portfolio equity and since these tend to be the deepest markets in Asia-Pacific, most economies have a net liability position with US residents in equities. In overall net terms, the majority of economies in Asia-Pacific have a balanced or net portfolio asset position with the United States. Only Australia and Papua New Guinea have notable overall net liability positions.

Figure 8

Net Portfolio Position vis-à-vis US Residents

2013, per cent of GDP

Sources: IMF; U.S. Department of the Treasury

A measure of direct gross exposures (DGE, assets plus liabilities) that US residents have in Asia-Pacific (relative to each economy's total gross foreign position), provides some guide to the degree of financial integration with the United States. However, drivers of assets and liabilities, and hence the behavior of residents and non-residents, are likely to differ. Consequently, we also break up the gross summary measure into a measure of liabilities and assets. Direct Liability Exposures (DLE) are the result of US capital inflows into Asia-Pacific, while Direct Asset Exposures (DAE) are the result of Asia-Pacific capital outflows to the United States. Finally, we also construct a Direct Net Exposure (DNE) to the United States to reflect that assets and liabilities have some offsetting attributes. Each metric is expressed as a ratio to their respective total international investment position aggregate (gross position, liabilities, assets, or net position).

The granularity of the disaggregated metrics is particularly informative for economies where the asset and liability positions vis-à-vis the United States differ substantially. This difference is most pronounced for China (Figure 9). The gross position of China with the United States is substantial but almost entirely due to large foreign reserve holdings in US Treasuries which is indicated by the differential between the asset position and small liability position. The policy implication is that as interest rates rise in the United States, there are relatively few US portfolio investments expected to flow out of China. The Philippines

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and Thailand have a similar, albeit less pronounced, asset-liability structure. The net portfolio-related capital flows that result from normalization by the Federal Reserve therefore crucially depend on behavior on the asset side for these economies. Insofar as reserve decisions by the monetary authorities are important in the composition of foreign assets, and independent of pure portfolio considerations, one might expect little response on the asset side.[12] The focus is therefore on the size of potential liability-related capital outflows initiated by non-residents.

Figure 9
Direct Portfolio Exposures to US Economy
Per cent, as at 2013

Sources: IMF; U.S. Department of the Treasury

Economies with a considerable portion of liabilities owing to US residents include Australia, India, Japan, Korea and the Philippines.[13] Importantly, the composition of those liabilities also matters. Whereas most Asia-Pacific economies have mainly equity liabilities, Australia has a larger exposure in debt securities purchased by US residents.

4.2   US Monetary Policy Tightening Cycles and Capital Flows

We infer a reaction function for South-East Asian economies to policy normalization in the United States by conducting a simple event study for past tightening cycles. Given the short data sample there are only two Federal Reserve tightening cycles (early-2000s and mid-2000s) over which to observe the reaction of capital flows (refer to Appendix 5 for

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[12] While official reserve assets can reasonably be expected to be less interest sensitive than private investments, to the extent that some central banks hold very large foreign exchange reserves, this excess might be driven more by the same incentives as private investments. The exchange rate adjusted return is a crucial metric in the investment decision, often overwhelming any interest rate consideration. These might be important considerations for large reserve holders, but are beyond the scope of this paper.

[13] Note that what appears to be a very large net liability position for Korea is the result of the net overall investment position being close to zero. Given that this is the denominator for the calculation the small net liability position of Korea with the United States is a very large percentage of a small denominator. See also Appendix 4 for details of the calculation.

details). The sample includes 15 rate increases.[14] The response function is the cumulative change in average capital flows in South-East Asian economies for the quarter in which the tightening occurs and the subsequent 8 quarters, bounded by a maximum and minimum reaction over the sample (Figure 10). To benchmark the reaction of capital flows, we also calculate a baseline which is the cumulative average quarterly capital flow over the entire sample from 2000 to 2014.

Figure 10
Net Capital Flows
Cumulative response, per cent of GDP, 2000–2014

Source: author's calculations
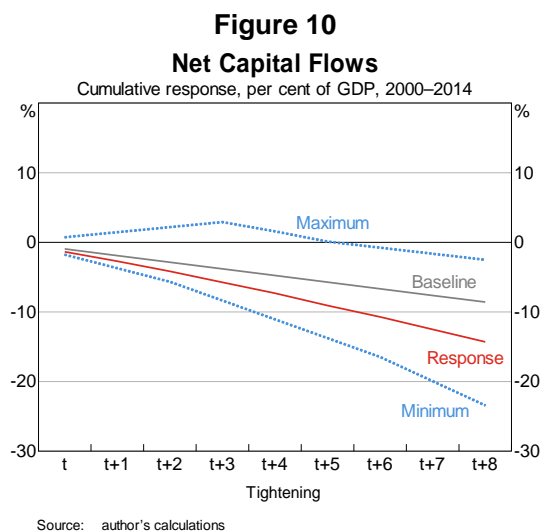
Since economies in Asia-Pacific typically record current account surpluses, they export capital to the rest of the world as shown by the gray baseline which cumulates to 8.6% of GDP over 8 quarters. During episodes when the Federal Reserve raised interest rates, total net capital flowed out of the region more quickly on average (red line), cumulating to 14.3% of GDP after 8 quarters. This finding is consistent with interest rate increases in the United States resulting in a repatriation of capital flows from South-East Asian economies (non-residents) and attracting increased investment from the region (residents) into the United States. The main drivers of the increased outflow appear to be a slowdown of non-resident portfolio debt inflows, bank and money market inflows, as well as a tendency for residents to invest more abroad. While it is difficult to quantify with any degree of precision, this effect might amount to 5.7% of GDP 8 quarters after the interest rate rise (or an average of 0.6% of GDP per quarter).[15] Notably the upper and lower bounds of the reaction function indicate that there is a considerable degree of uncertainty about the actual outcomes (see also below for findings from the IMF 2015 Spillover Report).

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[14] We drop the last three rate increases from the sample because the tail of the event study overlaps with the onset of the 2008 financial crisis. Including them would unnecessarily bias the results, given that developments in capital flows during that time are not principally driven by monetary policy developments 8 quarters earlier.
[15] In this event study, the 8 quarter windows overlap so that it is difficult to exactly separate the effect from the first and subsequent interest rate increases on capital flows. Also, no attempt is made to control for expectations of future policy interest rate changes. In a similar exercise, the IMF finds a cumulative negative impact on GDP of 2% after 8 quarters for an unanticipated change in US interest rates (Bluedorn et al. 2011).

The question that arises is whether this change attributable to monetary policy developments abroad is material. The quarterly magnitude does not appear to be very large given the standard deviation of net capital flows in the region since 2012 is around 3.5% of GDP per quarter. However, capital is shown to be flowing in one direction in the event study and is not simply fluctuating around a mean during the tightening cycle. The importance of a persistently more pronounced capital outflow is likely to depend on the starting point with respect to general macroeconomic and financial market conditions. It is difficult to define a meaningful benchmark against which to measure these findings. As an outer extreme, we could delineate the Asian financial crisis as an event that was indisputably disruptive. The magnitude of the reversals in capital flows was associated with volatility in real and financial variables. During that time, the Korean experience provides a useful case study. Total net capital inflows initially slowed and then suddenly reversed at an average rate of 6.5% of GDP per quarter, cumulating to outflows of 51.8% of GDP between March 1998 and the end of 1999.[16]
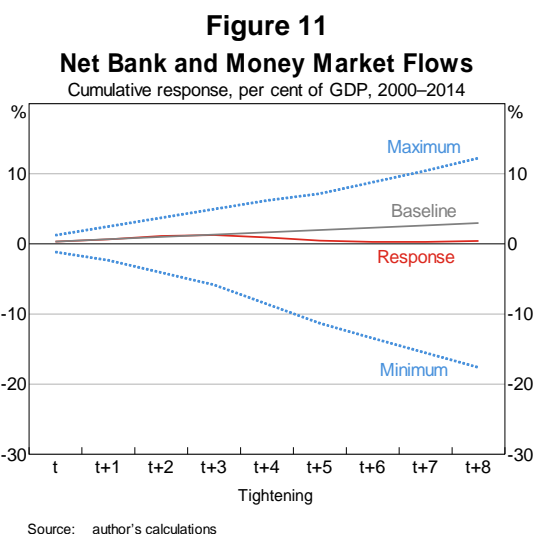
For this type of reaction in capital flows to occur in response to tightening in the United States, the Federal Reserve would either have to act considerably more aggressively than currently anticipated, or the market reaction would have to be more pronounced than the historical norm.[17] In this context, the event study of the typical relationship between past policy rate increases in the United States and the reaction of capital flows in Asia-Pacific appears to be weak when considered in isolation. Nonetheless, there might be second round effects or additional shocks which could be transmitted to Asia-Pacific at a time when US yields begin to rise. One such second round effect might be the transmission of European risk aversion via bank and money market flow to the Asia-Pacific following a Federal Reserve rate rise that is interpreted by markets to be a net negative for the euro area's own recovery.

Interestingly, while there is a clear slowing in net bank and money market inflows from non-residents into Asia-Pacific around 4 quarters after interest rates rise in the United States, there is a very wide dispersion of potential outcomes (Figure 11). While at the extreme, banking-related flows can be shown to reverse by as much as 17.6% of GDP after 8 quarters, at times inflows might actually accelerate. We interpret this finding as an indication that bank and money market flows are likely to be a function of a wider variety of determinants than the US policy interest rate.

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[16] Another metric to gauge the magnitude of the flows is the revisions to which the data are subject. For example, in the 2015 June quarter Balance of Payments release by the Australian Bureau of Statistics several quarters of data were each revised by more than 1% of GDP. The quarterly increase in capital outflows due to changes in the US federal funds rate described above lies well within this margin of error. See also Becker (2003).
[17] Current market expectations are for the US federal funds rate to rise gradually toward 2% by the end of 2017.

Figure 11
Net Bank and Money Market Flows
Cumulative response, per cent of GDP, 2000–2014

Source: author's calculations

One reason this wide range of uncertainty surrounds bank-related flows could be because these flows are mainly sourced out of Europe and not the United States. Arguably, the eventual normalization of policies in the euro area could have a clearer and more appreciable impact than the actions of monetary authorities in the United States.

4.3   Implication for Capital Flows from Findings in the IMF Spillover Report

The recent Spillover Report published by the International Monetary Fund (IMF) also addressed some of the ambiguities surrounding possible financial market responses to normalization of interest rates in the United States (Osorio-Buitron and Vesperoni, 2015). The report differentiates between the reasons why interest rates rise and identifies how these can be expected to impact emerging markets. Since nominal returns can reflect real, monetary or other developments, the analysis suggests that the impact on emerging markets can be very different. To summarize:

$$i_t^{U.S.} = r_t^{U.S.} + \pi_t^{U.S.} + \varepsilon_t^{U.S.}$$

where $i_t^{U.S.}$ is the nominal market interest rate; $r_t^{U.S.}$ represents the real component of the return; $\pi_t^{U.S.}$ is the component compensating for inflation; and $\varepsilon_t^{U.S.}$ reflects all other factors that affect observed nominal returns.

The findings of the Spillover Report are that 'money' shocks (that is, increases in $\pi_t^{U.S.}$ or $\varepsilon_t^{U.S.}$) that lead to higher yields in the United States result in worse outcomes for economic growth in emerging markets, net portfolio outflows, and a depreciation of the exchange rate. On the other hand, if yields in the United States rise due to a 'real' shock, implying stronger economic activity (that is, an increase in $r_t^{U.S.}$), then emerging markets tend

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to benefit.[18] Improved economic growth in the United States leads to better growth prospects in emerging markets, which boosts risk appetite, causes capital to flow to emerging markets, and leads exchange rates to appreciate against the US dollar.

The Spillover Report suggests that there are two transmission channels for positive growth shocks to emerging markets. The first is the usual one in which higher real growth in the United States attracts capital inflow due to the implied higher returns and causes the US dollar to appreciate. The second is a positive spillover to general risk appetite from the growth surprise (that is, improved global economic prospects) through which capital flows to emerging markets and leads to an appreciation of exchange rates vis-à-vis the US dollar. The IMF analysis indicates that the second channel dominates.

Policy interest rate increases in the United States that aim to normalize yields as the real economy recovers would appear to be more consistent with the Spillover Report conclusions that suggest the source of yield increases is a positive real growth shock. While an unanticipated monetary policy change by the Federal Reserve would be analogous to a money shock, it is difficult to envisage a reason why such a policy surprise would eventuate.

5.   Investment Returns and Capital Flows

The return that non-residents are able to earn on their investments in South-East Asia economies should, at least in principle, be an indicator of capital flows. However, capital movements are also determined by a number of factors which can make it difficult to identify a clear role for returns. Furthermore, the aspect of returns that non-residents care about most might differ depending on the type of investment, the investor and extent of foreign currency exposure. We, therefore, consider several dimensions of flows that might be important and caution against applying a uniform correlation of returns and capital flows across South-East Asia.

Firstly, we suggest that nominal rather than real returns are likely to be more important to non-residents. Since non-residents are unlikely to consume the proceeds from investments in the destination economy, the rate of inflation in the recipient economy is not directly relevant.[19] Secondly, the return on investment is not easily proxied by any one measure. Depending on the depth and openness of financial markets in the receiving economy non-residents might be influenced by the return on short- or long-term debt instruments, the return in equity markets or the average total rate of return on capital in the economy. Bond yields and equity prices might be jointly significant if domestic markets are sufficiently deep for non-residents to liquidate fixed income positions and reinvest in equites

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[18] The analysis indicates that the effects of shocks emanating from the United States or the euro area are similar in magnitude, irrespective of whether they are money or real shocks. However, the transmission from the United States is more likely to be through trade channels, while shocks from the euro area are probably more closely related to the financial linkages between respective regions.
[19] The inflation rate nonetheless plays an important role as an indicator of general macroeconomic conditions and thereby influences capital flows.

or alternative investments. The investment mandate plays an important role in the decision. Thirdly, the currency composition of the underlying investment is also likely to matter. Similar to the argument about the relevant price deflator for investment returns, it is probable that investors care most about the return in their local currency (e.g., US dollars) adjusted for exchange rate effects applicable to their foreign investment positions. A complication is that there are only sparse data sufficiently comprehensive to measure the currency composition of international investment positions.

We attempt to assess the importance of some of these considerations by calculating average nominal rates of return applicable to non-resident investments across different types of instruments, in the foreign currency of the investment, and taking into account exchange rate variations by using the US dollar as a numeraire.

$$r_{USD}^* = \left(r_{SFI}^{FCY}.\beta_1 + r_{LFI}^{FCY}.\beta_2 + r_{EQU}^{FCY}.\beta_3 \right) x\, \Delta e^{FCY/USD}$$

where r_{USD}^* is the foreign rate of return to a non-resident investor expressed in US dollar terms; r^{FCY} is the rate of return in foreign currency (FCY) on either short-term fixed income (SFI) of 90-day maturity, long-term fixed income (LFI) of around 10-year maturity, or the annualized rate of return on equities (EQU), noting that the three measures of return are equally weighted ($\beta_1 = \beta_2 = \beta_3$); adjusted by the annualized rate of change in the bilateral exchange rate $\Delta e^{FCY/USD}$ between the US dollar and the foreign currency of the destination economy. For completeness, we also calculate the differential between this measure and an equivalent measure of US dollar-denominated returns based on US Treasury notes, bonds and the S&P500 Index (which obviously does not require conversion into US dollar terms).

Returns on short and longer-term fixed income securities are relatively slow moving and predictable compared with the more extreme fluctuations in equities and the exchange rate. In Table 4, we show the results of correlations between the components of the capital account and different measures of return. We only investigate the effect on capital inflows/liabilities that might exhibit a relationship with returns and therefore leave aside the actions of residents in their accumulation or retrenchment of foreign assets. The first measure is the foreign currency return that a non-resident investor is able to earn in fixed income (i.e., averaged across short- and longer-term securities). The second indicator is also in foreign currency but adds the return on equities. Measures three and four adjust the first two measures for exchange rate developments, and the fifth measure is the differential in total US dollar returns between the destination economy and the United States. The Table lists those economies for which a significant positive correlation of between 40% and 60% was found. For example, in both Australia and Korea, there is evidence that the average total return on financial instruments, denominated in their currencies, is positively correlated with non-resident portfolio debt flows.

Table 4

Significant Positive Correlations between Capital Flows and Measures of Return

Sample quarterly data 2000 to 2014, excluding 2008 and 2009

	KAB	FDI	PFE	PFD	BMM	DER	RES	PKB
1. Fixed income return in FCY	AUS, KOR	KOR, CHT	SIG, THL			AUS, HKD, KOR, CHT	CAM, HKD	AUS, KOR
2. Total returns in FCY	AUS, HKD, KOR, SIG	SIG	INI, JAP, PHP, SIG, SLK	AUS, KOR	KOR, PHP, SIG, SLK			AUS, HKD, KOR, PHP, SIG, SLK
3. Fixed income return in USD		CAM	SLK	MYR		HKD, INI	HKD, INI, SIG	
4. Total return in USD	HKD, INI, INO	HKD, INO		AUS, INO	HKD, BMM			HKD, INI, INO
5. Total return differential in USD	KOR		PHP, SLK		KOR, SLK	HKD		KOR, PHP, SLK

Memorandum items:
Table lists economies for which correlation coefficients were found to be at least 40 per cent. None exceeded 60 per cent.
Correlations between returns (foreign currency, FCY, or US dolars, USD) and respective capital inflows/liabilities by category.
Sample includes Australia, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Sri Lanka, Chinese Taipei and Tha
No significant correlations were found for China.

Source: author's calculations

The most notable findings are:

- There is no uniform pattern of significant correlations between returns and capital flows that can be generalized across all economies. We interpret this as a reflection of the importance of idiosyncratic factors. These are potentially a function of the behavior of different investor bases and financial instruments.

- The strongest results for correlation with capital flows were for the average rate of return across all instruments (short- and long-term debt and equities) denominated in the destination economies' currency. This was strong for portfolio equity flows (in India, Japan, the Philippines, Singapore, and Sri Lanka) as well as bank and money market flows (in Korea, the Philippines, Singapore, and Sri Lanka).

Interpretation of this result can be complicated for policy makers. It is not immediately obvious why equity returns might be a significant determinant of bank and money market flows. However, considering that bank-related capital movements can be shown to be sensitive to risk aversion (see above) the reflection of generalized investor sentiment in equity markets might be captured in the correlation coefficient between equity returns and bank-related capital flows. Note, however, that the strongest correlation between risk

aversion and capital flows during the financial crisis was omitted from the analysis to give a clearer indication of regular relationships.

- Other correlations were weaker for individual components of the capital account. However, a degree of co-movement results in notable positive correlation of the private capital account balance or the overall capital account with returns. That is, while the exchange rate adjusted total return measure might for instance be only weakly correlated with debt-related flows and bank-related flows, if these flows move in the same direction then the relationship might be stronger in the aggregation of all flows. This was particularly evident for the total return across all securities adjusted for exchange rate variations (Hong Kong, Philippines, and Singapore) as well as the return differential measured in US dollars (Korea, Philippines, and Sri Lanka).

There is no easily identifiable relationship between returns and the flows. Furthermore, there appears to be some evidence to suggest that the characteristics of returns that matter in the determination of capital flows differ between economies. While the work presented here is rudimentary, it could be refined in several ways to attempt to enrich the understanding of relationships that are deterministic. While the rates of return are equally weighted, they could instead be weighted by the importance of different types of foreign investment. While we assume that the US dollar is the numeraire for all non-resident investors, this might not necessarily be the case, especially considering how active European banks are in lending to Asia-Pacific. An attempt to more closely relate movements in capital to the relevant exchange rate adjustment should also bear in mind that there are a number of factors that might mitigate foreign exchange risk. For example, natural hedges might exist in the form of offsetting foreign currency denominated assets or economies with more developed financial markets might engage in a significant degree of hedging through derivatives (see also Becker and Fabbro, 2006).

6. Policy Considerations, Implications and Options

All policy makers are likely to agree with generalized statements that recommend 'appropriate' or 'sound' practices. The real challenge for individual economies lies in understanding and defining a hierarchy of policy objectives that is appropriate and sound. The policy mix most conducive to better outcomes in Asia-Pacific is also a moving target as economies develop and the global environment changes. For a summary of policy actions since the 2008 crisis see Hussain et al. (2011).

We can safely assert that macroeconomic fiscal and monetary policy should be aimed at certain principles such as debt sustainability and achievable targets linked to variables such as inflation. Nonetheless, the exact implementation and objectives vary from one economy to another. Increasingly, macroprudential policies have also been advocated to achieve consistency between traditional macroeconomic management and financial

sector supervision. The main fiscal and monetary policy options should, therefore, always be set in an 'appropriate' manner (as defined by the authorities). Insofar as this is not always the case, during times of capital flow disruptions, such misalignments should be corrected first before alternative or additional policy responses are contemplated. In other words, it might prove to be counterproductive to implement policies that respond to developments in the capital account when fiscal and monetary policies are out of alignment with macroeconomic fundamentals.

This paper has nothing to say about the appropriate exchange rate regime, other than to note that the exchange rate is one of the most important prices in any economy. It has important implications for the real sector, nominal values, and financial markets. It is also jointly determined with the current account, capital account, and the saving-investment balance. The choice of exchange rate regime is, therefore, a central decision that all policy makers have to evaluate in the context of the degree of adjustment that can be absorbed by the exchange rate.

6.1   Bank and Money Market Flows

The financial crises in 1998 and 2008 were primarily associated with bank and money market flows. Given that this is a sub-component of the capital account where emerging markets often experience volatility, it is worth understanding more fully. Bank and money market inflows appear to be the most flexible in financing those residuals or imbalances not financed through other means. At turning points in the economic or financial cycle, bank and money market flows might consequently reflect the buildup of excesses. It is, therefore, not surprising that this sub-component is more often subject to reversals and bouts of volatility. The relationship between risk aversion and bank-related capital flows should not be surprising if investor sentiment triggers an unravelling of unsustainable positions.

Banking flows have exhibited the instability that could be predicted at those times when the banking sector, either domestically or abroad, is the underlying source of shocks. That is to say, banking sector shocks are most likely to be reflected in transactions undertaken by that sector. However, this is not to be over-simplified to imply that bank loans and money market financing will necessarily be the only, or even the principal, source of instability in the future. This may have been the case in 1998 and 2008 but is not assured to be a source of instability during future crises. For instance, one could conceive of a shock that would destabilize those flows that the conventional wisdom would consider to be 'safer', 'cold' or inherently more 'stable'. Such attributes are usually believed to be a feature of direct investment flows. Notwithstanding this preconception, during times of heightened activity in mergers and acquisitions in industrialized economies such as in the mid-2000s, foreign direct investment was also observed to be volatile. And in some Latin American economies when questions arise about the enforceability of property rights, direct investment might

become flighty.[20] The policy implication is that domestic and international political, macroeconomic and financial developments can be the source of volatility in 'all' types of capital movements. It would be naïve to restrict scrutiny to just a narrow subset of the capital account.

The domestic policy focus should take the form of ensuring that banking and non-intermediated financial markets are as robust and safe as they can be. Internationally, economies have to ensure that they are able to withstand the consequences of crises that originate in jurisdictions that are beyond the direct sphere of their own influence. A key recommendation is to create the correct incentives and remove distortions that would drive unproductive or speculative lending by non-resident banks.

A more systematic and detailed dissection of banking-related flows and the underlying stock of assets and liabilities to better understand the dynamics of the capital account is required. Building on the work of Pontines and Siregar (2012), future research should aim to also include additional variables that are identified as important in this paper. For example, risk aversion could be refined to relate more specifically to the economy of origin (common lender) rather than the US variable used. The relevant exchange rate considerations and therefore, foreign currency exposures, would also be likely candidates for investigation. Furthermore, the degree of openness to capital flows and substitutability between different components of the flows are likely to be important. This type of work should proceed by careful analysis of existing data and evolving trends. Modeling historical relationships provides useful insights but is only of limited use in guiding future policy responses.

6.2   Foreign Exchange Exposures

Foreign exchange exposures in the banking system that arise from cross-border lending are often a source of volatility. Furthermore, a short-term policy response to such volatility often necessitates access to foreign currency which complicates the capacity of local authorities to respond. It requires reliance on an adequate stock of foreign exchange reserves and the ability to deploy that stock when needed. In a crisis situation, the use of foreign exchange reserves can be inhibited if there is a perceived signaling problem or stigma associated with a run-down in the stock. As a result, international organizations and individual constituencies have become vocal in advocating cooperation in building safety nets where economies cooperate in the event of a crisis. This cooperation might take the form of a network of foreign currency swap lines or coordinated policy responses. These types of actions can help underpin confidence and perhaps even forestall those crises that result from little more than a change in investor sentiment. However, it is difficult to secure multilateral agreement on such initiatives and even more difficult to convince central banks

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[20] The re-nationalization of petro-chemical assets in several Latin American economies in the 2000s provides examples of shocks to property rights that might affect foreign direct investment.

to subjugate their domestic monetary targets to international objectives and factors beyond their own control. It would appear that these difficulties would be less of a pressing concern if foreign currency exposures were limited at the outset. Banking crises that involve the local currency can be addressed more easily with the liquidity that domestic central banks control and are able to supply freely without limit.

6.3 Role of Foreign Exchange Reserves

Insofar as reserves are used to offset the destabilizing effects of private agents, they might be a useful policy tool. However, as noted in Appendix 1, monetary authorities have to be cautious not to introduce instability by their actions in foreign exchange markets if private flows reflect fundamentals and official transactions in reserves imply a 'crowding-out' of the private sector for a given current account balance. In the medium-term, a policy objective might be to foster private market outcomes that are conducive to a more stable capital account. Such outcomes are observable for most industrialized economies, irrespective of their size. The openness of the economies to international capital movements, the exchange rate regime, and domestic economic policies have to be consistent and supportive of such a goal. A specific course of action would be to encourage the types of large resident institutional investors who could provide some counterbalance to the actions of non-residents. Retirement funds or similar pooled saving vehicles could be fostered to play a larger role in the region.[21]

6.4 Monetary Policy Responses to Capital Account Reversals

The relationship between returns and capital flows is difficult to define. It would appear that different aspects of returns are important for each economy and cannot be generalized even across a region with many similarities. Monetary policy abroad is also only loosely related to capital account developments. There is a link but it is not strong and surrounded by a wide band of uncertainty.

In a study for Korea, Choi et al. (2014) suggest that monetary policy is best suited to addressing the domestic macroeconomic consequences of capital movements and that foreign exchange reserves are better suited to smoothing the capital account. Importantly, they also note that if monetary policy were tightened to stem capital outflow and stabilize the reversal of foreign inflows, it would have unhelpful consequences for domestic growth if the episode is associated with a deflationary economic shock.[22] There is, therefore, an explicit trade-off that constrains the use of monetary policy, which is further complicated if the monetary authorities also have some exchange rate objectives.

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[21] See also Genberg et al. (2005), especially pages 82-83.
[22] This policy choice is also described in Kokenyne et al. (2010).

Given how little time is devoted in this paper to how monetary policy might relate to capital flows, at best policy makers would be well advised to consider a number of other responses to capital account developments before responding with monetary policy. It would appear to be a rather blunt tool in the context of the capital account unless the exchange rate is fixed and monetary policy is imported from abroad (as it is in Hong Kong).

6.5   Cross-contagion between Flows and Fostering Substitutability

Another area to monitor is the possibility of contagion within the capital account. Whereas industrialized economies typically enjoy a degree of substitution in the capital account to finance the aggregate requirement, emerging economies are often subject to compounding volatility because at times, all flows move in the same direction (Becker and Noone, 2009). The credibility of domestic macroeconomic policy settings is an important determinant of stability, as are the international investment positions of residents which might offset the actions of non-residents and provide a natural hedge. One policy implication is that the private sector might not be able to fully equilibrate without official intervention in many emerging economies. This could be telling about the appropriate balance between domestic and international policy objectives in the context of an open capital account.

6.6   Capital Flow Management Measures

One of the goals to help stabilize capital flows and mitigate risks has been the deepening and development of local currency debt markets. However, progress on this objective remains a long-term aim and policy makers might have to respond to fast changing capital flows before it can been achieved. As a result, the implementation of measures to manage capital flows in specific circumstances is now considered to be part of the policy toolkit, and has been endorsed by the major international organizations (IMF, 2015 and IMF, 2011). Some general guiding principles apply to the implementation of capital flow measures.

Management of flows begins with a prevention of, or response to, inflows and the build-up of vulnerabilities. Economies are advised to exhaust their macroeconomic policy options before implementing restrictions on capital movements. This approach seeks to ensure that policy settings are appropriate and do not create the type of distortions that exacerbate vulnerabilities. That is, policies will typically seek to lean against inflows (e.g., allowing exchange rate appreciation reduces the potential for one-way bets). Prudential regulations and capital controls can also help to forestall the build-up of balance sheet vulnerabilities and credit booms. However, there is a risk of creating distortions which could create unintended misalignments and associated vulnerabilities elsewhere in the financial system.

The risk of creating distortions is especially pronounced if capital flows reflect the underlying financing decisions of firms in the host economy. Given that there is some degree of substitutability between different forms of financing, and therefore capital flows, efforts by policy makers to discriminate using capital flow measures might (unintentionally) not be welfare enhancing (Smithy and Valderramaz, 2008). There is no a priori reason to believe that the policy maker always has better information. Therefore, it might be preferable to address the root cause of instability such as the international or market features that lead to volatility.

Measures should target specific risks and be tailored to the circumstances of the economy. For instance, if inflows are intermediated through the regulated financial system, prudential tools can be the main instrument, but if inflows bypass regulated institutions, then capital controls may be the only option.

The last resort of implementing capital controls should ensure broad coverage of the measures, and only be imposed when flows are expected to be temporary. Controls are unlikely to remain effective if the capital is expected to leave as soon as they are lifted. In the medium-term, such controls are typically either circumvented or result in undesirable distortions which render them ineffective. As a result, it is generally acknowledged that controls can only remain effective temporarily and should be removed as soon as practicable.

There is also a regional dimension to the potential imposition of capital flow measures. Insofar as one economy imposes restrictions, these actions might divert flows to another economy that non-residents consider to be a close substitute. One could imagine a cascade of measures implemented across Asia-Pacific that would benefit from some regional coordination to avoid beggar-thy-neighbor type outcomes. A particularly undesirable outcome would be if resort to restrictions leads to a delay in necessary macroeconomic adjustment. This is especially the case if costs increase if they persist for longer.

A final point that policy makers contemplating capital flow measures should bear in mind relates to the consequences they might have on the credibility of policies and the impact on the composition of the non-resident investor base. The nature of capital flow measures is to alter the rules of the game. By definition this creates a degree of uncertainty that non-residents might view as a risk or dead-weight loss for which they will require some form of compensation. Even a very successful capital flow measure which prevents the large scale reversal of non-resident investments, say through a moratorium on liquidating certain investments, might raise the risk that at some future point investors will once again face the risk that their assets in the host economy are inaccessible. Such a fundamental, albeit temporary, alteration in property rights might run contrary to the investment mandate of some non-residents. The question is whether the type of investors who remain and are willing to bear these policy-related risks are those that are necessarily always the most conducive to stable and efficient cross-border capital allocation.

7. Concluding Comments

Even in Asia-Pacific, there appear to be few regularities that would allow generalized policy advice other than to do what this paper attempts to do – dissect the capital account and exposures to make policy makers aware of looming vulnerabilities and appropriate responses.

We have attempted to show that careful and methodical analysis of developing trends allows the formulation of potential policy responses in the event of rapid inflows, sudden stops, and possible reversals. The balance of payments and international investment position provide a useful framework to think about capital flows. Some volatility is inevitable but the manner in which economies accommodate this volatility is a policy choice with competing objectives that have to be evaluated ex ante. All policy reactions have costs and benefits.

The implications for capital movements in Asia-Pacific following on from policy normalization in the United States are highly uncertain given that there is no recent precedent of either the 2008 financial crisis or unwinding of extraordinary policy responses. History is therefore of only limited usefulness. Nonetheless, there are a number of reasons to believe that, notwithstanding considerable uncertainty, the probable negative implications might well have been overestimated in recent years.

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Appendix 1 – Balance of Payments Accounting and Definitions

Throughout the project, we use the balance of payments identity to construct data sets and make policy inferences. At times, we choose to group certain types of flows based on particular characteristics. Our use of abbreviations and methodology are detailed in this Appendix. The basic concepts are as follows, where the negative of the current account is equal to the variables on the right hand side:

$$
\begin{aligned}
-CAB_t^i &= I_t^i - S_t^i \\
&= KAB_t^i \\
&= PKB_t^i + RES_t^i \\
&= FDI_t^i + PFE_t^i + PFD_t^i + BMM_t^i + DER_t^i + RES_t^i
\end{aligned}
$$

where CAB_t^i is the current account balance for economy i at time t, S is national saving, and I is investment. From national accounts accounting we know that the current account balance is equal to the saving-investment imbalance.[23] Insofar as domestic saving and investment are not equal, a shortfall in financing has to either be imported as capital inflow or a surplus exported as capital outflow. The balance of payments counterparts to the current account balance and saving-investment imbalance are therefore cross-border financial flows.

We define KAB[24] to be the capital account balance, which comprises the private capital account balance (PKB), and the change in official foreign exchange reserve balances (RES). Since reserves are a policy tool controlled by the monetary authorities, they are deemed not to be a reflection of private sector decisions.[25]

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[23] For ease of exposition we write this as the inverse of the current account balance equal to investment less saving since the double-entry accounting of the balance of payments means that the capital account is equal to the inverse sign of the current account.

[24] International standards (*Balance of Payments and International Investment Position Manual – BPM6*) specify that the 'financial' account is the main counterpart to the current account. However, since we are primarily discussing capital flows, we prefer to use the term 'capital account' to describe the record of cross-border financial transactions recorded in economies' external financial accounts. The actual item in the official statistics that is referred to as the 'capital account' (capital transfers and flows associated with non-produced/non-financial assets) is usually very small and adds little to the analysis at hand.

[25] While all non-reserve related flows are assumed to be private, this might not be true for economies whose currencies are held as international reserves. A useful example is the United States. While actions in the foreign exchange market to alter the level of foreign exchange reserves held by the Federal Reserve are clearly US official flows, so are capital inflows into US Treasuries that represent investment of non-resident reserve holdings. Such capital flows are most likely reflected in the portfolio debt category (i.e., a central bank non-resident to the US buys Treasuries as part of its reserves). Insofar as official flows remain small relative to other investment flows, this is unlikely to be a major issue. However, for smaller economies the effect might be more pronounced (e.g., in Australia for portfolio diversification). In this case we assume that even reserves behave like private flows since it is most likely that these currencies are not regarded as core reserves and are mainly held for diversification and return enhancement purposes rather than direct intervention. We therefore ignore the impact of official non-resident capital flows for the purposes of this analysis.

The components of the private capital account balance are foreign direct investment flows (FDI), portfolio equity flows (PFE), portfolio debt flows (PFD), bank and money market flows (BMM)[26], and derivatives (DER). Capital transfers, flows associated with non-produced/non-financial assets, as well as errors and omissions, are generally small and therefore omitted.

Each of the components detailed above have underlying gross asset and gross liability flows which are the result of transactions entered into by residents and non-residents. Capital inflows (a positive sign) arise when external liabilities to non-residents are incurred by the recipient economy's residents, but when external liabilities decline this repatriation by non-residents is recorded as a negative inflow (i.e., effectively an outflow). Gross inflows can therefore be characterized as the net purchase of resident assets by non-residents. Capital outflows are purchases of non-resident assets by residents (a negative sign), but can also be thought of as capital inflows when residents repatriate their investments (outflows with a positive sign). Gross outflows can therefore be characterized as the net purchase of non-resident assets by residents. Overall net flows are the sum of gross inflows and gross outflows.

Since this derivation is the outcome of simple double-entry bookkeeping, a number of interesting relationships between the flows are implied that have important policy implications. Most notably, if the fundamentals that determine the current account, saving and investment are given in the short-term, so that the total capital account is fixed, then changes in official reserves must be accommodated by private capital flows to maintain the balance of payments identity. That is, policy actions that induce reserve-related capital flows will affect other parts of the capital account. Typically bank and money market flows are negatively correlated with reserves (see also Becker and Noone, 2009). Also note that, for a given private capital account balance, a change in one type of private flow must be offset by a change in the sum of the others. This suggests that there is an inherent tendency for negative correlation between capital flows within the capital account which might also be indicative of a degree of substitutability. Industrialized economies exhibit a higher degree of negative correlation between the flows than emerging economies. This is, at least in part, because they are less likely to accumulate reserves and also helps to explain why gross flows are more broadly balanced in industrialized economies (see also Bluedorn et al., 2013).

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[26] In the balance of payments these flows appear under the category of 'other investment'. As bank loans and money market transactions are typically the main components of this category, we refer to these flows as 'bank and money market' flows to lend them a more meaningful label.

Appendix 2 – Measuring the Diversification and Openness of Gross Capital Flows

We calculate a measure of how freely capital flows in and out of economies following Becker and Noone (2009). The degree of openness (Flow Openness) for every economy or type of flow (i) depends in every period (t) on the ratio of the absolute value of gross resident and non-resident flows to the absolute value of the sum of gross and net flows, as follows:

$$Flow\ Openness_{it} = \left[\frac{|resident\ flows_{it}| + |nonresident\ flows_{it}|}{|resident\ flows_{it}| + |nonresident\ flows_{it}| + |net\ flows_{it}|} - \frac{1}{2}\right] x\ 200$$

When capital flows readily in both directions, we expect the sum of substantial absolute gross flows to be large relative to net flows, because the gross movements are at least partially offsetting. In this case, the index tends toward 100. Global financial centers, such as the United Kingdom and Hong Kong, register a very high index value as capital is channeled in and out with large two-way flows, but in the context of relatively small net positions. However, when capital flows are very one-sided, we expect the sum of gross flows to be more in line with net flows. The most extreme case would be where gross flows (either assets or liabilities) are the same size as net flows. This would occur if either resident or non-resident flows were completely restricted. In this case, the value of the index would be zero.

Substantial two-way flows may indicate that residents have the capacity to offset volatility caused by foreign investors, in part because residents hold a stock of foreign assets. If residents do not invest abroad, they lack the capacity to initiate either capital outflow (when they invest) or capital inflow (when they repatriate). Thus, more substantial investment by domestic residents abroad may provide a natural hedge to manage capital flow volatility. The extent of gross flows may also reflect the degree of market development. For example, it would be unrealistic to expect portfolio debt flows to play a major part in smoothing capital flows in economies that do not have well-developed domestic bond markets. Furthermore, the extent of gross capital flows reflects the degree of capital account openness – the less open the capital account, the less scope there is for shocks to one type of flow to be offset by changes in other flows.

Care also needs to be exercised in interpreting the policy implications of the index. Some flows might record a low index due to capital account restrictions, while others might register a low index because either resident or non-resident flows are inhibited due to a lack of market development. While a policy implication of the latter might be to foster market development, for the former, the outcome already reflects a deliberate policy choice. Furthermore, it is important to understand the composition of the index. For example, economies that are natural destinations for foreign direct investment such as Australia and Mongolia will have more non-resident inflows than resident outflows and hence score

relatively low on this index. The data can also be sensitive to the data sample given the volatility in capital flows data.

Leaving aside changes in foreign exchange reserves, the private capital flows in the Asia-Pacific region vary in their openness and diversification from relatively closed or one-sided to open and well diversified. The most closed economies are the Philippines, China and India, while Korea, Thailand and Hong Kong are open by this measure (Figure 12). The remaining economies are somewhat mixed for a variety of idiosyncratic reasons.

Figure 12
Private Capital Account Balance Openness
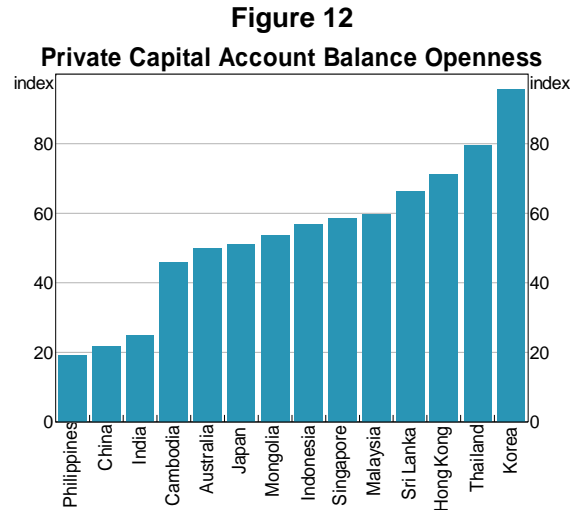
Source: author's calculations

Importantly, while we would expect those economies with a higher openness score to be better suited to accommodating capital account shocks, there are important idiosyncratic factors to consider. A very open economy might still experience disruptions from capital flow reversals if the underlying flow arose due to market distortions or a misalignment of macroeconomic fundamentals and policy. Conversely, a relatively closed economy might have more policy tools to address sudden developments in the capital account.

Appendix 3 – Banking-related Claims on SEACEN Members by Source

Several SEACEN member economies can be flagged as having notable exposures to the main banking centers in industrialized economies. For example the financial hubs of Hong Kong and Singapore are significantly integrated with other major banking centers in Europe, Japan and the United States, as are Chinese Taipei, Malaysia, and Korea.

Table 5

Claims of Major Banking Jurisdictions on SEACEN Economies*

Per cent of GDP, as at end 2014

	Europe	Japan	United States	G3
	% of GDP	% of GDP	% of GDP	% of GDP
Brunei	17.1 #	0.0	3.7 #	20.8
Cambodia	1.7	0.0	0.1	1.8
China	3.3	0.8	1.0	5.1
Chinese Taipei	15.5 #	4.9 #	7.8 #	28.2
Fiji	0.1	0.0	0.0	0.1
Hong Kong SAR	150.3 #	22.0 #	19.2 #	191.5
India	6.0	1.4	3.9 #	11.2
Indonesia	3.7	2.8 #	1.7	8.2
Laos	1.8	4.6 #	0.0	6.4
Malaysia	18.6 #	6.4 #	4.7 #	29.7
Mongolia	5.1	0.0	0.4	5.5
Myanmar	0.1	0.0	0.0	0.1
Nepal	0.6	0.0	0.0	0.6
Papua New Guinea	4.4	4.6 #	0.2	9.2
Philippines	5.4	2.6	3.0 #	10.9
Singapore	70.4 #	16.1 #	21.3 #	107.8
South Korea	8.5 #	3.9 #	6.2 #	18.6
Sri Lanka	7.9	0.2	0.8	8.9
Thailand	4.7	20.3 #	2.6	27.6
Vietnam	6.2	2.7 #	1.0	9.9
SEACEN total	**8.5**	**2.6**	**2.8**	**13.9**
SEACEN total (US$ billion)	**1,470**	**441**	**482**	**2,394**

* Consolidated foreign claims of reporting banks on individual economies
 by nationality of reporting banks; amounts outstanding; ultimate risk basis.
Notable position vis-a-vis foreign banking sectors.

Sources: BIS; IMF

Other notable exposures are those of Brunei to Europe; Indonesia, Laos, PNG, Thailand, and Vietnam to Japan; as well as the exposures that India and the Philippines have to the United States. Shocks that affect the source economies are important in the interpretation of potential vulnerabilities of the destination economies.

Appendix 4 – Direct Financial Exposure to the US Economy

Direct financial exposure to the US economy is one relatively transparent way to calibrate the potential response of capital flows to a normalization of monetary policy by the Federal Reserve. Previous work on such a measure can be found in Bluedorn et al. (2011). We build on this work to ascertain a more refined understanding of direct portfolio linkages between the United States and SEACEN member economies.

The value of these different measures is interpreting them in conjunction to better understand the nature of exposures to US investors and US financial instruments. This should be useful information when forming a view about the likely response of capital flows to Federal Reserve normalization of monetary policy. Note also that the calculation of these indices is restricted to portfolio positions and does not encompass foreign direct investment or bank and money market flows. Since we expect the response of different financial flows to be sensitive to different determinants, we prefer to investigate exposures separately.

Direct Gross Exposure to US Economy (DGE) – sum of gross US investments (resident and non-resident, or US assets and US liabilities) as a share of the total gross international investment position of each SEACEN economy:[27]

$$DGE_i = \frac{\left(\sum_{k=1}^{K} A_{US,i}^k + L_{US,i}^k\right)}{A_i + L_i}$$

where the direct gross financial exposure to the United States (DGE_i) is measured as the sum across a universe (K) of US portfolio assets and liabilities (denoted as $A_{US,i}^k$ and $L_{US,i}^k$) for each SEACEN economy i. The US portfolio instruments considered (k) are equity, short-term debt, and long-term debt. These US assets and liabilities are expressed as a share of the total international portfolio position of SEACEN economy i (denoted as A_i and L_i).[28] Note, for example, that if economy i's foreign assets were entirely held as US Treasuries (a US resident liability) then $A_i = L_{US,i}^k$ and if US residents were the only foreign investors in economy i, then $A_{US,i}^k = L_i$. In an extreme case where both of these examples occur, the calculated index would be equal to one. The index tends toward zero as the importance of the United States declines in the international investment position of an economy.

A shortcoming of this measure of direct exposure is that it is unable to differentiate between the relative composition of assets and liabilities. For example, an economy such as

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[27] This first metric of direct exposure follows the work in Bluedorn and others (2011). The remaining measures are augmented by SEACEN to refine the analysis and to overcome some of the shortcomings identified in the gross measure.

[28] The data source for the SEACEN member international investment position is the IMF. Data for the position of US residents in SEACEN economies (US assets) and SEACEN positions in the US (US liabilities) are taken from the US *Treasury International Capital System (TIC)* database available online at http://www.treasury.gov/resource-center/data-chart-center/tic/Pages/fpis.aspx#usclaims.

China might have a large stock of US assets in the form of reserves held in US Treasuries but because its capital account remains relatively closed to non-resident investment, has only very few liabilities to US residents. However, the index calculated for China might have the same value as for an economy that has very few US assets but instead a large stock of liabilities owing to US residents. Whereas the former implies that the normalization of US monetary policy might have no effect at all on the reserve decisions of the People's Bank of China, and hence capital movements, the latter example might imply significant capital outflows for an economy with the opposite asset-liability composition. Gross assets and gross liabilities are treated equally while they clearly have different implications for the expected response of capital flows. Consequently, the quantitative results of the Bluedorn et al. (2011) study are difficult to interpret reliably.[29]

The supplementary metrics developed by SEACEN outlined below attempt to overcome this shortcoming measure by separating assets and liabilities, and by calculating a net position.

Direct Liability Exposure to US Economy (DLE) – US investments (non-resident) in SEACEN economy, as a share of international liabilities of SEACEN economy:

$$DLE_i = \frac{\sum_{k=1}^{K} A_{US,i}^k}{L_i}$$

This measure calculates the direct exposure of SEACEN economies to the United States through the liabilities owing to US residents (from the perspective of SEACEN residents). It is essentially a measure of gross outflow exposures if US residents choose to repatriate their investments (assets) in SEACEN economy *i* due to changes in US returns (which might be linked to developments in US monetary policy settings).

Direct Asset Exposure to US Economy (DAE) – SEACEN economy investments (resident) in US economy (US liabilities), as a share of total international assets of SEACEN economy:

$$DAE_i = \frac{\sum_{k=1}^{K} L_{US,i}^k}{A_i}$$

This measure calculates the direct exposure of SEACEN economies to US assets (e.g., the value of US Treasuries held as reserves). It is a simple measure of how important the United States is in the overall composition of foreign assets for SEACEN economies.

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[29] Also note that while the IMF constructed metric for direct financial exposures to the US encompasses all positions, we restrict our measure to portfolio positions in equity and debt. One could reasonably expect that foreign direct investment and banking-related positions respond differently to portfolio investment. An aggregate metric might, therefore, be difficult to interpret.

Direct Net Exposure to US Economy (DNE) – net US investments (resident and non-resident) in SEACEN economy, as a share of net international investment position of SEACEN economy:

$$DNE_i = \frac{\left(\sum_{k=1}^{K} A_{US,i}^k - L_{US,i}^k\right)}{A_i - L_i}$$

This net measure avoids the problems of the DGE measure proposed by Bluedorn et al. (2011) but also has some shortcomings. Note that insofar as a SEACEN member has a net international investment position where assets and liabilities are of a similar magnitude (e.g., Korea) the denominator of the index approaches zero and pushes the index toward infinity.

Appendix 5 – US Federal Reserve Tightening Cycles

Since 1990, we identify four distinct tightening cycles in US monetary policy. The Federal Reserve raised nominal short-term interest rates in the mid-1990s, late-1990s, early-2000s and mid-2000s (Figure 13). Each cycle had a different starting point (trough), speed of adjustment, and end (peak).

Figure 13
Effective U.S. Federal Funds Rate

Per cent

Source: U.S. Federal Reserve Board
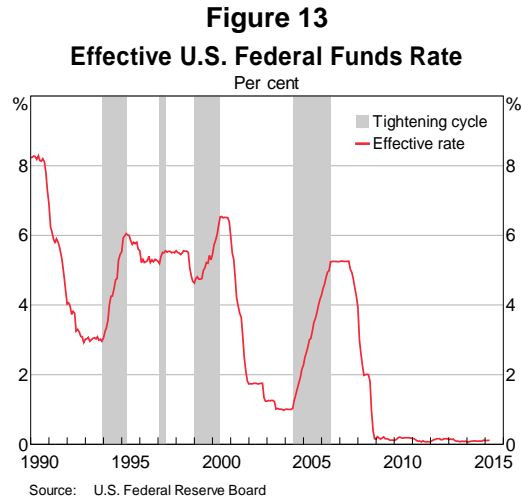
The cycles are defined by the quarter in which the Effective Federal Funds Rate first increased and the quarter in which it peaked (Table 6). No attempt is made to differentiate between the sizes of the rate increase in each quarter we examine. Apart from the very short cycle in the late-1990s, this does not appear to matter substantially as rates typically rise by an average of around 50 basis points per quarter.

Table 6
US Monetary Policy Tightening Cycles

	Trough or start		Peak or end		Duration	Extent	Average
	Date	Per cent	Date	Per cent	(a) no. of qtrs	(b) change bps	(b) ÷ (a)
Mid-1990s	Mar-94	3.00	Jun-95	6.00	6	300	50
Late-1990s	Mar-97	5.25	Jun-97	5.50	2	25	12
Early-2000s	Mar-99	4.75	Jun-00	6.50	6	175	30
Mid-2000s	Sep-04	1.00	Sep-06	5.25	9	425	50

Sources: US Federal Reserve; author's calculations.

Appendix 6 – SEACEN and Working Group Membership

Since its inception in the early 1980s, The South-East Asian Central Banks (SEACEN) Research and Training Centre has established its unique regional position in serving its membership of central banks in the Asia-Pacific region through its learning programs, research work, and networking and collaboration platforms for capability building in central banking knowledge. Over the years, SEACEN has built a wide network base, with whom the Centre collaborates in the design and delivery of its programs in central banking knowledge areas (Macroeconomic and Monetary Policy Management; Financial Stability and Supervision; and Payment and Settlement System) and Leadership and Governance.[30]

Regular Members:
SEACEN membership has grown to 20 central banks/monetary authorities.

1. Autoriti Monetari Brunei Darussalam
2. National Bank of Cambodia*
3. People's Bank of China
4. Reserve Bank of Fiji
5. Hong Kong Monetary Authority
6. Reserve Bank of India
7. Bank Indonesia*
8. The Bank of Korea*
9. Bank of the Lao PDR
10. Bank Negara Malaysia*
11. The Bank of Mongolia*
12. Central Bank of Myanmar
13. Nepal Rastra Bank
14. Bank of Papua New Guinea
15. Bangko Sentral Ng Pilipinas*
16. Monetary Authority of Singapore
17. Central Bank of Sri Lanka*
18. Central Bank, Chinese Taipei*
19. Bank of Thailand*
20. State Bank of Vietnam

Associate Members:
SEACEN has 7 Associate Member Central Banks/ Monetary Authorities that are invited regularly to participate in all SEACEN learning programs as well as the annual SEACEN Governors' Conference/High-level Seminar.

1. Reserve Bank of Australia*
2. Bangladesh Bank
3. Royal Monetary Authority of Bhutan
4. Monetary Authority of Macao
5. State Bank of Pakistan
6. National Reserve Bank of Tonga
7. Reserve Bank of Vanuatu

Observers:
SEACEN also has 8 Observer Central Banks/ Monetary Authorities which are invited regularly to participate in all SEACEN training programs.

1. Da Afghanistan Bank
2. Central Bank of Islamic Republic Iran
3. Bank of Japan
4. Maldives Monetary Authority
5. Reserve Bank of New Zealand
6. Central Bank of Samoa
7. Central Bank of Solomon Islands
8. Central Bank of Timor-Leste

Members with representation on the working group

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[30] Refer also to SEACEN's website: http://www.seacen.org/

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In this paper, the grouping referred to as 'South-East Asia' includes Australia, Cambodia, China, Chinese Taipei, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Mongolia, the Philippines, Singapore, Sri Lanka and Thailand.