

Ito, Hiro; Jongwanich, Juthathip; Terada-Hagiwara, Akiko

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What Makes Developing Asia Resilient in a Financially Globalized World?

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Hiro Ito, Juthathip Jongwanich, and Akiko Terada-Hagiwara
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Hiro Ito, Juthathip Jongwanich, and Akiko Terada-Hagiwara

December 2009

Juthathip Jongwanich and Akiko Terada-Hagiwara are Economists in the Macroeconomics and Finance Research Division, Economics and Research Department, Asian Development Bank. Hiro Ito is an Associate Professor at Portland State University. The authors are grateful to Jong-Wha Lee and Joseph E. Zveglic, Jr. for their helpful comments; Hon Cheung for providing insights on reserves in the People's Republic of China; and Aleli Rosario and Nedelyn Magtibay-Ramos for superb research assistance. However, the authors are solely responsible for any remaining errors. This paper was prepared as a background paper for a theme chapter on "Managing Financial Globalization" in the *Asian Development Outlook Update 2009*, available at www.adb.org/economics.

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Abstract

The pullbacks of capital inflows to developing Asia following the onset of the global financial crisis in 2008 have brought renewed attention to the role and benefits of financial globalization. A number of notable distinctions between the current global crisis and the Asian financial crisis have become evident. Solid domestic institutions, especially in the financial sector; swift policy responses; and a sound macroeconomic environment with adequate reserves have helped the region to manage well the adverse impacts of the global crisis. Empirical analysis examining the link between capital account openness and output volatility reveals that a developing country with a more open capital market tends to experience lower output volatility, contrary to what might be expected. It is also found that countries can mitigate the destabilizing effect of pursuing greater exchange rate stability by holding a sufficiently high level of foreign reserves. Furthermore, if they want to reap the benefit of financial liberalization to reduce output volatility, highly integrated economies need to be equipped with highly developed financial markets, particularly of banking and stock markets.

I. Introduction

The issue of financial globalization has received much attention since the 1997 Asian financial crisis when the reversal of capital inflows went hand in hand with massive depreciation of the exchange rates and significant contraction of economic growth. It was revealed that financial openness could expose economies to volatile cross-border capital flows, including sudden stops or reversals of capital flows, thus making economies face boom-bust cycles (Kaminsky and Schmukler 2008).¹ The debates about the benefits of financial globalization and cross-border capital movements have intensified, although empirical evidence has been mixed at best (Kose et al. 2006, Obstfeld 2008). Henry (2006) argues that financial integration could have a long-term effect on investment and output growth only when it fundamentally changes productivity growth through financial market development. Otherwise, the effect of financial liberalization would be short-lived at best. Nonetheless, cross-border financial flows continue to surge, strengthening the interlinkages of economies and markets in both advanced and developing worlds. Developing Asia is no exception; the region experienced a surge in capital inflows from 2002 through 2007, from US\$45 billion to US\$363 billion.

The current global financial crisis, however, has only rekindled the debate about the role of financial globalization. Although Asia is not the epicenter of the crisis this time, it has received much attention because the region has been perceived as the main contributor to the “global imbalances”; Asian countries have financed the profligacy of advanced countries, especially the United States (US), with their current account surpluses, i.e., excess saving, through holding a sizeable amount of international reserves. These countries’ financial systems have been also under critical scrutiny because, allegedly, they are not developed or open enough to convert domestic saving into investment needs within the country or the region, and instead exported liquidity abroad.

This paper reappraises the role of financial globalization, focusing especially on its impact on developing Asia’s economic growth and stability. The main group of interest in this paper is developing Asia’s highly integrated economies, which are composed of 12 economies.² These economies have been the major recipients of capital flows to the region. Over the past two decades, nearly 90% of total regional capital inflows have been directed to them. In particular, they have been the dominant players in receiving foreign direct investment (FDI) inflows, accounting for nearly 95% of the total. In addition, these

¹ For a summary on the cost and benefits of financial liberalization, refer to Henry (2006) and Kose et al. (2006).

² The 12 highly integrated developing Asian economies are Cambodia; People’s Republic of China (PRC); Hong Kong, China; India; Indonesia; Republic of Korea; Malaysia; Philippines; Singapore; Taipei, China; Thailand; and Viet Nam.

12 economies account for the vast majority of developing Asia's gross domestic product (GDP) and foreign trade. Therefore, a look into these selected economies will provide a clear picture of how the region as a whole has coped with the past and current financial crises.

Section II reviews how financial integration has progressed in developing Asia both interregionally and intraregionally. We will also look into the process of financial integration in the region in conjunction with other macroeconomic objectives in the context of the “trilemma” hypothesis. Section III discusses capital movements in the region and how they respond to the global financial crisis. Section IV investigates the determinants of capital flows, especially focusing on the relative importance of external and internal factors. Section V provides some empirical evidence of how the region has benefited from financial globalization, and what are the preconditions for the link to be materialized. Section VI looks briefly at how foreign reserves have been managed in the region and how better management of reserves could be done. The final section provides conclusion and policy inferences.

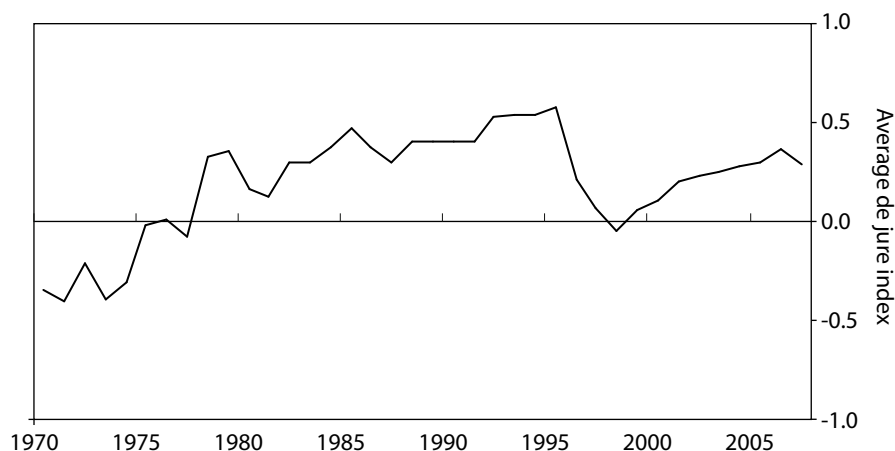
II. Financial Integration in Developing Asia: Theory and Evidence

Although most economists agree that both advanced and developing worlds have experienced rapid financial globalization for the last two decades, measuring the extent of openness toward cross-border capital flows is extremely difficult. The measure of financial openness can be roughly categorized into two groups, namely, “de facto” and “de jure” measures. The de facto measures look into the actual volume of cross-border flows of financial assets, and usually take the form of the sum of external assets and liabilities as a ratio to GDP. The de jure measures on the other hand attempt to measure regulatory restrictions on capital account transactions using information about regulatory restrictions on cross-border capital flows reported in the *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER) published by the International Monetary Fund (Chinn and Ito 2008, Kose et al. 2006).

While the *de jure* measures may reflect policy makers' intentions, *de facto* ones may represent actual cross-border capital flows. The two measures could differ from each other because both measures look into different aspects of financial openness. Generally, the de facto measure is subject to output fluctuations, while the *de jure* measure can be affected by the degree of enforcement of the controls. Obviously, these types of financial openness measures have their own strengths and weaknesses, so that it is difficult to rank them in terms of usefulness.

We take a look at both measures to see how they affect macroeconomic performance. Figure 2.1 shows the de jure measure as constructed in Chinn and Ito (2008). Developing Asian economies seem to have retrenched their efforts of liberalizing their financial markets in the late 1990s, reflecting capital tightening by some of the economies in the region in response to the Asian financial crisis. Since the beginning of the 2000s, however, these economies have been steadily increasing the level of capital account openness. This index presents a quite different picture about the trajectory of financial openness in this region compared to what we can see in the de facto flows as we show in Figure 2.6, which we will examine in details later in this section.

Figure 2.1: De Jure Measure of Financial Openness for Developing Asia



Note: The index ranges [-2.5, 2.6]. Higher values indicate higher degrees of financial openness. For more details on the index, refer to Chinn and Ito (2008).

Source: Chinn and Ito (2008).

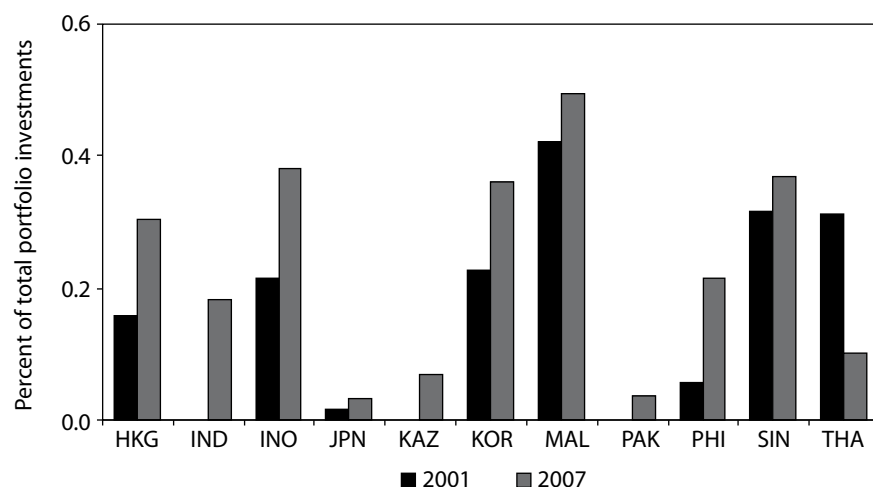
A. Regional Financial Integration in Developing Asia

While many economists have wondered why capital tends to flow “uphill”, contrary to theoretical predictions, from developing to industrial countries in recent years—the “Lucas paradox”—financial integration has also taken place within the developing world, including Asia.

According to the *Coordinated Portfolio Investment Survey* published by the International Monetary Fund (IMF), which reports the volume of bilateral flows in equity and debt securities for the years 1997 and 2001–2007, the 10 highly integrated Asian economies have more than doubled their portfolio investment trade to US\$3.9 trillion from 2001 to 2007 (Figure 2.2). At the same time, the share of portfolio investments to neighboring countries have increased on average from about 6% to 13% of total investments,

suggesting that there is still room for further regional integration. Lee (2008) argues that the low level of regional financial integration can be explained by high bilateral exchange rate volatility, a low level of capital account liberalization, and underdeveloped financial infrastructure, particularly in debt securities in the region.

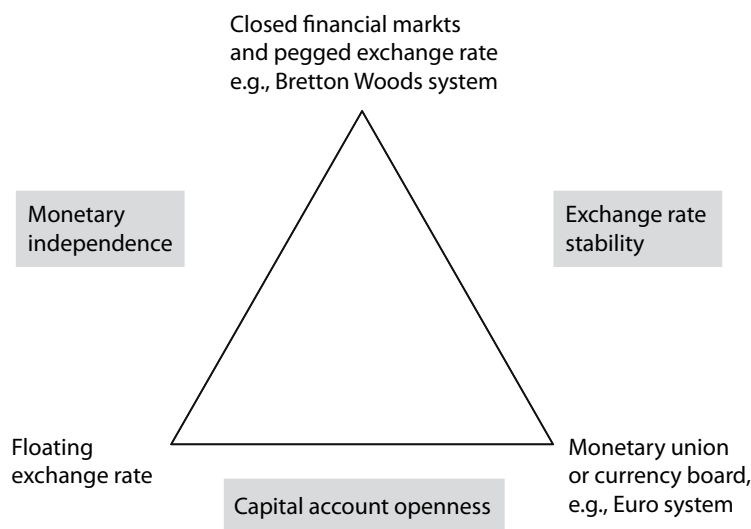
Figure 2.2: Share of Portfolio Investments to Neighboring Countries (percent of total investments)



Source: International Monetary Fund, Coordinated Portfolio Investment Survey Data, available: www.imf.org/external/np/sta/pi/datarsl.htm.

1. The “Trilemma” Hypothesis

Financial globalization does not take place independent of other macroeconomic policy objectives. That is, policy makers consider the extent of financial openness in conjunction with two other key objectives, namely, exchange rate stability (ERS) and monetary independence (MI)—the so-called “trilemma” hypothesis. The hypothesis states that a country may simultaneously choose any two, but not all, of the following three goals: monetary independence, exchange rate stability, and financial integration. Based on this concept, policy makers must decide within the constraints of choosing two out of the three policy goals (Figure 2.3).

Figure 2.3: The “Trilemma”

Let us look into how combinations of the three policy goals have changed for the developing Asian economies over years. We measure the degree of achievement in each of the three policy goals using the indexes developed by Aizenman et al. (2008). The index for monetary independence is based on the annual correlation of the monthly interest rates between the home country and the base country. The exchange rate stability index is based on the annual standard deviation of monthly exchange rates between the home country's currency and that of the base country. Finally, the capital account openness index is a composite measure encompassing the presence of multiple exchange rates, restrictions on current and capital account transactions, and requirements of the surrender of export proceeds (Chinn and Ito 2008). All indexes are normalized to range from 0 to 1, and higher values indicate greater use of a particular policy.³

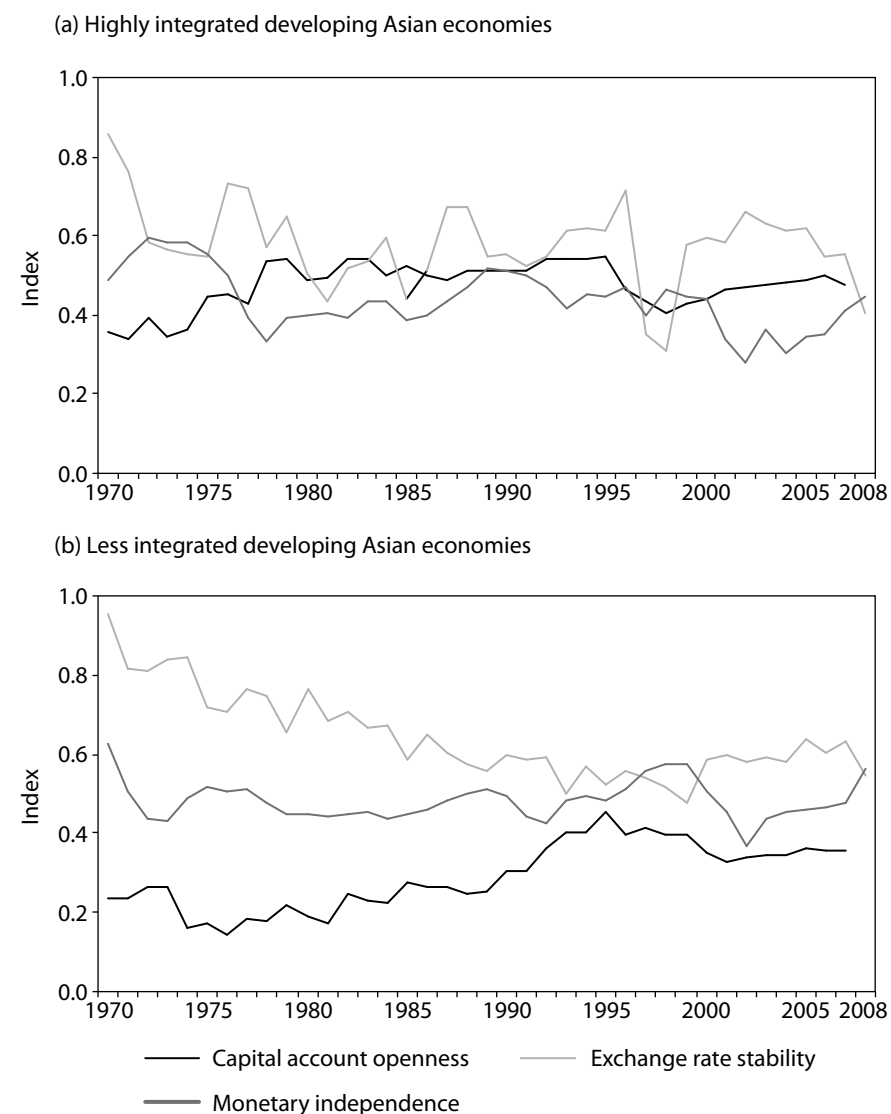
Figure 2.4 (a) shows interesting characteristics of the development path of international macroeconomic arrangements for highly integrated developing Asian countries. For these countries, as early as the beginning of the 1980s, the three indexes appear to cluster around the middle range, though for most of the time except for the Asian crisis years, exchange rate stability is the most pervasive policy choice. In the postcrisis years in the 2000s, the indexes diverged, but seem to be converging again in recent years. This “middle-ground” convergence or the “managed floating plus” regime (Goldstein 2002) is unique to highly integrated developing Asian countries and cannot be observed in other income or geographical groups of countries.⁴ For other developing countries, as can be

³ More details of these indexes are in Aizenman et al. (2008).

⁴ To no one's surprise, the Euro countries have experienced a divergence of the indexes (not reported): while the indexes for exchange rate stability and financial openness increased rapidly in the 1990s, the monetary independence index has been trending downward since then, reflecting the currency union arrangement.

seen in Figure 2.4(b), the three indexes for the other developing countries in Asia do not show a discernible trend except for exchange rate stability being usually the most pervasive policy and financial openness the least.

Figure 2.4: Capital Account Openness, Exchange Rate Stability, and Monetary Independence



Note: Panel (a) includes PRC; Hong Kong, China; India; Indonesia; Korea; Malaysia; Philippines; Singapore; and Thailand. Panel (b) includes Bangladesh, Bhutan, Cambodia, Fiji, Lao PDR, Maldives, Mongolia, Nepal, Pakistan, Papua New Guinea, Solomon Islands, Sri Lanka, Vanuatu, and Viet Nam.

Sources: Aizenman et al. (2008) and authors' calculation.

The fact that countries have adopted different combinations of two out of the three policy choices and altered them occasionally in response to crises or major economic events must indicate that each of the three policy options is a mixed bag of both merits and demerits for managing macroeconomic conditions.⁵ Greater monetary independence could generally lead to stable and sustainable economic growth because it allows monetary authorities to have autonomy over macroeconomic management. Exchange rate stability could bring out price stability by providing an anchor, and lessen risk premium by mitigating uncertainty, thereby fostering investment and international trade. However, greater levels of exchange rate fixity also rid policy makers of a policy choice of using exchange rate as a tool to absorb external shocks. Prasad (2008) argues that exchange rate rigidities would prevent policy makers from implementing appropriate policies consistent with macroeconomic reality, and could cause asset boom and bust through overheating of the economy. Hence, the rigidity caused by exchange rate fixity could not only enhance output volatility, but also cause misallocation of resources and unbalanced, unsustainable growth.

Financial liberalization is probably the most contentious policy among the three in terms of conflicting costs and benefits. Theory predicts that more open financial markets can lead to economic growth through more efficient resource allocation, mitigating information asymmetry, enhancing and/or supplementing domestic savings, and transferring technological or managerial know-how (i.e., growth in total factor productivity). Theoretically, economies with greater financial openness should be able to stabilize themselves through risk sharing and portfolio diversification. However, as financial liberalization increased its pace over the last two decades, financial openness received the blame for economic instability because it could expose economies to boom and bust cycles. Thus, each one of the three trilemma policy choices can be a double-edged sword, which should be reason for the wide and mixed variety of empirical findings on the macroeconomic impacts of each of the three policy choices.

2. Conditions for Countries to Benefit from Financial Globalization

When economists argue what conditions allow economies to benefit from financial globalization, they often refer to two hypotheses—the composition hypothesis and the threshold hypothesis.⁶ The composition hypothesis states that different types of capital flows can have different macroeconomic impacts. For example, long-term capital movements, such as FDI, tend to be more resilient to financial calamity than other forms of capital flows. In addition, FDI is often found to be positively associated with economic growth and productivity improvement (Borensztein et al. 1998, Greenaway and Kneller 2005).

⁵ Aizenman et al. (2008) have statistically shown that external shocks in the last four decades, namely, the collapse of the Bretton Woods system, the debt crisis of 1982, and the Asian crisis of 1997/1998, caused structural breaks in the trilemma configurations.

⁶ These two hypotheses are not mutually exclusive. Wei (2006) presents a hybrid view that countries with better public institutions are likely to attract more FDI than other forms of capital flows, especially bank loans.

The threshold hypothesis postulates that a country needs to have certain minimum conditions to reap the benefits of financial globalization. These conditions include financial market development, institutional development, better governance, trade integration, and macroeconomic disciplines (Chinn and Ito 2006, Kose et al. 2006 and 2009). Kose et al. (2009) find that the level of domestic financial development greatly affects the extent to which a country could benefit from financial globalization. Generally, it has been argued that a country needs to be equipped with a higher level of financial development than a threshold so that it can reap the benefits of financial liberalization and reduce the risks of volatile capital flows.⁷

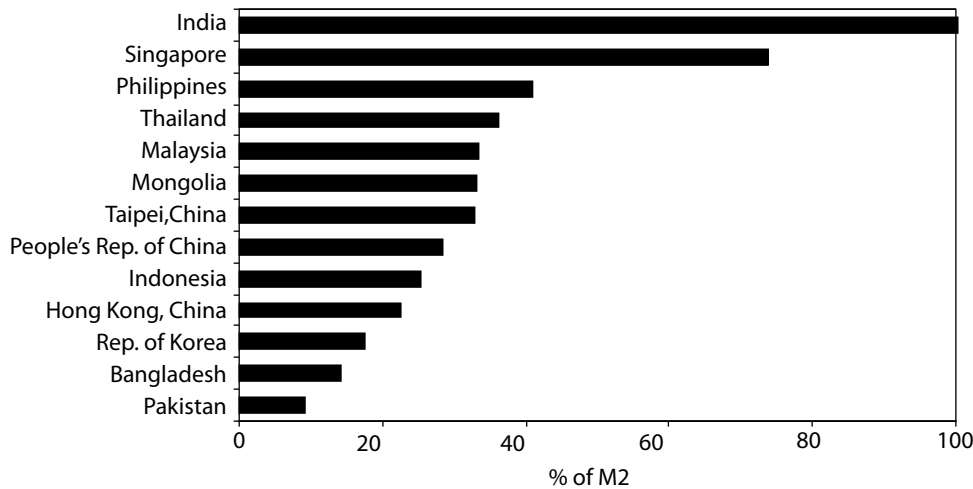
3. International Reserves Holding in Developing Asia— Lubricant of Financial Globalization?

In recent years, especially since the aftermath of the Asian crisis, international reserves accumulation has received much attention among both academics and policy practitioners simply because it can affect a country's vulnerability to external shocks. The role of international reserves holding can be also valued from the perspective of the threshold hypothesis, in which international reserves allow countries to deal better with financial globalization. Many researchers have attempted to develop a yardstick to measure the level of international reserves adequacy. While some have focused on whether foreign reserves are sufficient enough to cover non-FDI foreign liabilities or short-term liabilities (Greenspan 1999 for the "Guidotti-Greenspan criteria"; Prasad 2009), others have looked at the level of international reserves adequacy by examining whether reserves are sufficient enough to cover broad monetary aggregate such as M2 (de Beaufort Wijnholds and Kapteyn 2001, Obstfeld 2008, Obstfeld et al. 2009).⁸ Obstfeld et al. (2009) focus on the crisis scenario of an "external/internal double drain" where agents make a run on banks while trying to flee from domestic markets for hard currency. Interestingly, despite the anecdotal argument that Asia hold excessive international reserves, by this criterion, not all developing Asian countries have an excessively high level of reserves (Figure 2.5).⁹

⁷ Mendoza et al. (2009) also find that countries with less developed financial markets may experience welfare losses by liberalizing capital markets unless the liberalization policy is accompanied by other factors such as technology transfer, financial markets development, and risk-sharing, all of which can take some time to materialize. This evidence is supported by Kim et al. (2008) and Fujiki and Terada-Hagiwara (2007), particularly on the issue of risk-sharing benefits such as consumption smoothing, which has scarcely been achieved among developing countries.

⁸ de Beaufort Wijnholds and Kapteyn (2001) argue that money stock in an economy is a proxy for potential capital flight by domestic residents, and therefore can be a measure of the intensity of the "internal drain."

⁹ Bird and Rajan (2003) show how the level of international reserve adequacy can appear different depending on what variable is used to scale the size of international reserves holding (i.e., short-term debt, GDP, M2, etc.).

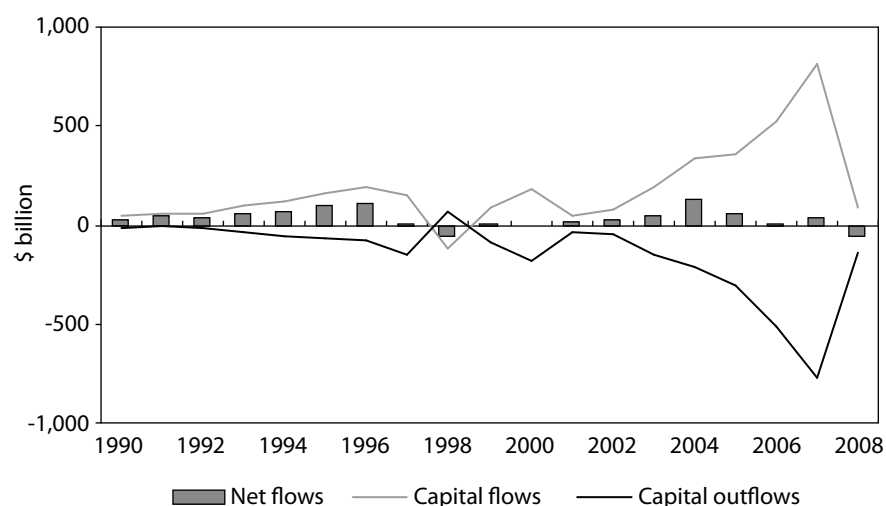
Figure 2.5: Foreign Reserves Adequacy Measured by the Ratios to M2, as of 2008

Source: CEIC Data Company Ltd., downloaded 31 August 2009.

B. A Disaggregated Look at Capital Flows in Developing Asia

A country's vulnerability to external shocks can be also affected by the composition of external assets and liabilities as stated in the composition hypothesis. Reviewing the ebbs and capital flows for developing Asia allows us to make interesting observations about the differences between the Asian crisis and the current crisis.

Since the late 1980s—when many developing countries including those in Asia started liberalizing financial markets—highly integrated developing Asia experienced two waves of private capital inflows (Figure 3.1). The first wave began in the late 1980s and steadily increased its level through the mid-1990s, until it got abruptly interrupted by the Asian financial crisis of 1997/1998. The second wave began in 2002 and continuously increased its size by a larger degree than the first wave until 2007. However, it was again interrupted by the global financial crisis that started in mid-2008. By the end of 2008, the volume of cross-border capital flows to developing Asia had plummeted.

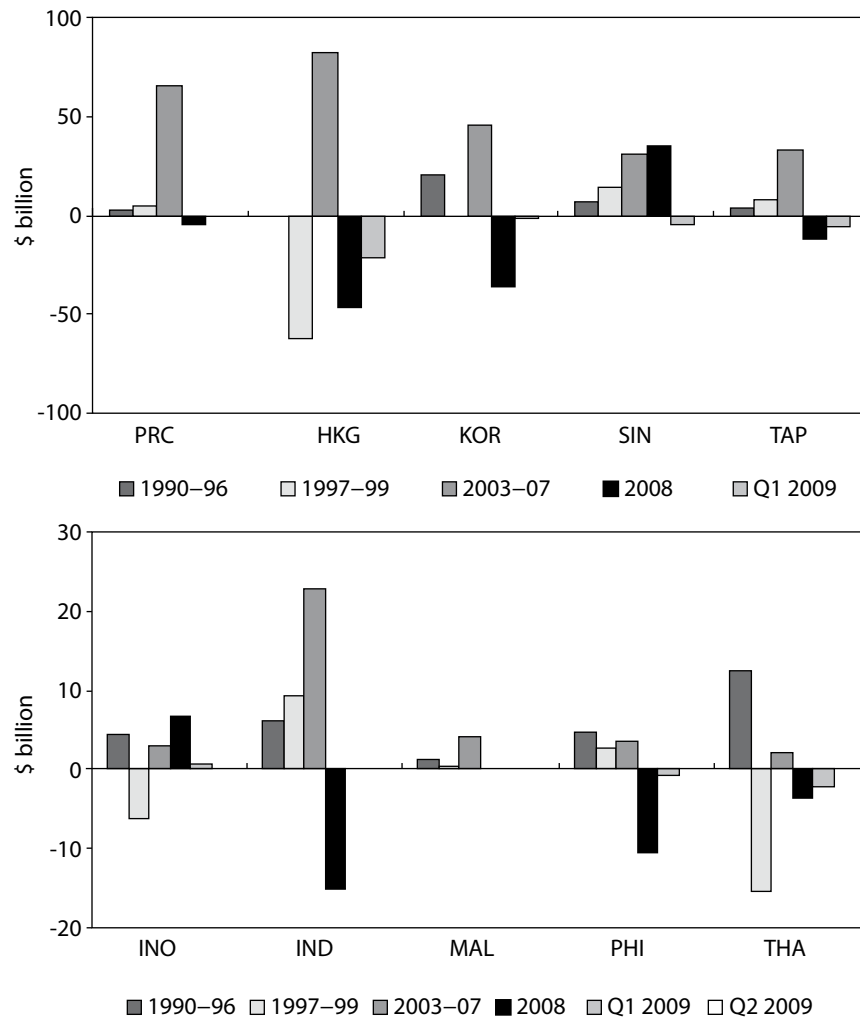
Figure 2.6: Capital Flows to/from Developing Asia

Note: This figure includes only highly integrated developing Asian economies.

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online.

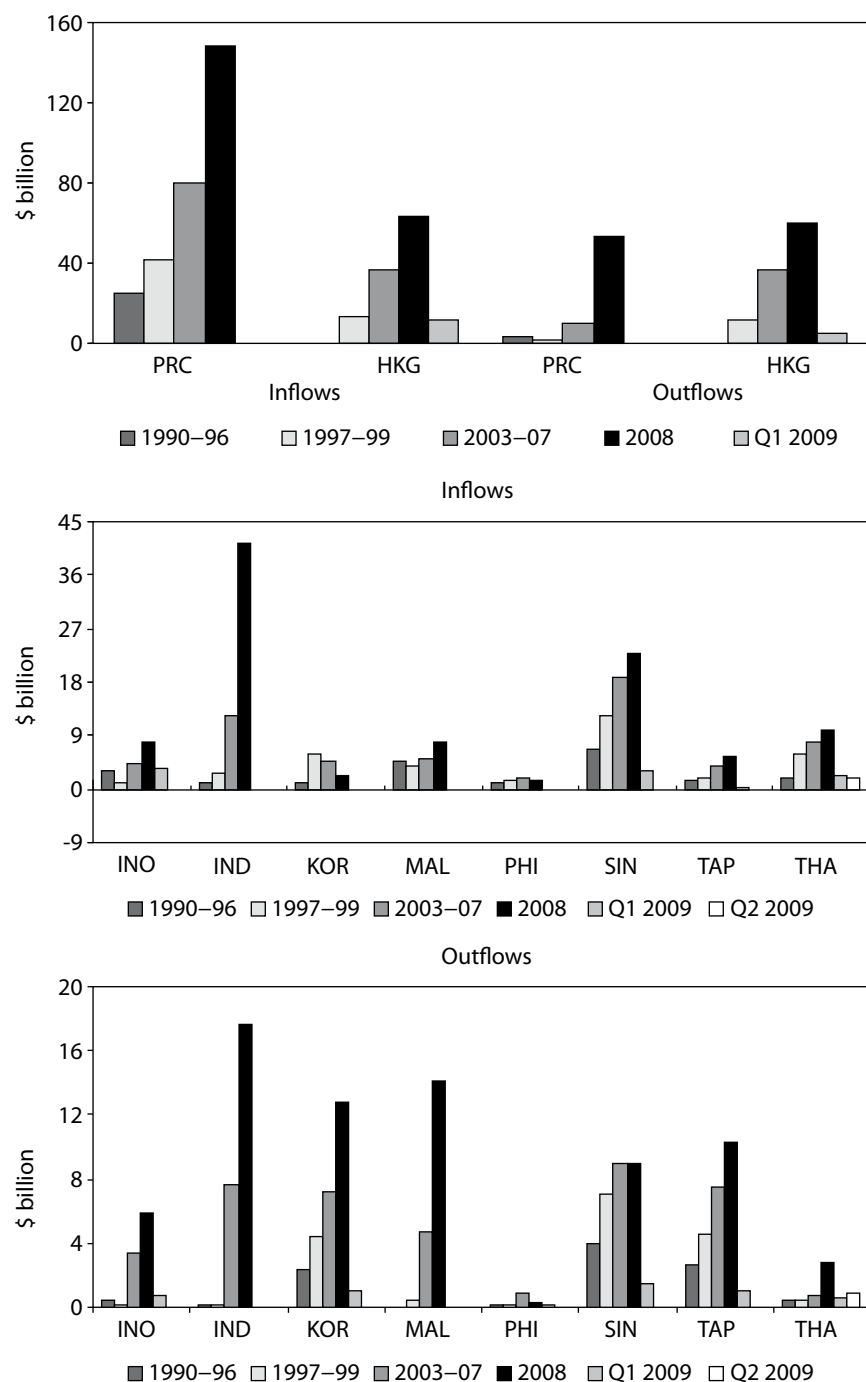
Portfolio and other investment inflows, including bank loans, contributed substantially to the decline of capital inflows in response to the current global financial crisis. The extent of decline in these types of capital inflows was profound especially in Hong Kong, China; India; Republic of Korea (Korea); and Taipei, China (Figure 3.2). Gross FDI, i.e., including both inflows and outflows, declined in many countries such as Malaysia; Philippines; Singapore; Taipei, China; and Thailand (Figure 3.3). However, total FDI inflows to highly integrated developing Asia even rose in 2008 mainly due to the relatively robust economy of the People's Republic of China (PRC). The slowdown of FDI inflows started in the first quarter of 2009 in Korea; Philippines; Taipei, China; and Singapore where the export-oriented manufacturing (electronics) sectors were hit hard. In 2008, FDI outflows increased noticeably in the region, dominated by the outflows from the PRC. However, in many highly integrated Asian economies such as Hong Kong, China; Korea; Singapore; and Taipei, China where contagion effects from industrial countries are more pronounced, FDI outflows started to decline in the first quarter of 2009, reflecting the general shrinkage of capital flows across the world.¹⁰

¹⁰ The same sort of observation can be made for cross-border mergers and acquisitions in the region.

Figure 2.7: Portfolio and Other Investment Inflows

PRC = People's Republic of China; HKG = Hong Kong, China; IND = India;
 INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines;
 SIN = Singapore; TAP = Taipei, China; THA = Thailand

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online;
 both downloaded September 2009.

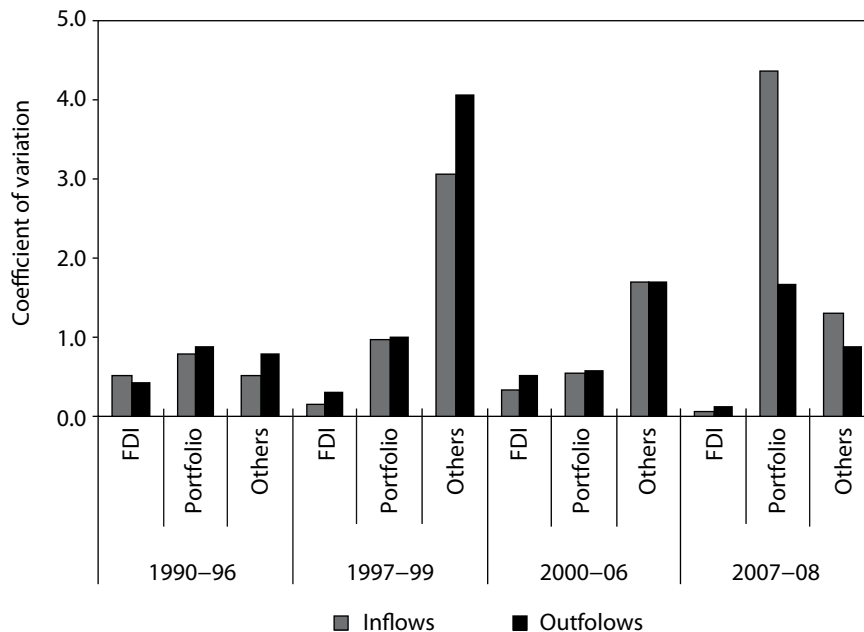
Figure 2.8: Foreign Direct Investment flows

PRC = People's Republic of China; HKG = Hong Kong, China; IND = India;
 INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines;
 SIN = Singapore; TAP = Taipei, China; THA = Thailand

Sources: CEIC Data Company Ltd.; International Monetary Fund, *International Financial Statistics* online;
 both downloaded September 2009.

The above findings are consistent with the general consensus that FDI flows tend to be more stable than other forms of capital flows. The stable nature of FDI can be also observed by comparing the coefficient variation (standard deviations divided by the mean) of different types of capital flows. As Figure 3.4 shows, the coefficient of variation of FDI was by far lower than that of other types of capital flows, and stood out especially during the crisis periods.

Figure 2.9: Volatility of Capital Flows in Selected Asian Economies



Note: Coefficient of variation is measured by dividing the standard deviation by the mean.

Source: Authors' calculations.

A closer look at capital flows in developing Asia allows us to point out that the current crisis differs from the Asian financial crisis in several interesting ways. First, while the Asian crisis was more regionally contained, affecting a relatively small number of countries, the current financial crisis, which originated in the US, has impacted much more economies on a global scale, though to varying degrees. Hence, the environment for cross-border financing, including FDI and cross-border mergers and acquisitions deals, also declined universally. Corporate financial conditions got exacerbated by poor earnings due to drastically weakened demand in the real economy. This is in sharp contrast to the Asian crisis where foreign investors took advantage of greatly depreciated assets in some crisis-hit Asian countries (the "fire-sale" phenomenon), which contributed to continuous inflows of FDI to the region even during the crisis.¹¹ For example, in Korea and Thailand,

¹¹ Indonesia and Malaysia are exceptions. In Malaysia, FDI inflows were relatively flat during the crisis while Indonesia experienced a sharp decline in FDI inflows. Malaysia's case can be explained by the capital controls policy implemented in the midst of the crisis. In the case of Indonesia, political and social instability along with its corruption-prone environment contributed to the country's poor investment climate in the postcrisis period.

FDI inflows increased, respectively, from US\$1.2 billion and US\$2.0 billion in 1990–1996, to US\$5.9 billion and US\$5.8 billion in 1997–1999.

Second, in terms of capital outflows, during the Asian financial crisis, the slowdown of capital flows was quite naturally concentrated in the crisis-hit countries, including Indonesia, Philippines, and Thailand. By contrast, in the current crisis, some Asian countries, especially those that have started showing some signs of recovery, are making the best use of this kind of environment. They are aggressively acquiring depreciated assets across the world. Hence, there has been evidence of an increase in outward FDI in many developing Asia, including the PRC.

Third, even though the collapse of capital inflows this time is more significant in size than that during the Asian crisis, strong economic fundamentals in the region, including sound financial institutions, have helped these economies to successfully redress and manage the adverse shocks of the global crisis. The soundness and robustness of financial institutions in the region can be ensured by various indicators such as nonperforming loan ratios, risk-weighted capital adequacy ratios, and loan–deposit ratios. Most of the Asian economies have sustained exchange rate stability as well.¹² That along with massive foreign reserves has helped to sustain investors' confidence in the region.

Finally, in the current crisis, prompt policy responses to financial distress and credit crunch—enabled by sound financial institutions and economic fundamentals—have kept the adverse impacts of the crisis minimal in the Asian region. In response to the global credit crunch, central banks in many countries provided swift liquidity support, provided financial institutions with guarantees to their liabilities, and injected capital into troubled banks. Current account surpluses, high sovereign ratings, and expanded coverages of deposit insurance have all helped many countries to buffer the financial distress by supporting repatriation of capital (BIS 2009). The bilateral swap arrangements with the Federal Reserve as well as cooperative initiatives among Asian countries, including the Chiang Mai Initiative, ensured accessibility to foreign exchange reserves.¹³

These findings suggest that economies can be resilient to external shocks in a financially globalized world only when they meet a certain set of preconditions, which include sound macroeconomic conditions, financial development, and institutional development. In such an environmental, policy makers can respond appropriately and swiftly to external shocks and minimize their potential repercussions. Before we further investigate the benefits of financial globalization with reference to what kind of preconditions are needed, we analyze the determinants of different types of capital flows and draw policy implications on how a country can attract capital flows.

¹² For example, the rate of depreciation of the Korean won and Thai baht was 85% and 109% during 1996–1997, but was only 34% and 9%, respectively, in 2008 (January–October).

¹³ The Chiang Mai Initiative Multilateralisation, which is expected to operate by end-2009, will allow ASEAN countries plus PRC, Japan, and Korea to draw 50% (large countries) to 500% (small countries) of their contributions to a US\$20 billion multilateral reserves pooling arrangement.

III. “External” versus “Internal” Factors Affecting Capital Flows

The previous section showed that different types of capital flows can respond to financial crises differently. The next question we want to explore is, To what extent can the volume and direction of capital flows be determined by global conditions or domestic policies? If external factors dominate internal ones, that means policy makers can hardly influence the flows of foreign capital. However, if internal conditions—the country-specific factors—are found to drive capital flows, policy makers can and should focus on putting sound macroeconomic policies in place to affect foreign capital. The recent collapse of capital inflows to developing Asia motivates us to examine the relative importance of external and internal factors, especially focusing on the nature of capital flows in the region.

To explore the determinants of capital flows, we first implement the gravity model for bilateral FDI flow data and examine what factors, domestic or external, drive FDI inflows. Like the original gravity model, our estimation model incorporates variables pertaining to both the source country (i.e., the country where the capital flow originates) and the host country (that which receives the capital) such as real income, distance between the two, and their dependencies on imports. We also include variables particularly on the conditions of the host country such as ratio of intra-industry trade, share of mineral and fuel exports, labor costs, level of human capital development, level of infrastructure development, tariff barriers, whether or not the host country participates in free trade agreements, and so forth. In the analysis, external factors are proxied by real income per capita of home countries, including that of the G3 countries.

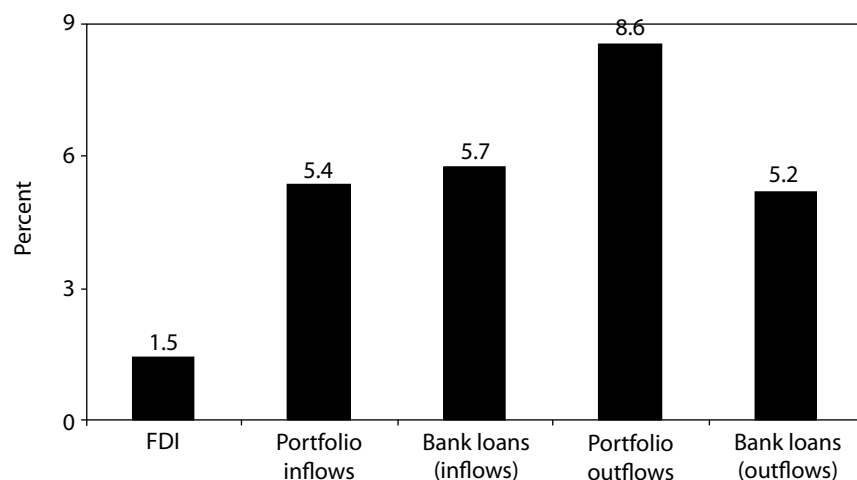
For FDI, the data on bilateral FDI flows from the UNCTAD/TNC database are used for the period 1994–2007. In the analysis, eight highly integrated Asian economies, namely PRC; Hong Kong, China; India; Korea; Malaysia; Philippines; Singapore; and Thailand, are the host countries while there are 61 source countries, including both industrial and developing countries.¹⁴ The gravity equation model with an unbalanced panel econometric procedure is applied for five nonoverlapping 3-year periods. To deal with the issue of censored data, the Tobit model (truncated regression model) is applied. More details on the estimation model and the estimation results can be found in Appendix 2.

The estimation results (shown in Table A2.1) indicate that internal factors are important in attracting FDI inflows.¹⁵ The significant internal factors include per capita income, labor costs, development of human capital, trade and financial openness, as well as the level of infrastructure development. The performance of G3 countries’ per capita income is also important in determining FDI flows to the region. During the estimation period, a 1.0% drop in the per capita real income of the G3 countries could cause a decline in FDI flows to the region by 1.5% (Figure 3.1).¹⁶

¹⁴ The eight highly integrated Asian economies can be both “host” and “source” countries.

¹⁵ This finding is consistent with Mandilaras and Popper (2009).

¹⁶ The impact of real income per capita of the G3 countries is derived from the coefficients corresponding to the per capita real income variable of home country (M_i) and its interaction term with the G3 dummy ($M_i \text{ * } \text{dummyG3}$), i.e.,

Figure 3.1: Responsiveness of Capital Flows to G3 Growth

Notes: The figure shows the estimated coefficients of the per capita real income variable in the estimation models for different types of capital flows. The dependent variables are normalized by the GDP of the corresponding host country. For the details on the estimation models, see Appendixes 2 and 3.

Source: Authors' estimations.

We apply a similar approach to examine the determinants of other types of capital flows, specifically portfolio investment and bank loans. However, since the bilateral flow data are limited for these types of capital flows, we do not employ the gravity model.¹⁷ We instead use balance of payments data from the IMF's *International Financial Statistics* (IFS) and apply the Tobit model to examine the determinants of portfolio and bank lending flows to 10 highly integrated developing Asian economies during 1990–2008.¹⁸ Appendix 3 provides more details of the regression models and results.

In contrast to FDI, the estimation results show that the G3 countries' GDP significantly affects the movements of bank loans and portfolio inflows, i.e., a 1.0% increase in G3's GDP leads to a 5.7% rise in bank loans inflows and a 5.4% increase in portfolio inflows (Figure 3.1). The effect is found to be stable before and after the Asian crisis. The real per capita income of key trading partners in the region is also found to significantly affect both portfolio and bank loan flows to the region. However, the magnitude of the coefficients of this variable is much smaller than that of the G3 per capita GDP and this variable is found to be significant only for the portfolio regressions. This finding reflects the tendency that investors outside the Asian region, especially those from the G3 countries, are crucial players in affecting capital inflows of portfolio investment or bank lending in the region.

1.5 = 0.81 + 0.66 (see Column C of Table A2.1).

¹⁷ See full discussions of the determinants for these types of capital flows in Jongwanich (2009 and 2010). Note that the bilateral data of portfolio and bank loans are limited; the *Coordinated Portfolio Investment Survey* from the IMF reports bilateral flows in equity and debt securities only for 1997 and 2001–2007.

¹⁸ PRC; Hong Kong, China; Korea; Indonesia; India; Malaysia; Philippines; Singapore; Taipei, China; and Thailand.

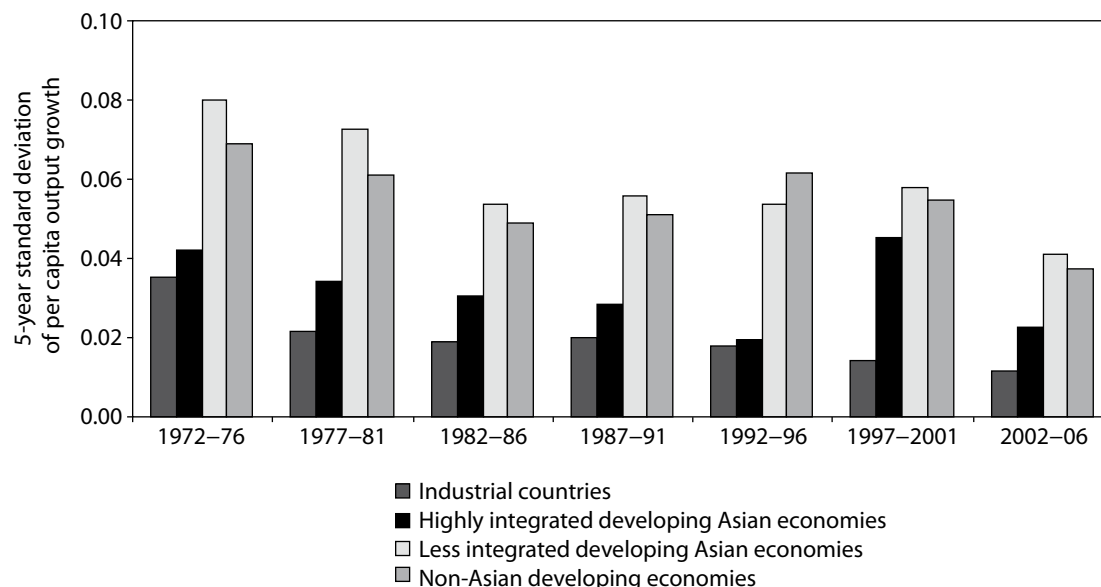
The per capita income of the G3 countries is also found to affect portfolio and bank loans outflows. A 1.0% increase in G3 countries' per capita GDP could increase portfolio and bank loans outflows by 8.6% and 4.5%, respectively. The output performance of the home country and its financial liberalization policy are also found to contribute to portfolio and bank lending outflows.

All in all, the G3 economies are crucial in determining the movements of short-term capital flows while their impacts on long-term capital are relatively limited. It is, therefore, not surprising that bank loans and portfolio investment deteriorated more significantly than FDI in response to the current financial crisis. Based on the estimation results, the importance of internal factors is also recognized, especially for longer-term capital, suggesting that the country-specific factors, e.g., business and policy environment, including financial and trade openness, are still crucial to attract such capital flows.

IV. How Does Financial Globalization Affect Macroeconomic Performance?

We have observed that both domestic and external factors can drive capital flows in the Asian region. In a financially globalized world, as we have repeatedly mentioned, institutions or policies cannot be determined independently from other macroeconomic policy objectives because of the constraint based on the trilemma hypothesis. In other words, policy makers must face a trade-off issue of choosing two out of the three policies: monetary independence, exchange rate stability, and financial openness. However, each combination of two policies, or each one of the three policies, has its own merits and demerits in terms of implications on macroeconomic performance. Here, we empirically examine the impact of the trilemma policy choices on output volatility.

Our intention is to examine whether certain policy combinations can create a favorable or unfavorable macroeconomic environment in this globalized world while focusing on the performance of highly integrated Asian economies. While there has been an anecdotal argument (at least before the current crisis) that the world economy has experienced a drop in output volatility in recent years, it is true that highly integrated Asian economies collectively have outperformed other developing economies persistently in terms of output growth stability. Figure 4.1 shows that output volatility—measured by the standard deviations of per capita output growth rates—for highly integrated Asian economies has been maintained at lower levels than in other developing countries or less integrated Asian countries. The level of stability is even comparable to that of the industrialized countries. Considering that macroeconomic volatility can have a negative impact on long-term economic growth as Hnatkovska and Loayza (2005) found, we may find evidence that Asian countries' international macroeconomic management have allowed them to be better suited to cope with globalization.

Figure 4.1: Output Volatility by Region

Note: The economies included in this group are: Hong Kong, China; Korea; Malaysia; India; Indonesia; Malaysia; PRC; Singapore; Philippines; and Thailand. Output volatility is measured by 5-year standard deviations of the growth rate of per capita output.

Sources: Penn World Table Version 6.2; Authors' calculations.

A. The Estimation Model

Following Aizenman et al. (2008), our estimation looks into the effect of three policies based on the trilemma for the period of 1972–2006. Our focus will be placed on the effect of financial liberalization, but because the degree of financial globalization must be determined in conjunction with two other macroeconomic objectives, we will look into the effect of financial liberalization while controlling for one other policy goal, i.e., either monetary independence or exchange rate stability. From the perspective of the two hypotheses we previously introduced, our estimation model is a hybrid that incorporates both the threshold and composition hypotheses. Consistent with the threshold hypothesis, we assume that the preconditions of the level of international reserves holding may matter for how financial liberalization, along with two other trilemma policies, can affect output volatility. Therefore, we include the level of foreign exchange reserves and interact it with the trilemma variables. Following the composition hypothesis, our estimation model also includes different types of capital flows, i.e., FDI, portfolio investment, and other (bank lending) flows.

More specifically, the benchmark estimation model is given by:

$$y_{it} = \alpha_0 + \alpha_1 TLM_{it} + \alpha_2 IR_{it} + \alpha_3 (TLM_{it} \times TR_{it}) + X_{it}B + Z_t\Gamma + D_i\Phi + \varepsilon_{it} \quad (1)$$

y_{it} is the measure for macro policy performance for country i in year t , i.e., output volatility, measured as 5-year standard deviations of the growth rate of per capita output. TLM_{it} is a vector of any two of the three trilemma indexes, which measures the extent of achievement in the three policy goals of monetary independence, exchange rate stability, and financial openness.¹⁹ TR_{it} is the level of international reserves (excluding gold) as a ratio to GDP, and $(TLM_{it} \times TR_{it})$ is an interaction term between the trilemma indexes and the threshold variables that allow one to observe whether they complement or substitute for other policy stances.

X_{it} is a vector of macroeconomic control variables that includes the variables most used in the literature. It includes relative income (to the US—based on the Penn World Tables per capita real income), its quadratic term, trade openness, terms-of-trade shock (defined as the 5-year standard deviation of trade openness times terms-of-trade growth), fiscal procyclicality (defined as the correlations between Hondrick-Prescott [HP]—detrended government spending series and HP-detrended real GDP series), M2 growth, private credit creation, inflation rate, and inflation volatility. Z_t is a vector of global shocks that includes changes in US real interest rate, world output gap, and relative oil price shocks (measured as the log of the ratio of the oil price index to the world's consumer price index). D_i is a set of characteristic dummies that includes a dummy for oil-exporting countries and regional dummies. ε_{it} is an independently identically distributed error term.

The estimation model is also extended by including a vector, $ExtFin_{it}$, of external finances, which includes net FDI inflows, net portfolio inflows, net “other” inflows (mostly bank lending), short-term debt, and total debt service. For net capital flows, we use IFS data and define them as external liabilities (capital inflows with a positive sign) minus assets (capital inflows with a negative sign) for each type of flow. Negative values mean that a country experiences a net outflow of capital. Short-term debt is included as the ratio of total external debt and total debt service as a share of gross national income (GNI). Both variables are retrieved from the World Development Indicators (WDI) dataset.

The dataset is organized into 5-year panels of 1972–1976, 1977–1981, 1982–1986, 1987–1991, 1992–1996, 1997–2001, and 2002–2006. All time-varying variables are included as 5-year averages.²⁰ The regression is conducted for the group of developing countries and a subgroup of highly integrated developing economies.²¹ Robust estimation is conducted to downweight outliers that can arise in both the dependent variable and explanatory variables.²²

¹⁹ Aizenman et al. (2008) have shown that these three measures of the trilemma are linearly related. Therefore, it is most appropriate to include two of the indexes simultaneously, rather than individually, or all three jointly. That means that for each sample, three types of regressions, i.e., those with three different combinations of two trilemma variables, are estimated.

²⁰ The variable for relative income and its quadratic terms are sampled from the initial year of each five-year panel.

²¹ The highly integrated economies are defined as the countries classified as either emerging or frontier during 1980–1997 by the International Financial Corporation. For those in Asia, emerging market economies are “Emerging East Asia-14” defined by Asian Development Bank plus India.

²² Explanatory variables that persistently appear to be statistically insignificant are dropped from the estimation.

B. Basic Regressions Results: Output Volatility with Foreign Reserves as a Threshold

The estimation results in Table 5.1 (columns B, C, E, and F) show that output volatility is negatively associated with financial openness in developing countries though it is not found to be significant among highly integrated countries. The result is independent of whether it is paired with monetary independence or exchange rate stability. Interestingly, exchange rate stability is found to destabilize output movement in both samples.²³ At the same time, the interaction term between this variable and the one for foreign exchange reserves is found to have a statistically negative effect, suggesting that countries can cancel or reverse the destabilizing effect of pursuing greater exchange rate stability if they hold higher levels of foreign reserves than a threshold. Based on the estimation result, the threshold to reverse the destabilizing effect of exchange rate stability is about 20% of GDP.

Table 4.1: Determinants of Output Volatility in Highly Integrated and Developing Economies

	Highly Integrated Economies			Developing Economies		
	(A)	(B)	(C)	(D)	(E)	(F)
Private credit creation	0.000 [0.007]	−0.005 [0.007]	0.001 [0.007]	−0.003 [0.006]	−0.008 [0.006]	−0.005 [0.007]
Monetary independence (MI)	−0.018 [0.017]	−0.038 [0.018]**		−0.019 [0.014]	−0.035 [0.014]**	
MI x reserves	0.008 [0.088]	0.096 [0.094]		0.005 [0.085]	0.112 [0.089]	
Exchange rate stability (ERS)	0.023 [0.009]**		0.028 [0.009]***	0.008 [0.007]		0.012 [0.006]*
ERS x reserves	−0.125 [0.052]**		−0.150 [0.051]***	−0.086 [0.044]*		−0.095 [0.044]**
KA Openness		−0.010 [0.009]	−0.002 [0.009]		−0.020 [0.008]**	−0.014 [0.008]*
KAOPEN x reserves		0.062 [0.047]	0.016 [0.042]		0.086 [0.045]*	0.048 [0.042]
Net FDI inflows/GDP	−0.121 [0.107]	−0.105 [0.112]	−0.155 [0.113]	0.047 [0.068]	0.092 [0.071]	0.109 [0.070]
Net portfolio inflows/GDP	−0.113 [0.140]	−0.048 [0.145]	−0.081 [0.147]	0.241 [0.122]**	0.289 [0.129]**	0.286 [0.127]**
Net ‘other’ inflows/GDP	0.025 [0.037]	0.017 [0.037]	0.022 [0.037]	0.069 [0.029]**	0.063 [0.029]**	0.071 [0.029]**
Short-term debt (as % of total external debt)	−0.013 [0.019]	−0.008 [0.019]	−0.011 [0.019]	−0.009 [0.016]	−0.008 [0.016]	−0.007 [0.016]
Total debt service (as % of GNI)	0.008 [0.044]	0.037 [0.044]	0.011 [0.044]	0.063 [0.035]*	0.081 [0.035]**	0.078 [0.035]**
Observations	154	154	154	311	311	311
Adjusted R-squared	0.45	0.29	0.46	0.37	0.39	0.40

* significant at 10%; ** significant at 5%; *** significant at 1%.

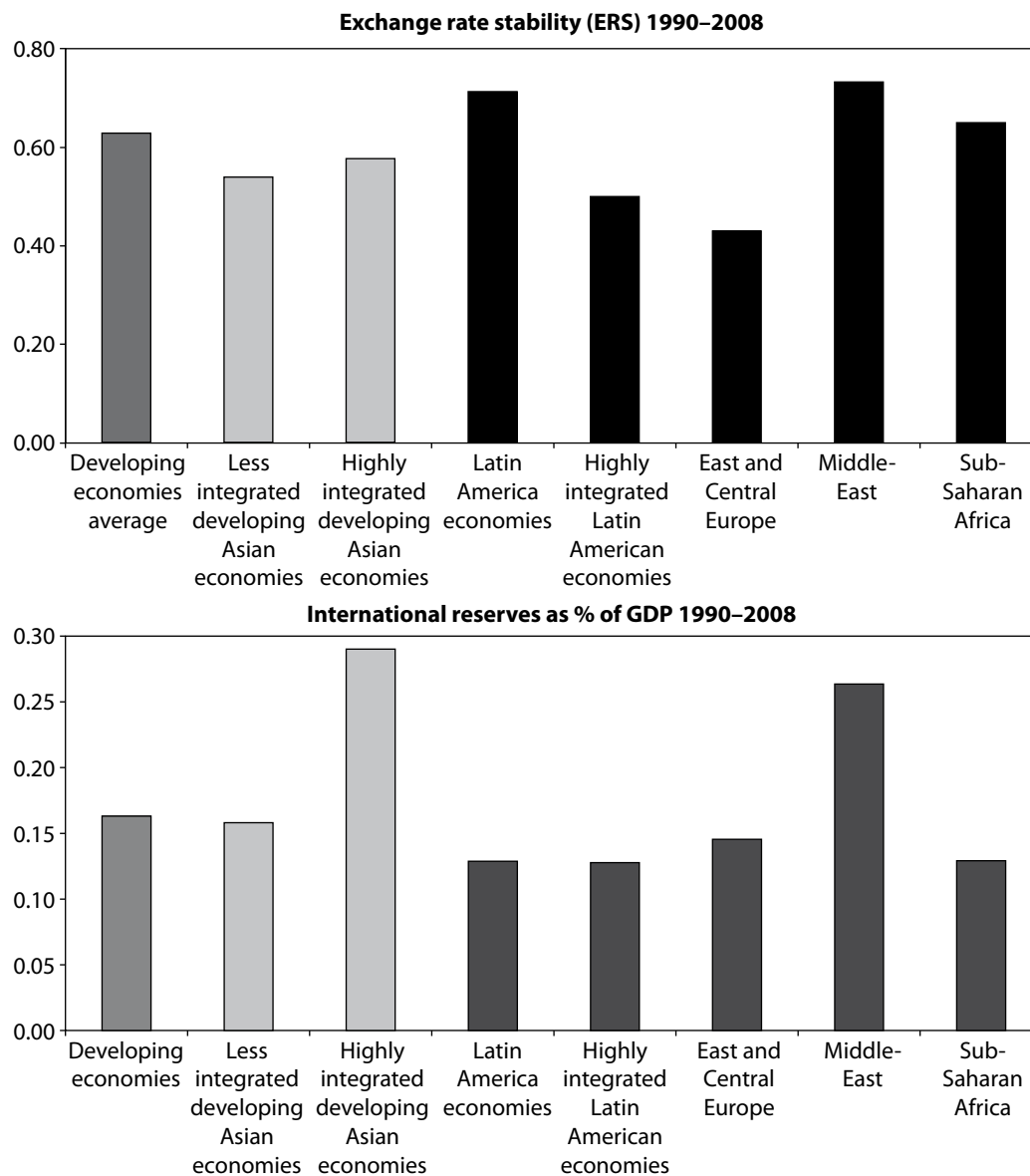
Note: Robust regressions are implemented. Standard errors are in brackets. The dummy for Sub-Saharan countries is included in the regressions. Other control variables are not reported to conserve space.

Source: Authors’ estimation.

²³ This result is consistent with Edwards and Levy-Yeyati (2005) and Haruka (2007), both of which find conversely that more flexible exchange rate regimes are associated with smaller output volatility.

This finding has a significant relevance to Asian economies. Figure 4.2 shows ERS and foreign reserves as a percentage of GDP (IR) in Asia and other countries. In the period 1990–2008, the average level of exchange rate stability for highly integrated and developing Asia is higher than that for highly integrated Latin America and European countries, but lower than the group average for developing countries and other subgroups. At the same time, the ratio of international reserves holding for highly integrated Asian economies is much higher than in all other regions except the Middle East, and much greater than the threshold level of about 20%. These panels of figures reflect that developing Asian economies have pursued international macroeconomic policies that allow their massive IR holding to reduce the level of output volatility.²⁴

Figure 4.2: Regional Comparison of Exchange Rate Stability and Foreign Reserves



²⁴ Based on the estimation result, for example, Singapore—a country with a middle level of exchange rate stability (0.5 in 2002–2006) and a very high level of international reserve holding (100% of GDP)—is able to reduce output volatility by 2.7–2.9 percentage points while the PRC, whose exchange rate stability index is as high as 0.97 and whose ratio of reserves holding is 40% of GDP, is able to reduce volatility by 1.4–1.7 percentage points.

Among the disaggregated capital flow variables, bank lending (i.e., “other” capital flows in the IFS dataset) and net portfolio investment tend to have a statistically positive impact on output volatility. In other words, the more bank loans or net portfolio inflows a country receives, the more likely it is to experience higher output volatility, reflecting the “hot money” argument regarding cross-border, short-term capital flows such as bank lending and portfolio investment. FDI flows do not appear to have any definitive impact on output volatility. At the very least, this type of capital flows do not necessarily destabilize the economy.

C. Extended Analyses: Output Volatility, Financial Development, and Cross-border Capital Flows

While foreign reserves seem to play a role in how international macroeconomic management affects output volatility, financial development, included in the estimation as private credit creation (as a percentage of GDP: *PCGDP*), turns out to be statistically insignificant. The statistical insignificance of financial development could illustrate that financial development per se can be a double-edged sword. That is, although further financial development may enhance output growth and stability by ameliorating information asymmetry, enabling more efficient capital allocation, and allowing for further risk sharing, it can also expose economies to high-risk, high-return financial instruments, thereby involving the possibility of amplifying real shocks and/or falling into the boom-bust cycles.

Although we do not find any impact of financial development as a level, we still suspect that financial development can interact with other international macroeconomic policies and affect output volatility indirectly. This attempt is based on our anecdotal observation that policy makers seem to incorporate the level of financial development as one of the important factors in their decision making. For example, the PRC has been alleged to pursue closed financial markets with exchange rate stability as precautionary measures to protect its underdeveloped financial system. In addition, some argue that a country with newly liberalized but underdeveloped financial systems tend to experience financial fragility (Demirguc-Kunt and Detragiache 1998). The economic damage can be greater especially when the financial fragility is coupled with a currency crisis (Hutchison and Noy 2005).

1. Trilemma Variables with Financial Development as a Threshold

Given the potentially ambivalent effects of financial development, we suspect the nonlinearity of financial development.²⁵ Hence, we introduce the dummy variables for different level groups of financial development. That is, X-HI is assigned a value of 1 for a

²⁵ When *PCGDP* is interacted with the trilemma variables, the interaction term was never found to be insignificant. This suggests that we cannot assume the effect of *PCGDP* on the link between the trilemma indexes and output volatility to be monotonic. Hnatkovska and Loayza (2005) and Kose et al. (2009) find the nonlinear effect of financial development especially in interaction with financial liberalization.

country that has a measure of financial development (X) above the 75th percentile in the distribution of 5-year averages of X within a 5-year window, and zero, otherwise. X -LO takes a value of 1 if a country has a level of financial development below 25th percentile, and zero, otherwise. X -MD takes a value of one if a country's financial development level lies between 25th and 75th percentiles in a 5-year period. Financial development (X) is proxied by three variables, namely, private credit creation (FD), stock market capitalization ($SMKC$), and bond market capitalization (all as a percentage of GDP).

Table 4.2 reports the estimation results when private credit creation (FD) is used as the measure of financial development, and presents some interesting findings among highly integrated economies. The estimated coefficient on the term “ERS x Medium FD ” is significant in columns 4 and 6. In column 6, the coefficient on “ERS x High FD ” is also significant, and both “ERS x Medium FD ” and “ERS x High FD ” are statistically greater than “ERS x Low FD ” in the estimates' magnitude.²⁶ With these results, we can surmise that for countries with underdeveloped financial markets, higher levels of exchange rate stability do not lead to higher output volatility. Those with medium levels of financial development do seem to experience higher output volatility when they pursue a more stable exchange rate, suggesting that countries with newly developed financial markets can be volatile when they pursue greater exchange rate stability.²⁷

Deepening credit market and financial openness seem to have interesting interactive effects on output volatility, especially again among highly integrated economies. While those highly integrated economies with medium or high levels of financial development tend to experience less output volatility when they decide to pursue greater financial openness, those with shallow credit markets are expected to experience greater output volatility. When the coefficient on “KAOPEN x Medium FD ” and “KAOPEN x High FD ” is compared to that of “KAOPEN x Low FD ”, the difference is found to be statistically significant. These results indicate that highly integrated economies need to be equipped with deeper credit markets if they want to reap the benefit of financial liberalization on their output volatility. Having a higher level of financial openness and deep credit market can yield a synergistic impact to dampen output volatility, presumably by facilitating allocation of capital and ameliorating information asymmetry, thereby reducing the cost of capital. The worst and more significant case is that a country with shallow credit markets can exacerbate output volatility caused by financial liberalization. For developing countries, financial openness may be the volatility reducer when coupled with a high level of financial development—however, the relationship is weak.

²⁶ The results are shown in the bottom part of Table 5.2 that reports the Wald test statistics for the tests on the differences in the estimated coefficients of the interaction terms between the trilemma indexes and different FD groups.

²⁷ In both columns 4 and 6, the estimated coefficients on the interaction term between ERS and IR are found to be significantly negative. Using the estimates, we can estimate that to cancel or lessen the volatility-enhancing effect of ERS, highly integrated economies with medium (or higher) levels of financial development need to hold at least 21–26% of GDP of international reserves. However, this rule is not applicable to those with underdeveloped financial markets.

Table 4.2: Impacts of Financial Market Development on Output Volatility

	Developing Economies			Highly Integrated Economies		
	(1)	(2)	(3)	(4)	(5)	(6)
Private credit creation (percent of GDP)	−0.008 [0.008]	−0.005 [0.008]	−0.008 [0.007]	0.001 [0.008]	0.000 [0.007]	0.000 [0.006]
MI x International reserves	−0.028 [0.067]	−0.006 [0.064]		−0.050 [0.067]	−0.024 [0.063]	
MI x High FD	−0.018 [0.017]	−0.013 [0.016]		−0.013 [0.019]	−0.016 [0.017]	
MI x Medium FD	−0.015 [0.012]	−0.019 [0.012]		−0.008 [0.014]	−0.017 [0.014]	
MI x Low FD	−0.005 [0.015]	−0.019 [0.013]		0.004 [0.023]	−0.034 [0.018]*	
ERS x International reserves	−0.048 [0.033]		−0.051 [0.031]	−0.084 [0.037]**		−0.058 [0.030]*
ERS x High FD	0.008 [0.010]		0.015 [0.009]	0.017 [0.012]		0.015 [0.009]*
ERS x Medium FD	0.005 [0.006]		0.005 [0.005]	0.018 [0.007]**		0.014 [0.007]**
ERS x Low FD	−0.007 [0.007]		−0.002 [0.006]	0.011 [0.016]		−0.012 [0.010]
KAOPEN x International reserves		0.009 [0.027]	−0.005 [0.027]		0.032 [0.027]	0.025 [0.026]
KAOPEN x High FD		−0.016 [0.010]	−0.015 [0.011]		−0.018 [0.010]*	−0.014 [0.010]
KAOPEN x Medium FD		−0.003 [0.006]	−0.001 [0.006]		−0.008 [0.006]	−0.006 [0.006]
KAOPEN x Low FD		−0.008 [0.010]	−0.003 [0.009]		0.040 [0.017]**	0.045 [0.015]***
Adjusted R-squared	0.23	0.22	0.23	0.46	0.36	0.40
MI: High vs. Med.	0.07	0.32		0.10	0.01	
MI: Med. vs. Low	0.82	0.00		0.35	1.83	
MI: High vs. Low	0.69	0.22		0.55	1.25	
ERS: High vs. Med.	0.11		1.56	0.01		0.02
ERS: Med. vs. Low	3.27*		0.02	0.21		7.84**
ERS: High vs. Low	0.02		3.78**	0.15		5.53**
KAOPEN: High vs. Med.		0.02	1.80		1.25	0.70
KAOPEN: Med. vs. Low		0.24	0.05		7.84**	10.70***
KAOPEN: High vs. Low		0.40	0.85		10.25***	11.82***

FD = financial market development, MI = monetary independence, ERS = exchange rate stability.

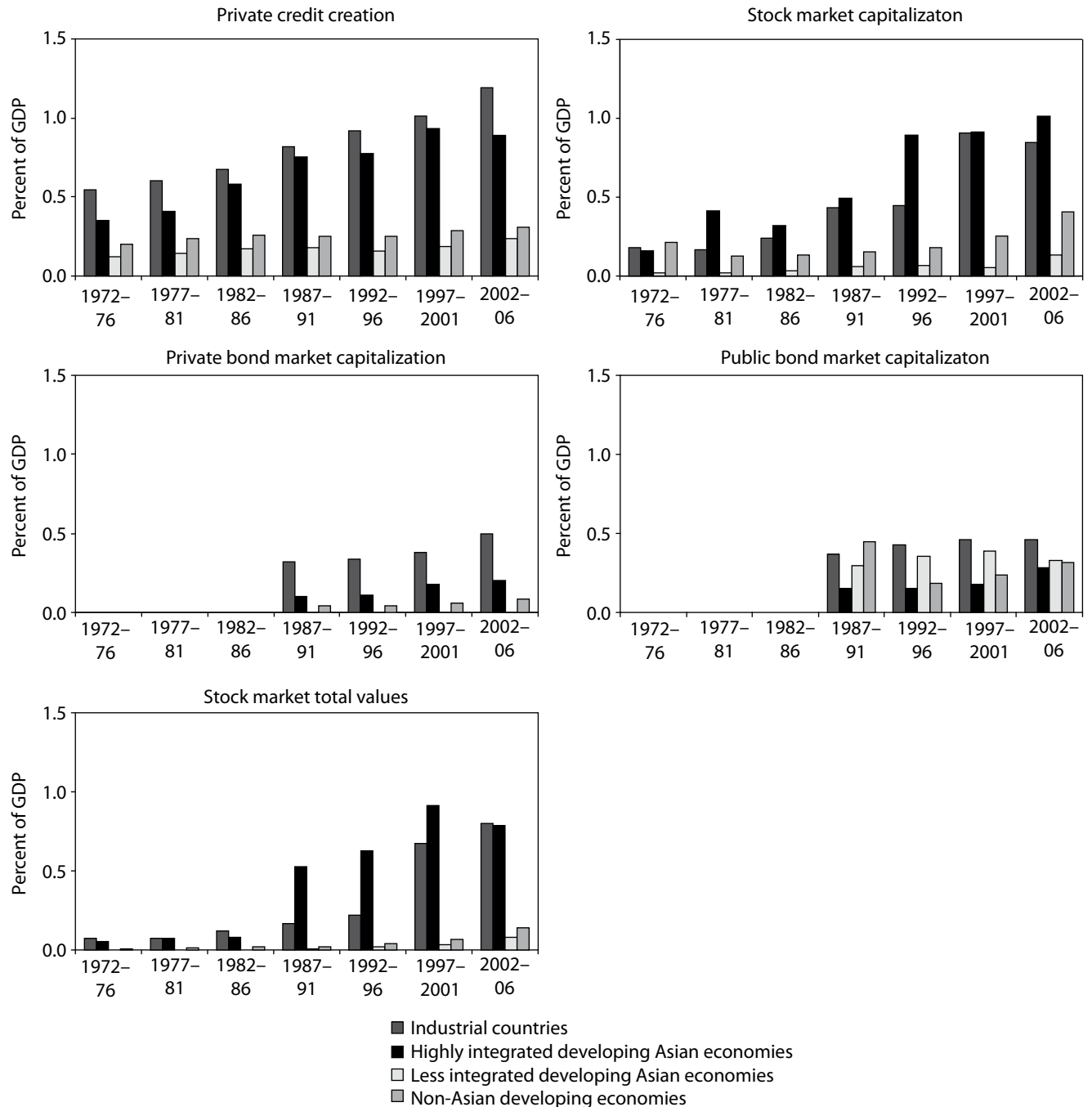
Note: Significance of the estimated coefficients of the interaction terms between the trilemma indexes and different FD groups is tested using a Wald test.

The estimations with stock and bond market development also yield an interesting result (not reported). In sum, again, financial liberalization can be beneficial when it is coupled with highly developed stock markets (measured by stock market capitalization). This is an indication that financial liberalization needs to be hand-in-hand with financial development in both banking and equity sectors. This means that financial development does not merely mean conventional financial intermediation through the banking system, but also includes more efficient resource allocation and portfolio diversification through stock markets.²⁸

²⁸ The estimations with bond markets (both private and public) does not yield any insightful results, but mainly due to data limitations.

Where do Asian economies stand in terms of financial development? Figure 4.3 compares the level of financial development, measured by the different aspects of financial markets, across different groups of economies. One can see that in terms of development in the banking sector or stock markets, the financial development of highly integrated economies in Asia is quite comparable to that of industrialized countries. However, less integrated Asian countries are still behind other countries.

Figure 4.3: Measuring Financial Development



Financial development in terms of bond market development presents a different story. In this type of financial development, whether public or private bond sectors, even highly integrated Asian economies still lag behind the industrial countries. Clearly, in Asia, there is still room for both public and private bond markets to catch up with those of industrial countries. Ironically, Eichengreen and Luengnaruemitchai (2004) argue that a stable macroeconomic environment may have been one of the reasons for the underdevelopment of bond markets in Asia. The debate for developing bond markets in Asia has been active, especially since the Asian crisis. The main motivations for advocating bond market development in the region can be twofold. First, more developed bond markets in the Asian region should promote more regional risk sharing, which has been advocated especially among policy makers as a lesson from the Asian crisis. Second, bond market development should contribute to alleviating the global imbalances by allowing Asian capital to be “recycled” within the Asian region. However, for now, the impact of bond market development and implications for Asia need to be discussed in future research.

2. Interactions between Financial Development and Different Types of Cross-border Capital Flows

Having seen the impact of financial globalization and other macroeconomic policy choices from the perspective of the threshold hypothesis, let us focus on the composition hypothesis. Previously, we have seen that net inflows of portfolio investment and bank lending can raise output volatility. Given that *de jure* financial openness is found to interact with different levels of financial development differently, let us examine the interactions between financial development and external financing by extending the previous approach.

Columns (1) through (3) in Table 4.3 show the estimated coefficients for the interaction terms between different types of net capital inflows and the dummies for different levels of financial development measured by private credit creation (as a percentage of GDP: FD). The models shown in columns (1) through (3) contain different pairs of the trilemma variables (shown at the bottom row of the table). Columns (4) through (6) present the same type of exercise, but the level of financial development is measured by stock market capitalization (as a percentage of GDP: SMKC) instead of FD.²⁹

When FD is used as the measure of financial development, it appears that the coefficients for the interactions between net FDI inflows or net “other” inflows and the low level of financial development is significantly different from the other estimates. This implies that net inflows of FDI and bank lending can increase volatility only when the economy’s financial markets are underdeveloped. Thus, to prevent net FDI inflows or net bank lending inflows from increasing output volatility, an economy needs to be equipped with financial markets with medium or higher levels of development.

²⁹ The estimation models do include the benchmark macroeconomic variables and other characteristic dummies, though their estimation results are not reported in the table.

Columns (4) through (6) present a different picture. When the level of financial development is measured by stock market capitalization, generally, the effect of FDI is found to be negative. The degree of negativity is higher especially when stock markets of the economy are underdeveloped. The result reported here needs to be interpreted with caution since, by using SMKC instead of FD, the number of observations shrinks by 40%. However, with this reduced sample, if one wants to explain the negative coefficients with greater magnitude for the interactions between net FDI inflows and the low financial development dummy, which may be explained by the role of FDI as a tool to supplement an equity-type of domestic saving, thereby reducing output volatility. In fact, for the interactions with high-level stock market development, the magnitude of the coefficient becomes smaller.

Table 4.3: Output Volatility: External Finances Interacted with Different Levels of Private Credit Creation or Stock Market Capitalization

Financial Development Level Dummies		Private Credit Creation			Stock Market Capitalization		
		(1)	(2)	(3)	(4)	(5)	(6)
Net FDI Inflow	High	0.055	0.063	0.055	−0.077	−0.115	−0.186
		(0.096)	(0.102)	(0.103)	(0.094)	(0.108)	(0.107)*
	Medium	0.030	0.068	0.057	−0.145	−0.159	−0.171
		(0.081)	(0.083)	(0.084)	(0.096)	(0.099)	(0.102)*
	Low	0.502	0.506	0.521	−0.209	−0.238	−0.249
		(0.051)***	(0.051)***	(0.051)***	(0.097)**	(0.101)**	(0.103)**
Net Portfolio Inflow	High	0.096	0.100	0.069	−0.079	−0.095	−0.124
		(0.098)	(0.104)	(0.101)	(0.067)	(0.067)	(0.067)*
	Medium	0.017	0.000	0.022	−0.086	−0.067	−0.069
		(0.075)	(0.075)	(0.075)	(0.131)	(0.134)	(0.136)
	Low	0.090	0.163	0.135	0.129	0.133	0.144
		(1.041)	(1.047)	(1.047)	(0.087)	(0.088)	(0.089)
Net “Other” Inflow	High	0.032	0.042	0.047	−0.155	−0.136	−0.108
		(0.062)	(0.063)	(0.063)	(0.051)***	(0.052)***	(0.053)***
	Medium	0.002	0.009	0.008	−0.062	−0.065	−0.064
		(0.039)	(0.039)	(0.039)	(0.047)	(0.048)	(0.049)
	Low	0.184	0.179	0.194	0.022	0.021	0.004
		(0.044)***	(0.043)***	(0.044)***	(0.068)	(0.069)	(0.071)
Included trilemma variables		MI	MI	ERS	MI	MI	ERS
		ERS	KAOPEN	KAOPEN	ERS	KAOPEN	KAOPEN

* significant at 10%; ** significant at 5%; *** significant at 1%.

Note: Robust regressions are implemented. Standard errors are in brackets. Columns (1) through (3) show the estimated coefficients for the interaction terms between different types of net capital inflows and the dummies for different levels of financial development measured by private credit creation (as a percentage of GDP: FD). For columns (1) through (3), different pairs of the trilemma variables are included (see the bottom row). For Columns (4) through (6), the level of financial development is measured by stock market capitalization (as a percentage of GDP: SMKC). The estimation models do include the benchmark macroeconomic variables and other characteristic dummies though their estimation results are omitted.

Source: Authors' estimation.

Net bank lending inflows can help reduce output volatility for economies with highly developed stock markets. This can be explained by the complementarity between overseas bank loans and domestic stock market. In fact, when the variable for net bank lending inflows is interacted with SMKC instead of the dummies for the different levels of stock market development, the estimated coefficient for the interaction term is found to be negative. That means that the effect of stock market development on net bank lending inflows is monotonically negative, which supports the complementarity between net bank lending and SMKC. This kind of complementarity is also weakly observed between net portfolio inflows and SMKC.

V. Managing Foreign Reserves

In the previous section, we investigated the role of international reserves holding as well as the impact of financing from both the domestic market and foreign investors. Among these factors, as we have repetitively pointed out, the massive and rapidly increasing accumulation of foreign reserves is the quintessential Asian phenomenon in contemporary international finance. In other words, progress in financial globalization has manifested in the asset side of developing Asia in the past several years, a large portion of which has been composed of US dollar assets. We revisit how foreign reserves have so far been managed, and review their underlying issues.

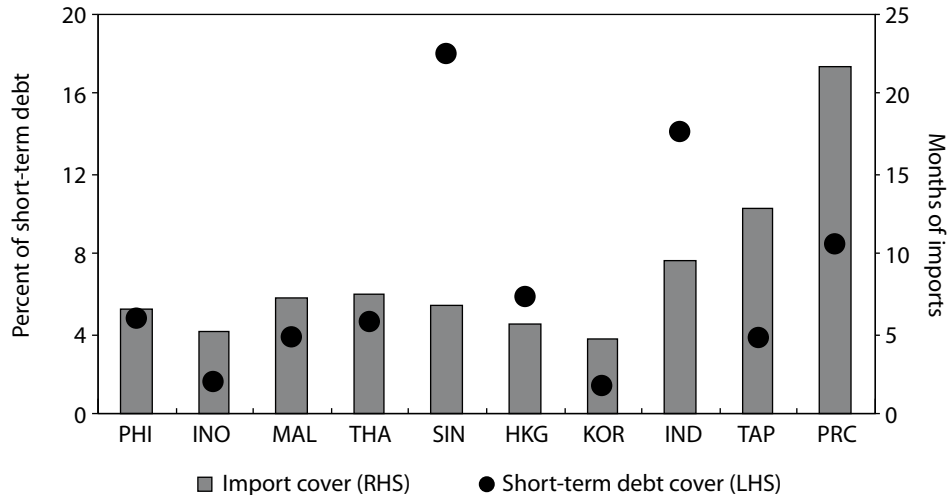
Obstfeld et al. (2009) argue that reserves accumulation is a key tool for dealing with domestic financial instability as well as exchange rate variability under a “managed floating plus policy regime.” In other words, a primary reason for a central bank to hold reserves is to protect the domestic banking sector and domestic credit markets more broadly, while limiting external currency depreciation.

Obstfeld et al. continue to argue that the need for such protection is much higher in countries with fragile financial systems and currency mismatch. As most developing countries are constrained to hold external liabilities that are denominated in foreign currencies, the problem of currency mismatch of external assets and liabilities is more serious in these countries than in industrialized countries. As local currency bond markets are still underdeveloped in the region, developing Asia is no exception.

While the high level of reserves revealed is crucial to cushion against external shocks over the past year, which was also highlighted in the empirical analysis in the previous section, carrying excessive reserves entails costs due to its poor management (Bird and Rajan 2003). In fact, most of developing Asia already meets the criterion suggested by conventional measures in terms of precautionary needs, such as the Guidotti-Greenspan rule (Feldstein 1999), which says that a country’s liquid foreign exchange reserves should at all times cover its foreign currency debt repayable within 1 year (shown in the right-

hand side of Figure 5.1), and that reserves can cover import bills for a number of months (shown in the left-hand side of Figure 5.1).

Figure 5.1: Reserves Adequacy Measures



Source: CEIC Data Company Ltd.

Efforts have been made to reduce the need to hold excessive amounts of foreign reserves in the region. In particular, extensive reforms of the banking sector, with strict enforcement of regulation and supervision, have proven to be crucial in shielding against the volatile flows seen over the year. Meanwhile, development of a local currency-denominated bond market has been put forward mainly to mitigate the risk of currency mismatch.

A. Recent Reserves Management in Developing Asia

In developing Asia, a combination of strong current account accumulation coupled with capital inflows, though to a lesser extent, has resulted in a large expansion in foreign reserve holdings. Principles governing reserve management can be categorized into two types—one where liquidity is a priority and the other that can be invested in less liquid markets with a medium- to long-term investment horizon. The liquidity consideration is important for the portion that needs to cover immediate precautionary needs, i.e., short-term debt repayment and, say, 3 months worth of import bills.

In cases where liquidity consideration is important, investing in government bonds—particularly US Treasuries—the US dollar and other highly liquid government bonds tend to be appropriate in securing its liquidity, and has been the practice. In fact, 64% of world reserves were held in US dollar assets in 2008, although at a declining trend. While the country breakdown of the currency denomination of foreign reserves is not available, a number of indicators, such as a share of US Treasury securities holding (percent of

total reserves), indicate that Asia's foreign reserves are invested largely in US dollar-denominated assets more than what can be warranted by precautionary needs. The fact that a large portion of the foreign reserves are invested in US dollar-denominated assets indicates that either liquidity consideration is overemphasized in the region and/or alternative financial instruments are missing.

In cases where liquidity is less of a consideration, any asset class consistent with diversified risk and/or return objective—bonds, equities, direct investments, hedge funds—are appropriate potentially with the goal of maximizing risk-adjusted returns. This portion might be managed within the balance sheet of the monetary authority such as the Hong Kong Monetary Authority, or through a separate entity, i.e., a sovereign wealth fund (SWF). Establishing an SWF has been a natural reaction to the increasing concern over foregone return-seeking opportunities by keeping the foreign reserves in the steady but low return yielding assets. Except for Singapore and Hong Kong, China, where SWFs have an established history, most of the SWFs in the region are newly created ones during the last decade—the period that coincides with the rapid accumulation of foreign reserves in these economies (Table 6.1). Assets of these SWFs are transferred from foreign reserves with an aim to seek more strategic longer-term investment with higher returns. However, the role of such SWFs has been limited due to its limited portfolio size so far.

Table 5.1: Sovereign Wealth Fund of Selected Developing Asia

Economy	Name of Fund	Year of Inception
Singapore	Government of Singapore Investment Corporation	1981
PRC	China Investment Corporation	2007
Singapore	Temasek Holdings	1974
Hong Kong, China	Investment Portfolio (Hong Kong Monetary Authority	1998
Brunei Darussalam	Brunei Investment Agency	1983
Korea, Republic of	Korea Investment Corporation	2005
Malaysia	Khazanah Nasional Bhd.	1993
Kazakhstan	National Oil Fund	2000
Taipei, China	National Stabilization Fund	2000
Azerbaijan	State Oil Fund	1999
Timor Leste	Petroleum Fund	2005
Uzbekistan	Fund for Reconstruction and Development	2006

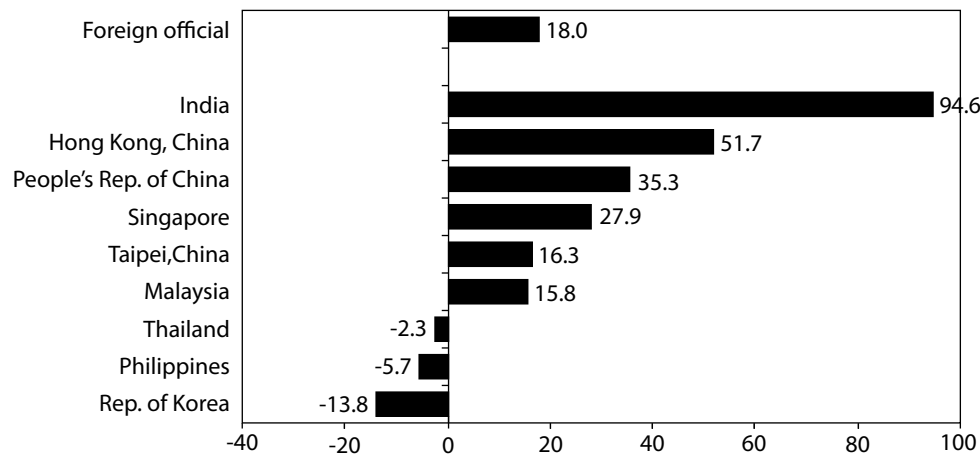
Source: Park (2007).

Consequently, it is still the case that the bulk of reserves appear to be currently managed very conservatively, which is reflected in the overallocation to US dollar-denominated assets, thereby reducing reserves diversification. Given the current medium- to long-term concerns over the US's fiscal position, this is beginning to be a concern for policy makers.

B. Better Reserves Management in the Future

Despite the deteriorating outlook for the US economy since the onset of the recent turmoil, demand for US Treasuries from developing Asia remains strong (Figure 5.2) mainly because no other bond market is comparable in terms of size and liquidity. This conservative stance makes sense given the experience of the 1997/1998 Asian crisis, and the fact that the US dollar remains the centerpiece of any reserve management policy that requires liquidity as a principal determinant. However, given the worrisome US fiscal outlook, as well as the likely continuing central role of the dollar as the world's reserve currency, the issue of reserve allocation becomes even more critical. In particular, if the cost of liquidity includes reduced reserve diversification and potential overexposure to a potentially depreciating US dollar, then the liquidity trade-off becomes less clear cut.

Figure 5.2: Change in US Treasury Holdings, August 2008 to June 2009 (percent)



Note: Foreign official pertains to holdings of US Treasuries by foreign officials and institutions.
 Sources: Treasury International Capital System, available: www.treas.gov/tic/mfh.txt, downloaded 31 August 2009; authors' calculation.

How could reserves be managed in the postglobal financial crisis era? The global financial crisis has created unparalleled opportunities for central banks to reshape reserve management. Amid growing concerns over the US economy and the US dollar, a number of debates are already under way, including a desire to increase the use of special drawing rights as a means to promote greater reserve diversification, among others.

If the overriding insistence on liquidity were to be less emphasized, particularly in cases where liquidity consideration is less important, then the Asian local currency government bond markets would have a potentially bigger role to play. Efforts are underway that will help further develop Asia's bond markets, such as the Asian Bond Market Initiative under ASEAN+3 and the Asian Development Bank, as well the Asian Bond Fund initiative under

the Executive's Meeting of East Asia and Pacific Central Banks group.³⁰ In addition to the efforts to expand the size of the markets, harmonization of the region's bond market rules and regulations has also been promoted to improve accessibility to the markets.

Nonetheless, the still limited size of the local currency bond markets in the region is hindering intraregional trade in financial assets from becoming comparable to that with the rest of the world. The share of portfolio investments to neighboring countries, as mentioned in Section II, has more than doubled from 2000 to 2007, but still remains at 13% of total investments by 2007. A number of practical implementation difficulties remain, which include (i) difficulty of access for markets such as the PRC; and (ii) difficulty of reserve reallocation to increase Asian bond exposure given the already substantial exposure to the US dollar-denominated assets, i.e., US Treasuries.

For better management of foreign reserves, further development of local currency bond markets both in size and accessibility are crucial. First, it would provide additional financial instruments to diversify risks in the portfolio, which is currently overexposed to US dollar-denominated assets.³¹ Second, it would help to reduce the risk of currency mismatch by allowing countries to issue debts in its own currency, which in turn would reduce the need to accumulate the excess level of foreign reserves. Finally, strengthened regional bond markets would serve as a pool of funds and additional financial channels to finance investments in the region instead of being channeled through developed countries.

VI. Concluding Remarks and Policy Implications

The repatriation of capital flows and the dry-up of the US dollar market that intensified in late 2008 have brought the role and benefits of financial globalization to the fore. This paper reexamines the role of financial globalization in affecting highly integrated developing Asia's economic stability, and the implications on the region's efforts to successfully benefit from financial globalization. The paper first reviews key differences between the recent pullback in capital inflows versus that in 1997/1998 and the importance of "external" and "internal" factors in determining capital flows.

A number of notable distinctions between the current global crisis and the Asian financial crisis become evident. First, FDI shows a declining trend in response to the global crisis, in contrast to the Asian crisis. While the collapse of capital inflows driven by the global crisis has been more significant in size than those during the Asian crisis, strong economic fundamentals in the region, especially in financial institutions, helped these

³⁰ "Review of the Asian Bond Fund 2 Initiative." EMEAP Working Group on Financial Markets, June 2006.

³¹ Cheung (2009) proposes a way to diversify the foreign reserve portfolio by expanding balance sheets of central banks, and allocating the expanded portion to cross-holding regional currency bonds.

economies to successfully redress and manage most of the adverse effects. Quick policy responses to the financial stress, credit shortage, and credit withdrawals managed to keep the adverse impacts minimal.

A developing country with more open capital market tends to experience lower output volatility. Further, it is found that countries can mitigate the volatility-increasing effect of pursuing greater exchange rate stability if they hold a sufficiently high level of foreign reserves. Additionally, the more bank lending or more net portfolio inflows a country receives, the more likely it is to experience volatile output, reflecting the “hot money” argument regarding cross-border bank lending and portfolio investment. Meanwhile, FDI flows do not necessarily destabilize the economy, though stabilizing effects do not seem to be significant either.

The role of domestic financial sector development is investigated in detail. The regression analyses indicate that highly integrated economies need to be equipped with highly developed financial markets, particularly of banking and stock markets, if they want to reap the benefit of financial liberalization to reduce output volatility. The findings also suggest that a macroeconomic policy regime leaning more toward exchange rate stability is most likely to exacerbate output volatility when the economy is equipped with only medium levels of financial development.

Additionally, the analysis reveals that net bank lending inflows can help reduce output volatility for economies with highly developed stock markets. This can be explained by the complementarities between overseas bank loans and domestic stock market. This complementarities argument can be also weakly observed between net portfolio inflows and stock market development.

In the sample examined in this paper, the levels of private credit creation (as a percentage of GDP) in highly integrated developing Asia are high and are categorized under the more developed financial market group. That means that for these economies, financial liberalization, by itself, can be volatility-reducing. Financial development, particularly in the banking sector in these economies, seems to have provided a favorable environment for reducing the level of output volatility. Having highly developed stock markets were also found useful in stabilizing the economy by complementing external financing. Meanwhile, there is significant room for a less integrated developing Asia to catch up with highly integrated developing Asia in financial development.

Having access to external financing by opening up the capital markets can be beneficial if advanced in a cautious manner, and if moved hand in hand with the development of domestic financial markets. However, bond market development, in particular, has been playing a limited role so far. For better management of foreign reserves, further development of local currency bond markets both in size and accessibility are crucial.

To summarize, the four key policy messages on financial globalization that can be drawn from this study are the following:

- (i) **Shifting the composition of capital flows.** Longer-term capital, such as FDI, is more desirable than short-term investment, given its stabilizing properties. Policies toward improving the investment climate would support such a shift and promote benefits from capital inflows in general and FDI in particular. Although “external” factors or the G3 economies’ growth prospects remain important for all types of capital flows, “pull” factors, especially supply-side capability, tend to be more important for FDI than for other capital flows. Thus, policies strengthening supply-side capacity and a country’s competitiveness are also important for supporting the composition shift. Improvement in infrastructure, in terms of both quantity and quality, is a priority for the government, especially in South Asian countries. Human capital needs to be further developed to improve labor productivity and offset a rise of labor costs in the region. Policies to reduce trade costs including custom reform, improve logistic services, increase legal certainty, and strengthen governance to enforce contracts and protect intellectual property rights need to be addressed.
- (ii) **Sequencing capital account opening.** When countries open their capital account, they should not hasten to remove all associated restrictions, since such opening needs to progress hand in hand with domestic financial market development. Some Asian economies have relatively deep credit markets, enabling them to harness the benefits of financial liberalization. Efficient stock markets are particularly useful in stabilizing an economy by complementing external financing. A bond market, however, is yet to be developed. Highly integrated economies need to be equipped with highly developed financial markets if they want to reap the benefit of financial liberalization on their output volatility. Having a deeper credit market, more open capital markets, and a developed stock market can also reduce output volatility. In particular, having a developed stock market complements bank lending from abroad in reducing output volatility.
- (iii) **Improving access to international capital markets.** This would obviate the need for countries with managed exchange rate regimes to maintain high levels of foreign reserves to mitigate output volatility and to insure against negative shocks. In the meantime, formalizing regional and international cooperation would help to improve access to liquidity when immediate needs arise. Temporary actions, such as establishment of bilateral swap arrangement with the Federal Reserve and cooperative initiatives for bilateral swaps among Asian countries proved to be useful over the years. Creating a multilateral reserve pool under the Chiang Mai Initiative could also mitigate the shortages in US dollar, and would reduce the need to accumulate excessive reserves. This

policy will allow a country to gradually pursue a more flexible exchange rate with less concern for negative external shocks.

- (iv) **Developing a local currency bond market.** Foreign reserves management has been conservative in developing Asia partly because liquidity needs are overemphasized, and largely because of the limited development of national and regional securities markets. A local currency bond market, in particular, needs to be developed further both in size and accessibility for developing Asia to diversify its assets and to avoid overexposure to US dollar–denominated assets. Developed local currency bond market would also address the currency mismatch problem of developing Asia that has arguably caused the excessive holding of foreign reserves.

Appendix

Appendix 1: List of Economies in the Sample

Industrialized countries:

Australia*, Austria*, Belgium*, Canada*, Denmark*, Finland*, France*, Germany*, Greece*, Iceland*, Ireland*, Italy*, Japan*, Malta*, Netherlands, The*, New Zealand*, Norway*, Portugal*, Spain*, Sweden*, Switzerland*, United Kingdom*

Developing Countries:

Less integrated country:

Albania*, Algeria, Angola*, Antigua and Barbuda*, Armenia*, Aruba*, Azerbaijan*, Bahamas, The* Bahrain*, Bangladesh, Barbados*, Belarus*, Belize, Benin, Bhutan*, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic Chad*, Comoros*, Congo, Rep., Costa Rica, Croatia*, Cyprus*, Djibouti*, Dominica*, Dominican Republic, El Salvador, Equatorial Guinea, Estonia*, Ethiopia, Fiji Islands, Gabon, Gambia, The, Georgia*, Grenada, Guatemala, Guinea, Republic of*, Guinea-Bissau*, Guyana*, Haiti, Honduras, Iran, Islamic Rep.*, Kazakhstan*, Kuwait, Kyrgyz Republic*, Lao People's Democratic Republic, Latvia*, Lebanon*, Lesotho, Liberia*, Libya*, Madagascar, Malawi, Maldives*, Mali, Mauritania, Micronesia, Fed. States of*, Moldova*, Mongolia, Mozambique, Myanmar*, Namibia, Nepal, Nicaragua, Niger, Oman, Pakistan, Panama, Papua New Guinea*, Paraguay, Qatar*, Rwanda, Sao Tome and Principe*, Samoa*, Saudi Arabia, Senegal, Seychelles*, Sierra Leone*, Solomon Islands, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadine, Sudan, Suriname, Swaziland, Tanzania, Thailand, Tonga*, Trinidad and Tobago, Ukraine*, Uruguay, Venezuela, RB, Viet Nam, Zimbabwe, Chile, People's Republic of China, Colombia, Czech Republic*

Highly integrated country:

Argentina, Botswana, Brazil, Bulgaria*, Cote d'Ivoire, Cambodia, Ecuador, Egypt, Arab Rep., Ghana, Hong Kong, China, Hungary, India, Israel, Jamaica, Jordan, Kenya, Korea, Rep. of, Lithuania*, Malaysia, Mauritius, Mexico, Morocco, Nigeria*, Peru, Philippines, Poland, Russian Federation*, Singapore, Slovak Republic*, Slovenia*, South Africa, Taipei, China, Tajikistan*, Togo, Tunisia, Turkey, Uganda, Yemen, Rep.*, Zambia.

Note: * - not included in the regression estimations

Appendix 2: Determinants of Foreign Direct Investment Flows to Highly Integrated Asian Economies

To examine the determinants of FDI flows to highly integrated Asian economies, we employ the gravity model and use the data of bilateral foreign direct investment (FDI) flows. We augment the basic gravity model with other determinants, which theory predicts should affect the choice of location of FDI. Specifically, the empirical model takes the form of Equation (A1).

$$\begin{aligned}
 FDI_{ij} = & \beta_0 + \beta_1 M_i + \beta_2 M_j + \beta_3 Distance_{ij} + \beta_4 BIMP_{ij} + \beta_5 ITT_j + \beta_6 Res_j + \beta_7 ULC_j \\
 & + \beta_8 HC_j + \beta_9 RER_{ij} + \beta_{10} REER_j + \beta_{11} MS_j + \beta_{12} FO_j + \beta_{13} INFRA_j + \beta_{14} TB_j \\
 & + \beta_{15} NTB_j + \beta_{16} RTAs_j + \beta_{17} BTAs_{ij} + v_{ij}
 \end{aligned} \tag{A1}$$

where

FDI_{ij} is the real FDI flows from source country i to host country j (as a percentage of GDP)

M_i and M_j is the market size of home country i and host country j (real GDP per capita, constant 2000 US\$)

$Distance_{ij}$ is the geographical distance between source country i and host country j (kilometers)

$BIMP_{ij}$ is the share of (lag) bilateral imports of parts and components of home country i from the host country j in total imports of country i (percent)¹

ITT_j is the intra-industry trade of parts and components in host country j (index: 0-1)

Res_j is the share of crude material (SITC2) and fuels (SITC3) exports of host country j in world total crude and fuel exports (percent)

ULC_j is unit labor costs, measured by value-added in host country j (constant 2000 US\$/worker)

HC_j is the measure of human capital, measured by UNDP education index, in host country j (index: 0-1)

RER_{ij} is the bilateral real exchange rate between source country i and host country j (index: 2000=100)

$REER_j$ is the real effective exchange rate in host country j (with its key trading partners) (index: 2000=100)

MS_j is the measure for macroeconomic stability (the weighted average of money [M2] growth, inflation, and standard deviation of inflation) in host country j (index: 1-10, higher values indicate greater the macroeconomic stability)

¹ The lag variable is included here as argued that the existing market of parts and components in the home country could further promote FDI in the following period (Milner et al. 2004).

FO_j is the financial openness measure (foreign ownership and/or investment restriction and capital controls) in host country j (index: 1-10, higher values indicate greater the financial openness [de jure measure])

$INFRA_j$ is the measure of infrastructure development (percentage of paved road to total road) in host country j (percent)

TB_j is the measure of tariff barriers (revenues from trade taxes (percent of total trade), mean tariff rate, and standard deviation of tariff rate) in host country j (index: 1-10, higher values indicate lower tariff barriers, i.e., greater trade openness)

NTB_j is the measure of nontariff barriers (level of nontariff barriers and compliance costs of importing and exporting) in host country j (index: 1-10; the higher the index, the lower the nontariff barriers)

$RTAs_j$ is the dummy variables for participation by host country j in regional trade agreements. There are three dummy variables: (1) the Asia-Pacific Trade Agreement (APTA) (1 for country participating in APTA and 0 otherwise); (2) the ASEAN Free Trade Area (AFTA) (1 for ASEAN Free Trade Area and 0 otherwise); and (3) ASEAN-other nonmember countries (AFTAHub) (1 for country outside ASEAN that signed the agreement with AFTA and 0 otherwise).

$BTAs_{ij}$ is the dummy variables for the presence of bilateral trade agreements signed between home country i and host country j .

All the variables except for indexes are included as natural logarithm.

The bilateral FDI data are extracted from the UNCTAD/TNC database for the period 1994–2007. Eight highly integrated Asian economies (People's Republic of China; Hong Kong, China; India; Republic of Korea; Malaysia; Philippines; Singapore; Thailand) are the host countries, i.e., FDI recipient countries. Sixty-one home (FDI-provider) countries comprise both developed and developing countries including the host countries.²² The FDI data are deflated by the consumer price index of the host country. Note that data relating to macroeconomic stability, financial openness, tariff barriers and nontariff barriers are from Fraser Institute (see www.freetheworld.com/release.html).

The original unbalanced annual dataset is organized into five nonoverlapping 3-year panels for the period of 1994–2007 (except for the last panel for which the data are averaged over the 2-year period). Sampling 3-year averages should mitigate the effect of business cycle fluctuations. The dataset contains a large number of missing variables and a small number of disinvestment figures that appear as negative figures in the dataset. Excluding missing and negative observations reduces the number of panel observations from 3,240 to 1,024. To deal with the issue of censored data, the Tobit model (truncated regression model) is applied (Stein and Daude 2006 and Loungani et al. 2002). The unit root tests are first performed to ensure that there is no unit root

²² Based on data availability, the 61 home countries are composed of Afghanistan; Argentina; Australia; Austria; Bahrain; Bangladesh; Belgium; Brazil; Brunei Darussalam; Canada; Chile; People's Republic of China; Colombia; Cyprus; Czech Republic; Denmark; Fiji; Finland; France; Georgia; Germany; Greece; Hong Kong, China; Hungary; Iceland; India; Indonesia; Ireland; Israel; Italy; Japan; Kazakhstan; Republic of Korea; Kuwait; Luxembourg; Malaysia; Mexico; Nepal; Netherlands; New Zealand; Norway; Pakistan; Papua New Guinea; Philippines; Poland; Portugal; Russian Federation; Saudi Arabia; Singapore; South Africa; Spain; Sri Lanka; Sweden; Switzerland; Thailand; Turkey; United Kingdom; United States; Vanuatu; Venezuela; and Viet Nam.

for all dependent and independent variables. Because no unit root is found, both dependent and independent variables can be used without concerns of spurious regression.

The estimation results are reported in Table A2.1. The growth impact of the G3 countries can be found as the statistically significant interaction terms between the variable for real income per capita income (M_i) and the dummy for the G3 countries. The regression results indicate that the output performance of both home and host countries positively affects FDI inflows to the Asian region. As shown in column C of the table, a 1.0% drop in the real income growth of the G3 countries could cause a decline in FDI inflows to highly integrated Asian economies by 1.5%.³³ The host country-specific factors, however, are still found to be more significant determinants of FDI inflows than those of the G3 countries. The low labor costs, real currency competitiveness, human capital development, and good business environment, especially in terms of trade and financial openness, are found to promote inward FDI in the region.

³³ The impact of real income per capita of the G3 countries is derived from the coefficients corresponding to the per capita real income variable of home country i (M_i) and the interaction term between M_i and the G3 dummy ($M_i \cdot \text{dummyG3}$), i.e. $1.5 = 0.81 + 0.66$ (see column C in Table A2.1).

Table A2.1: Estimation Results

Dependent Variable = FDI Inflows	Column A	Column B	Column C
Market size of home country (M_i)	1.17 (18.66)*	1.12 (7.22)*	0.81 (10.67)*
Market size of host country ($M_j^{^2}$)	0.07 (2.29)*	0.08 (2.96)*	0.07 (2.51)*
Distance ($Distance_{ij}$)	-0.74 (-5.45)*	-0.67 (-5.36)*	-0.85 (-5.37)*
(lag) bilateral imports of parts and components of i from j ($BIMP_{ij}$)	0.73 (9.89)*	0.74 (10.13)*	0.60 (4.81)*
Intra-industry trade ($IIT_j^{^2}$)	0.83 (1.31)***	1.22 (2.02)*	1.50 (2.67)*
Unit labor costs (ULC_i)	-1.72 (-3.55)*	-1.78 (-3.98)*	-1.58 (-3.67)*
Human capital ($HC_j^{^2}$)	12.87 (6.28)*	14.18 (7.40)*	12.64 (6.87)*
Natural Resources ($Res_j^{^2}$)	0.31 (1.66)**	0.34 (1.86)**	0.28 (1.59)**
Bilateral RER (RER_{ij})	-0.11 (-0.24)		
Real effective exchange rate ($REER_j$)	3.16 (3.46)*	2.91 (3.54)*	3.03 (4.06)*
Macroeconomic stability (MS_i)	0.19 (0.28)		
Financial openness (FO_j)	1.43 (3.75)*	1.53 (3.22)*	1.33 (3.61)*
Infrastructure ($INFRA_i$)	2.28 (4.06)*	2.48 (4.37)*	2.23 (4.10)*
Tariff barriers (TB_j)	0.85 (2.08)*	0.97 (2.39)*	0.77 (2.06)*
Nontariff barriers (NTB_i)	1.55 (1.77)**	1.06 (0.99)	1.38 (1.65)**
Asia-Pacific Trade Agreement (APTA)	0.36 (0.94)		
ASEAN Free Trade Area (AFTA)	-0.31 (-0.80)		
ASEAN-other nonmember countries ($AFTAhub$)	0.56 (1.47)***		
Bilateral Trade Agreement (BTA_{ij})	0.61 (1.92)*	0.70 (2.24)*	0.64 (1.82)**
Asian Crisis Dummy 1997–1999 ($dum9799$)		1.18 (0.65)	
$M_i^*dum9799$		-0.10 (-0.53)	
After Asian Crisis Dummy 2000–2007 ($dumaftercrisis$)		-0.14 (-0.09)	
$M_i^*dumaftercrisis$		0.04 (0.27)	
$M_i^*dummG3$			0.66 (3.99)*

Continued.

Table A2.1: Continued.

IIT_j^2 *dummyG3			1.53 (2.74)*
$BIMP_{ij}$ *dummyG3			0.26 (1.93)**
$Distance_{ij}$ *dummyG3			-0.51 (-2.80)*
No. Observations	1003	1024	1024
Standard errors of regression	2.14	2.16	2.10

* = 1% significance, ** = 5% significance, and *** = 10% significance.

Note: All variables except for the indexes are in natural logarithm; t-statistics in brackets. "dum9799" is the dummy that takes the value of 1 during 1997–1999, and zero otherwise. "dumaftercrisis" is the dummy variable to account for the post-Asian crisis years. The intercept is included in the estimations, but its estimates are not reported.

Source: Authors' estimations.

Appendix 3: Determinants of Portfolio Investment and Bank Lending Flows in Highly Integrated Asian Economies

We examine the determinants of portfolio investment and banking lending flows to highly integrated Asian economies by using the empirical models that incorporate economic performance of key trading partners; economic fundamentals of the host countries; returns on investment, as well as institutional environment of the host countries such as financial openness. In this investigation, the empirical model is applied to both portfolio investment flows and bank loans, and also to both inflows and outflows thereof to add more nuance to the analysis. The estimation model is specified as Equation (A2.1).

$$OCF_j = \alpha_0 + \alpha_1 * GDPG_j + \alpha_2 * G3GDP + \alpha_3 * G3GDPG + \alpha_4 * TPRGDP + \alpha_5 * TPRGDPG + \alpha_6 * RSHDiff + \alpha_7 * FO_j + \alpha_8 * Share_j + \alpha_9 * IS_j + v_j \quad (A2.1)$$

where

OCF_j = inflows/outflows of portfolio investment flows or bank loans of host country j as a percentage of gross domestic product (GDP)

$GDPG_j$ = GDP growth rate of host country j

$G3GDP$ = per capita real GDP of the G3 countries (constant 2000 US\$)

$G3GDPG$ = GDP growth rate of the G3 countries (percent)

$TPRGDP$ = per capita real GDP level of key trading partner within the region¹ (constant 2000 US\$)

$TPRGDPG$ = GDP growth rate of key trading partner within the region (percent)

$RSHDiff$ = real interest rate differential (differences between real short-term interest rates of host country j and G3 countries adjusted by the expected depreciation of the weighted exchange rate, proxied by the first lag of the rate of depreciation) (percent)

FO_j = financial openness of host country j (foreign ownership/investment restriction and capital controls) (index: 1-10; the higher the index, the greater the financial openness (*de jure* measure))

$Share_j$ = share prices index of host country j

IS_j = ratio of investment (gross fixed capital formation) to gross domestic savings of host country j

Unlike in the estimation model for FDI flows, because bilateral flow data for portfolio investment and bank loans are quite limited, we use the data from the Balance of Payments published by the

¹ Key trading partners within the region are composed of PRC; Hong Kong, China; Korea; Malaysia; India; Indonesia; Philippines; Singapore; and Thailand but the weight of each country varies from country to country.

IMF.² The original dataset is for the period 1990–2008. Also, we do not use 3-year panels for the estimation, but instead use annual data, hoping to capture the short-term dynamics of these types of capital flows. For the same reason as in the estimations on FDI flows, we use the Tobit model. Because the simultaneity bias can arise with the GDP growth of host countries, we employ the two-stage least square method and instrument it with first lags of GDP growth rates. The unit root tests ensure no unit root for all dependent and independent variables. All variables are extracted from the *International Financial Statistics* of the IMF and the CEIC database while the variable for financial openness is from Fraser Institute (see www.freetheworld.com/datasets_efw.html).

The regression results for the estimation on the inflows of portfolio investment and bank loans are reported in Table A3.1 and those on the outflows in Table A3.2. The models in Column (A) interact all explanatory variables with two dummies, one for the pre-Asian crisis period and the other for the during-the-crisis period to examine if the impacts of these variables have changed over time.³ Column (B) reports only the variables that are statistically significant, and column (C) provides the estimation results based on the generalized moments of method (GMM).⁴² While the results appear rather similar between columns (B) and (C) in terms of the statistical significance and the magnitude of the coefficients of the variables of our interest, our discussions on the estimation results focus on those in column (B). Except for the GMM estimations, we use the Huber-White robust standard errors to account for serial correlation and heteroskedasticity.

The estimation results show that the G3 countries' GDP significantly affects the portfolio and bank loan inflows to highly integrated Asian economies; a 1.00% increase in the G3 countries' GDP would lead to a 5.73% increase in bank loans inflows while portfolio inflows would increase by 5.34%. We also find that the financial crises do not affect this relationship. The output performance of key trading partners in the region is also found to significantly affect both portfolio and bank loan flows to the region. However, the coefficients corresponding to this variable are much smaller than those of the G3 GDP growth rates and they are significant only for the portfolio regressions. This finding reflects the tendency that investors outside the Asian region, especially those from the G3 countries, are crucial players in affecting capital flows in the form of portfolio investment or bank lending. This is consistent with the fact that intraregional capital flows are limited, though they are gradually trending upward. Thus, it is not surprising that the recent global crisis has resulted in a significant pullback of short-term capital flows.

² The *Coordinated Portfolio Investment Survey* from the IMF reports bilateral flows in equity and debt securities but only for 1997 and 2001–2007.

³ The dummy for the current global crisis is also included in the model and interacted with the explanatory variables. But the level and slope dummies turn out to be statistically insignificant both individually and jointly.

⁴ Note that in the regression for portfolio inflows, the first lag of GDP growth, instead of contemporaneous one, of the host country is included so that the simultaneity problem between portfolio inflows and GDP growth can be mitigated. Therefore, column (c), which is supposed to report estimation results based on the GMM model, is not presented for the portfolio inflow regressions, only the Tobit estimation results are reported.

Table A3.1: Estimation Results on Capital Inflows

Dependent Variables	Portfolio Inflows		Bank Loans Inflows		
	Column (A)	Column (B)	Column (A)	Column (B)	Column (C)
Real GDP level of G3 countries (<i>G3GDP</i>)	6.11 (2.30)**	5.36 (2.46)**	9.19 (1.55)***	5.73 (2.27)**	9.28 (2.15)**
Real GDP of key trading partners (<i>TPRGDP</i>)	2.18 (2.51)**	1.41 (2.50)**			
Real GDP growth of key trading partners (<i>TPRGDPG</i>)			−0.05 (−0.17)		
Real GDP growth of host country <i>j</i> (<i>GDPG_j</i>)	0.16 (2.05)**	0.07 (2.32)**	0.57 (2.81)*	0.26 (2.60)*	0.64 (1.88)***
<i>GDPG_j</i> ²		−0.01 (−3.54)*			
Financial openness (<i>FO_j</i>)	2.44 (4.12)*	1.05 (2.89)*	7.11 (4.30)*	4.02 (2.88)*	1.95 (1.03)
Share of investment over savings (<i>IS_j</i>)	−0.97 (−1.02)	−2.01 (−2.82)*	−0.75 (−0.33)	−2.61 (−2.02)**	−2.84 (−1.90)**
Real interest rate differential (<i>RSHDiff</i>)	0.06 (1.63)***	0.01 (3.03)*	−0.03 (−0.32)	0.0001 (1.67)***	0.0003 (1.85)***
Share prices index (<i>Share_j</i>)	−1.89 (−2.81)**		−2.43 (−1.44)		
<i>G3GDP</i> *dumbefore	−0.74 (−0.90)		−0.88 (−0.80)		
<i>TPRGDP</i> *dumbefore	−0.02 (−0.01)				
<i>TPRGDPG</i> *dumbefore			0.37 (0.65)		
<i>GDPG_j</i> *dumbefore	−0.41 (−3.47)*		−0.59 (−1.93)***		
<i>FO_j</i> *dumbefore	−2.01 (−2.61)*		−6.39 (−2.83)*		
<i>IS_j</i> *dumbefore	−0.56 (−0.28)	3.17 (2.49)**	−1.78 (−0.32)	10.52 (2.72)*	8.54 (2.35)**
<i>RSHDiff</i> *dumbefore	−0.06 (−1.42)		0.01 (0.12)		
<i>Share_j</i> *dumbefore	2.94 (3.66)*	0.34 (3.20)*	4.47 (2.20)**	0.50 (2.91)*	0.60 (1.65)***
<i>G3GDP</i> *dumcrisis	−0.61 (−0.50)		1.00 (0.47)		
<i>TPRGDP</i> *dumcrisis	−1.83 (−1.05)				
<i>TPRGDPG</i> *dumcrisis			0.21 (0.48)		
<i>GDPG_j</i> *dumcrisis	−0.09 (−0.98)		−0.13 (−0.43)		
<i>FO_j</i> *dumcrisis	−1.99 (−1.76)		−2.77 (−0.90)		
<i>IS_j</i> *dumcrisis	−2.47 (−1.30)		8.23 (1.48)	8.05 (2.30)**	

Continued.

Table A3.1: Continued.

<i>RSHDiff</i> ^{cr} <i>dumcrisis</i>	−0.05 (−1.31)		−0.007 (−0.07)		
<i>Sharej</i> ^{cr} <i>dumcrisis</i>	4.22 (3.04)	1.87 (2.16)**	−0.89 (−0.22)		
No. of observations	171	171	155	155	155
Adjusted R2 (mean dependent variable)	0.88	(1.88)	0.87	(0.55)	0.75
Standard errors of regression	1.66	1.75	4.18	4.33	5.98

* = 1% significance, ** = 5% significance and *** = 10% significance.

Note: t-statistics are in brackets. Except for the variables for GDP growth rates of host countries or trade partners (*TPRGDPG* and *GDPG_j*) and real interest rate differentials (*RSHDiff*), all variables are measured in natural logarithm. Because the regressions on portfolio inflows include the GDP growth rates of host countries as the first lagged values, the results from the GMM estimation are not reported. “Dumbefore” is the dummy variable for the period 1990–1996 while “Dumcris” is for the years during the crisis, i.e., 1997–1999.

Source: Authors’ estimates.

In the estimation on the outflows of portfolio investment and bank lending (Table A3.2), the G3 GDP is again found to positively affect these types of capital flows. A 1.00% rise in the G3 countries’ GDP increases portfolio outflows by 8.57% and bank loans outflows by 5.17%, respectively, from highly integrated Asian economies. This result explains that the collapse of the G3 economies in response to the global financial crisis has resulted in a decline of capital outflows from the region. Consistent with the estimation results on the capital inflows, key trading partners’ GDP growth in the region seems to have only a limited effect on the outflows of portfolio investment and bank loans, and the statistical significance is found only for bank loans. A 1.00% rise in key trading partners’ GDP growth would lead to a rise in bank loan outflows by 0.35%.

Table A4.2: Estimation Results on Capital Outflows

Dependent Variables	Portfolio Outflows			Bank Loans Outflows		
	Column (A)	Column (B)	Column (C)	Column (A)	Column (B)	Column (C)
Real GDP level of G3 countries (<i>G3GDP</i>)	7.97 (1.45)	8.57 (2.36)*	8.14 (1.90)**	7.55 (1.36)	5.17 (2.21)**	5.77 (1.65)***
Real GDP growth of key trading partners (<i>TPRGDPG</i>)	-0.69 (-2.53)*			0.47 (1.65)	0.35 (2.91)*	0.41 (1.87)**
Real GDP growth of host country <i>j</i> (<i>GDPG_j</i>)	0.35 (1.96)**			0.37 (2.04)*	0.15 (1.40)***	0.79 (2.11)**
<i>GDPG_j</i> ²		0.01 (1.61)***	0.03 (0.92)			
Financial openness (<i>FO_j</i>)	16.57 (12.26)*	14.51 (10.18)*	14.81 (11.41)*	2.86 (2.00)	1.73 (1.70)**	1.58 (1.46)***
Share of investment over savings (<i>IS_j</i>)	-0.50 (-0.25)	-2.44 (-1.60)***	-2.32 (-1.20)***	-1.43 (-0.70)	-2.12 (-1.74)**	-4.02 (-2.05)**
Real interest rate differential (<i>RSHDiff</i>)	0.10 (1.13)			-0.02 (-0.25)	-0.06 (-1.40)***	-0.22 (-2.76)*
<i>RSHDiff</i> ²		-0.002 (-3.11)*	-0.002 (-1.62)***			
Share prices index (<i>Share_j</i>)	-2.62 (-1.75)***	-1.41 (-2.11)**	-1.39 (-1.65)***	-1.75 (-1.17)		
<i>G3GDP</i> *dumbefore	-1.17 (-1.13)			-0.14 (-0.12)		
<i>TPRGDPG</i> *dumbefore	1.17 (2.24)**	1.75 (5.27)*	1.82 (5.60)*	-0.02 (-0.04)		
<i>GDPG_j</i> *dumbefore	-0.42 (-1.55)***			-0.66 (-1.44)		
<i>FO_j</i> *dumbefore	-15.12 (-7.06)*	-9.76 (-5.98)*	-10.37 (-5.49)*	-2.60 (-1.17)		
<i>IS_j</i> *dumbefore	-14.77 (-2.37)*			-0.99 (-0.20)		
<i>RSHDiff</i> *dumbefore	-0.14 (-1.27)			-0.03 (-0.20)		
<i>Share_j</i> *dumbefore	5.47 (2.89)*			2.31 (1.14)		
<i>G3GDP</i> *dumcrisis	-1.34 (-0.67)			12.63 (0.28)		
<i>TPRGDPG</i> *dumcrisis	0.87 (2.40)*			-0.29 (-0.77)		
<i>GDPG_j</i> *dumcrisis	-0.29 (-0.85)			-0.09 (-0.27)		
<i>FO_j</i> *dumcrisis	2.70 (0.74)			-1.42 (-0.58)		
<i>IS_j</i> *dumcrisis	-1.24 (-0.22)			-6.18 (-0.95)		
<i>RSHDiff</i> *dumcrisis	-0.16 (-1.12)			-0.11 (-0.79)		

Continued.

Table A4.2: *Continued.*

$Share_j^*dumcrisis$	-0.39 (-0.11)			4.01 (1.05)		
No. of observations	128	128	128	135	135	135
Adjusted R2 (mean dependent variable)	0.76	(3.95)	0.70	0.86	0.74	0.79
Standard error of regression	3.52	4.01	4.02	3.66	3.62	4.52

* = 1% significance, ** = 5% significance and *** = 10% significance.

Note: t-statistics are in brackets. Except for the variables for GDP growth rates of host countries or trade partners ($TPRGDPG$ and $GDPG_j$) and real interest rate differentials ($RSHDiff$), all variables are measured in natural logarithm. "Dumbefore" is the dummy variable for the period 1990–1996 while "Dumcris" is for the years during the crisis, i.e., 1997–1999.

Source: Authors' estimates.

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About the Paper

Hiro Ito, Juthathip Jongwanich, and Akiko Terada-Hagiwara note that solid domestic institutions especially in the financial sector, swift policy responses, and a sound macroeconomic environment with adequate reserves have helped the Asia and Pacific region to manage well the adverse impacts of the global crisis. Empirical analysis reveals that a developing country with a more open capital markets tends to experience lower output volatility, contrary to what might be expected. Furthermore, if they want to reap the benefit of financial liberalization to reduce output volatility, highly integrated economies need to be equipped with highly developed financial markets, particularly of banking and stock markets.

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Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.