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Decoupling Asia revisited

Cyn-Young Park

Introduction

Asia's integration and rise as a main driver of global production and trade has been reshaping the global economic landscape. East and South-East Asia, grouped together as emerging East Asia (EEA),¹ now account for about 25 per cent of total global trade and 21 per cent of global gross domestic product (GDP), whereas the comparable figures in 1985 were about 10 per cent and 5.8 per cent respectively. The region has made remarkable economic progress, with an annual growth rate averaging 7.6 per cent between 1985 and 2015. This performance has been underpinned by dynamic growth in the People's Republic of China (PRC), which contributed around 4.5 percentage points to this growth during the 30-year period.

The PRC has emerged as a major player in the world economy, as a producer, exporter of manufacturing goods and consumer of primary commodities. The PRC also plays a central role in the Asian production network, with the tightening of intra-regional trade and investment links fundamentally changing the nature of macro-economic interdependence and growth spillovers between the region and major advanced economies.

1 Throughout this study, Asia refers to nine selected countries in East and South-East Asia. The nine Asian economies that are selected for the study include the PRC; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Taipei, China; and Thailand.

The issue of decoupling is controversial.² The decoupling hypothesis was based on the observation that EEA's sustained high growth in the 2000s, prior to the global financial crisis (GFC) of 2008, was seemingly unaffected by the ups and downs experienced by the major advanced economies. In a narrow sense, the decoupling hypothesis involves the question of whether the regional economy will maintain its strong growth, regardless of a slowdown elsewhere, particularly in the US. In a broader sense, decoupling concerns the emergence of regional economic dynamics in EEA that are independent of economic swings in major industrial countries.

This chapter reinvestigates the decoupling hypothesis using the most recent data and focusing on the potential transmission of economic shocks between the EEA and Group of Three (G3) economies—the US, Japan and the EU. It is likely that the progress of regional economic development and integration has influenced the direction and magnitude of macro-economic interdependence and growth spillovers through regional and global trade and investment links. The ongoing reforms and economic restructuring in the PRC also indicate potential changes in its role in the regional production network.

Following strong policy efforts to rebalance, EEA's economic performance has been solid, despite the visible slowing in the US, Japanese and EU economies in the aftermath of the GFC. Given the weaker than expected economic recovery in the US, and subdued growth prospects in Europe in the post-GFC period, EEA's potential to lead the global economic recovery as an independent source of growth is of particular policy interest.

The three broad purposes of the chapter are as follows. First, the chapter evaluates the progress of regional trade and financial integration, which has implications for the direction and magnitude of macro-economic interdependence and growth spillovers, both intra-regionally and inter-regionally. Global macro-economic interdependence should be time varying and subject to structural changes in economies that are interrelated

2 The decoupling hypothesis gained considerable attention from market participants and commentators (see e.g. The decoupling debate, 2008; Are Asian economies decoupling from the US?, 2008). EEA's sustained high growth since the Asian financial crisis nonetheless faltered in the wake of the GFC and the economic downturn that followed. A sharp increase in the business cycle co-movement between Asia and major advanced economies after the crisis seemed to discredit the decoupling hypothesis and reconfirm that Asia remains highly dependent on the global economy.

through trade, investment and financial links. Therefore, it is important to understand the changing dynamics in each of these transmission channels for economic shocks.

Second, the chapter reviews the special role of the PRC in the closely knit regional trade and investment relationship. Intra-Asian trade has been driven, in part, by strong expansion of regional supply networks established by multinational companies. The PRC has become a regional hub of manufactured production by hosting the production process of many multinationals and attracting most inward foreign direct investment (FDI) to the region. The effect of ongoing structural changes in the PRC's production and trade patterns is of particular interest to the region's business cycle analysis and the issue of whether a regional component has strengthened in the region's business cycles.

Finally, the chapter will examine the evolution of business cycle synchronisation in Asia and investigate macro-economic interdependence and growth spillovers between EEA and developed economies. We employ a vector auto-regression (VAR) model to assess the effect of the US output, world trade, financial volatility and the PRC output shocks on EEA. Evidence presented in this chapter indicates how global and regional shocks transmit to the regional economy and which channel works prominently in the transmission of economic shocks.

The chapter is organised as follows. The first section presents a concise literature survey on the issues of economic integration and business cycle synchronisation, focusing on both intra-regional and inter-regional integration for EEA. The second section examines the recent trends in the region's trade and financial linkages, both within and beyond the region, and investigates the changing role of the PRC in these linkages. The third section reviews the evolution of Asia's business cycles and evaluates the growth spillover effects and the degree of macro-economic interdependence between EEA and G3 economies, using a VAR model. The fourth section concludes the chapter.

Literature review: Economic integration and business cycle synchronisation

In economic theory, the effect of economic integration on business cycle co-movement is ambiguous. A substantial literature has investigated the effect of trade linkages on business cycle synchronisation. Frankel and Rose (1998) empirically showed that increased trade integration leads to greater convergence in business cycles by allowing aggregate demand shocks to spread more easily across borders. Such spillover effects can also occur through changes in the relative prices of factors and products. For example, a change in the relative price of labour-intensive goods, resulting from a positive shock in an economy, can spill over to higher wages and employment in other countries through free trade (Kraay & Ventura, 2007). Following the seminal paper by Frankel and Rose (1998), many empirical studies have confirmed that trade intensity increases business cycle synchronisation, albeit at varying degrees, depending on country-specific economic structures (e.g. Baxter & Kouparitsas, 2005; Imbs, 2004; Inklaar, Jong-A-Pin & de Haan, 2008).

However, free trade may not necessarily lead to convergence in cross-country business cycles if stronger trade linkages induce the specialisation of production. Kose and Yi (2002) argued that increased trade linkages would encourage countries to specialise in certain types of production and that increased inter-industry specialisation across countries would decrease the co-movement of international business cycles. In this context, it is not just the size of trade, but also the similarities in industrial structures, that would be important in explaining output co-fluctuations.

A few related studies have focused specifically on the similarity of production structures as an important determinant of output co-movements. They showed the effect of industrial structure in cross-border spillovers through the trade channel. Industry-specific shocks can cause more business cycle synchronisation among countries with similar production structures. Clark and van Wincoop (2001), Imbs (2004) and Shin and Wang (2004) provided evidence that greater similarity in industry structure is associated with more synchronicity in output and employment. Imbs (2004) emphasised that when bilateral trade is driven more by intra-industry trade than by inter-industry trade, output co-movement tends to strengthen.

The effect of financial integration on output co-movement is even more controversial. Financial integration can help increase the efficiency of financial resource allocation across countries, for example, by moving capital from a country with a negative shock to one with a positive shock, implying a negative output correlation. Kalemli-Ozcan, Sørensen and Yosha (2003) demonstrated that better risk sharing through greater financial integration can lead to higher specialisation of production and, hence, less symmetric output fluctuations. Heathcote and Perri (2004) presented evidence that higher financial integration can lead to a decline in the correlation of output in a two-country, two-good model.

However, Imbs (2006) empirically showed that a higher degree of financial integration leads to greater business cycle synchronisation between two economies. The empirical literature on financial crises and financial contagion has also tended to highlight the direct and positive effects of financial integration on business cycle synchronisation (Calvo & Reinhart, 1996; Claessens, Dornbusch & Park, 2001; Kose, Prasad & Terrones, 2003, 2007). Especially in a crisis context, with imperfect information or liquidity constraints, a flight to safety can cause investors to withdraw capital from many countries simultaneously, contributing to positive output correlation. Kim, Kim and Wang (2003) illustrated how shocks to capital flows generate positive business cycle correlation for countries in Asia and the Pacific. Kim and Kim (2013) also examined the role of capital market liberalisation in business cycle synchronisation among Asian economies by providing empirical evidence of the positive effect of international capital flows on output co-movement.

The effect of trade and financial linkages on business cycle co-movement hinges more broadly on socio-economic and policy factors, including cross-country differences in industrial structure, factor intensity, macro-economic policies and foreign exchange regimes. With increasingly globalised trade and financial settings, policymaking (particularly in regard to monetary policy) shows a tendency towards cross-country convergence. In general, greater integration may call for greater macro-economic policy cooperation across borders to more effectively manage spillovers and macro-economic interdependence.

The nature and extent of business cycle co-movement is ultimately an empirical question. Several studies have adopted dynamic factor models that decompose an economy's output fluctuations into contributions by different factors, such as global, regional and country-specific factors. Using various specifications of a dynamic factor model, Moneta and Ruffer (2006) found a significant common factor in outputs of 10 East Asian economies, not including the PRC and Japan. Their findings showed that the common factor was mainly the result of co-movements in exports, as well as some exogenous factors, such as the oil price and the JPY–USD exchange rate. However, cross-country spillover effects do not explain a large share of the co-movement in Asia.

Other empirical studies suggest that the business cycles of Asian economies have increasingly synchronised, partly as a result of deepened trade integration. Shin and Wang (2004) employed a panel regression to show that intra-industry trade is the major channel for business cycle convergence between the Republic of Korea and other Asian economies. Abeyasinghe and Forbes (2005) developed a structural VAR model to examine how a shock to a country would transmit to 11 Asian economies, as well as to the US and the rest of the Organisation for Economic Co-operation and Development (OECD). They estimated the multiplier effects of a shock using trading linkages, which are large and significant, although they differ from the predicted patterns using a bilateral trade matrix. Kim and Lee (2008) examined the extent of output interdependence among Asian economies, and between Asia and the world, using a VAR approach, and found that regional influence increased as much as global influence in Asian outputs after the Asian financial crisis (AFC) of 1997–98.

Overall, the empirical studies suggest varying degrees of macro-economic interdependence in Asia, depending on the choice of empirical methodology and measures of integration. Although recent studies have found evidence of increasing output interdependence among Asian economies, especially after the AFC, the results remain inconclusive as to whether the outputs of Asian economies have become more independent and decoupled from those of the industrialised economies. Helbling et al. (2007) and Kose, Otrok and Prasad (2008) found that global and regional common shocks have accounted for a sizeable fraction of business cycle fluctuations in both industrial countries and emerging market economies, but that the relative importance of global factors has decreased while that of regional factors has increased. This result provides support for

the decoupling, or divergence, of business cycles between industrialised countries and Asian economies. However, Kim, Lee and Park (2009) provided empirical evidence to support the ‘recoupling’, rather than decoupling, of Asian economies with major advanced countries, as their findings indicated that economic interdependence between Asian and major advanced economies increased significantly after the AFC.

Trade and financial linkages

Intra-Asian trade: The PRC’s role and vertical supply networks

Trade is often considered an important channel through which economic shocks are transmitted from one country to another. Export-driven growth may expose countries to the economic conditions of their trading partners and external market environments. EEA has achieved rapid economic expansion over the past few decades, underpinned by strong export performance. Its export-to-GDP ratio rose rapidly from 25 per cent in 1985 to a peak of 46 per cent in 2006, before declining steadily to 29 per cent in 2015. The region’s average ratio over 1985–2015 was 35 per cent, much higher than the world average of 19 per cent, attesting to the export-oriented growth strategy in the region.

EEA’s high reliance on exports has been accompanied by significant progress in diversifying its export base. Figure 4.1 shows the composition of EEA’s exports by destination. The geographical composition of Asia’s export market has become much more diversified, with the share of the single largest market, the US, at only 14 per cent in 2015, down from 23 per cent in 1990. The G3 economies collectively accounted for 29 per cent of EEA’s total exports in 2015, down from almost 50 per cent from 1990. In contrast, EEA’s exports to other developing economies (Africa, Latin America and the Middle East) rose from only 5 per cent to 12 per cent.

Figure 4.1: Destination of EEA exports (percentage of total exports)

EEA = emerging East Asia; AXC = EEA excluding PRC; ROW = rest of the world; PRC = People's Republic of China; US = United States.

Note: EEA includes ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand), NIE (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China) and the PRC.

Source: Park (2017).

Greater diversification in the destination of Asian exports suggests that an idiosyncratic demand shock from a single market may be mitigated, to some extent, by stronger growth in other export markets. At the same time, the share of intra-regional trade of EEA economies in total exports rose from 32 per cent in 1990 to around 41 per cent in 2015. The PRC now accounts for around 30 per cent of EEA's intra-regional exports, up from 20 per cent in 1990. Strong growth in intra-regional trade, including with the PRC, has been regarded as evidence of EEA's greater resilience to cyclical fluctuations in the major trading partners outside the region.

However, changing demand conditions in the world's major economies—particularly the US—appear to remain a dominant factor in EEA's export growth. Figure 4.2 demonstrates the close relationship between US non-oil import growth and Asian export growth. The US non-oil imports account for about 60 per cent of total G3 non-oil imports, and are highly synchronised with the movements of G3 non-oil imports. Consequently, the correlation between EEA exports and G3 non-oil import growth should be quite significant. Although the share of G3 markets in Asia's total export market is declining, Figure 4.2 indicates that the relationship has strengthened; the decadal correlations between the growth rates of US non-oil imports and Asian exports confirm that this linkage is significant and tighter in the 2000s.

Figure 4.2: Correlation between growth in EEA exports and US non-oil imports

EEA = ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand); NIE (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China) and the People's Republic of China; RHS = right-hand side.

Note: Non-oil imports are calculated by subtracting crude oil imports from the total import of goods.

Source: Park (2017).

Underlying this strong linkage is the nature of intra-Asian trade, which is driven by the vertical integration of production chains, the final outputs of which are destined for markets outside the region. Figure 4.3 shows a breakdown of EEA exports based on exports destined for other countries within the region and those going elsewhere, based on the global value chain (GVC) database. The database was accessed from the multiregion input–output tables of the Asian Development Bank (ADB), using the methodology from Wang, Wei and Zhu (2014).³ Intra-regional trade within EEA is then decomposed into production inputs and the region's final demand. A similar decomposition is made for trade with the rest of the world. For both decompositions, total final demand is derived for different regions, which takes into account the trade of intermediate goods in the production process for final demands. Based on our estimates, about 41.9 per cent of total EEA exports (instead of the about 29 per cent of total exports shown above) are eventually consumed by G3 countries.

3 The input–output tables of Bangladesh, Malaysia, the Philippines, Thailand and Vietnam were constructed by the ADB, while the rest of the input–output tables were sourced from the world input–output database. While both sets of tables have been constructed in a clear conceptual framework on the basis of officially published input–output tables in conjunction with national accounts and international trade statistics, level numbers are likely to remain different from those officially released by the respective economies.

The results show that G3 countries remain the main export destinations for final goods that leave EEA when taking into account the share of intermediate goods trade that is for assembly and production within the region, but which are eventually shipped out of the region as final goods.

Figure 4.3: Value-added export decomposition—EEA, 2011

EEA = emerging East Asia; ROW = rest of world; G3 = US, EU and Japan; Value-added export decomposition = Domestic value-added + Returned domestic value. Values for the People's Republic of China are presented in red and in parentheses.

Source: Park (2017).

As a vast majority of intra-Asian trade stems from extra-regional demand, the growth of the intra-regional trade share in total emerging Asian exports does not necessarily indicate EEA's independence from an external demand shock. On the contrary, to the extent that intra-regional trade is driven by intra-industry processing and assembly through vertically integrated production chains, EEA exports remain highly sensitive to a shock from outside the region, especially one from the major advanced economies. The effect on Asian exports of the global slowdown, following the GFC, which originated from the US subprime mortgage sector and its ripple effects through the global financial system, was a vivid example of such sensitivity.

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2014) reported that strong growth in intra-firm and intra-industry trade through the vertical supply networks of multinational companies has boosted Asian trade both intra-regionally and inter-regionally. It suggested that regional production-sharing networks, allowing multinational companies to take advantage of specific local conditions and low-cost labour, may have contributed to the development of the intra-regional trade of intermediate goods destined for final consumption outside the region.

The PRC, as the region's main production base, has been at the centre of this growing intra-industry and intra-regional trade. In just two decades, between 1985 and 2015, the PRC's exports grew from US\$27 billion to US\$2,281 billion, while its imports grew from US\$42 billion to US\$1,602 billion. During this period of rapid growth, the pattern of PRC trade changed drastically. In the 1990s, the share of G3 markets steadily increased, reaching 50 per cent of total PRC exports by 2000, before declining gradually to around 35 per cent in 2015. Meanwhile, the PRC imported more than half of its total imports from Japan and EEA in the 1990s, although their collective share has fallen below 50 per cent in the past decade. However, from about 2000, the PRC has notably diversified its export and import partners, as the rest of the world takes up an increasing share of its total exports and imports (Figure 4.4).

Figure 4.4: People's Republic of China export and import share, by trading partner

ASEAN-4 = Indonesia, Malaysia, the Philippines and Thailand; EU = European Union; NIE = Hong Kong (China), the Republic of Korea, Singapore, Taipei (China); ROW = rest of world; US = United States.

Source: Park (2017).

The basic pattern of the PRC's trade in the 1990s was characterised by the export of processed consumption goods to the US and EU, and the import of large volumes of processed intermediate and capital goods from regional economies. However, since the mid-2000s, the PRC has emerged as a major importer of primary commodities from the rest of the world, whereas processed intermediate and capital goods, rather than consumer goods, are leading its exports.

This changing trade pattern is well captured by the trend in the type of commodity exports and imports by the PRC (Figure 4.5). For example, about 70 per cent of the PRC's total imports consisted of primary and processed intermediate goods in the 1990s. By 2015, this rose to more than 75 per cent, with the share of primary intermediate goods expanding faster than that of processed intermediate goods, suggesting an increase in the PRC's self-production of intermediate goods. Most of the PRC's exports were processed consumption and intermediate goods in the 1990s, but the share of capital goods in the PRC's total exports increased from 17 per cent to about 30 per cent between 2000 and 2015, whereas processed consumption goods fell from 44 per cent to 30 per cent.

Figure 4.5: People's Republic of China export and import share, commodity groups

Note: Based on broad economic categories.

Source: Park (2017).

The analysis highlights a notable change in the pattern of the PRC's trade. There has been a gradual decline in the PRC's imports of processed intermediate goods from other Asian economies, whereas the PRC has increased imports of primary intermediate goods from the rest of the world. This suggests that the PRC has been increasingly internalising the manufacturing input supply in the GVC. The PRC also exports an increasingly large share of capital foods, suggesting that its manufacturing production is becoming more sophisticated and higher value-added. Athukorala and Ravenhill (2016) noted similar trends using the UN Comtrade data for PRC exports in different product categories. They observed that the PRC is deepening the domestic supply base for its exports, which may have reduced its import dependence on other Asian economies. Their study also noted that, although the PRC's exports have become much more geographically diversified, the US and EU remain important as export destinations.

The trade—FDI nexus: Global production sharing in Asia

FDI has played an important role in promoting intra-regional and inter-regional trade of host countries. The growth in inward FDI to EEA has been remarkable, rising from US\$22 billion in 1990 to US\$426 billion in 2015. Excluding the PRC, the region attracted US\$290 billion in 2015, up from US\$18 billion in 1990. The EEA region has been the largest recipient region in the world, attracting almost a quarter of global FDI.

The pattern of inward FDI to Asia reveals that firms' motivations for FDI are different to those for the rest of the world. Firms can enter the market (i) to avoid trade barriers and gain better access to local markets by undertaking the same production activities in multiple countries (horizontal FDI), or (ii) to lower production costs by relocating different stages of production to the country with the least cost (vertical FDI). More foreign affiliates in Asia established by FDI tend to be engaged in trade and investment for the purpose of re-exporting intermediate and final goods to countries outside the host country (vertical and export-platform FDI) than is the case in other developing regions.

Rapid expansion of FDI to EEA has been closely associated with the establishment of regional production networks by multinational companies, especially with the PRC as the region's main assembly and production hub, to create positive spillovers for the rest of the regional economies (Fukao, Ishido & Ito, 2003; Kawai & Urata, 2004; Eichengreen & Tong, 2005; ADB, 2006). Indeed, based on the number of foreign affiliates in Asia that both import and export, the PRC is the most popular host for vertical and export-platform FDI (Table 4.1) with various parent economies. By sector, inward FDI from trade-oriented firms is mostly concentrated in manufacturing, except in Hong Kong, China, where it mostly goes to business services (Table 4.2).

Table 4.1: Most common economy pairs for trade-oriented FDI firms

Destination	Origin	Number of FDI firms that import and export	% of total FDI firms
1. PRC	Japan	2,260	81
2. PRC	Hong Kong, China	1,314	76
3. PRC	US	646	74
4. PRC	Germany	625	76
5. PRC	Taipei, China	401	79
6. PRC	Korea, Rep. of	358	86

Destination	Origin	Number of FDI firms that import and export	% of total FDI firms
7. PRC	Singapore	337	71
8. Vietnam	Japan	306	72
9. Thailand	Japan	258	64
10. Indonesia	Japan	214	53
11. Taipei, China	Japan	212	74
12. PRC	France	177	77
13. Malaysia	Japan	175	78
14. Philippines	Japan	171	69
15. Singapore	Japan	164	54

PRC = People's Republic of China.

Source: ADB (2016).

Table 4.2: Inward FDI from trade-oriented FDI firms—EEA economies, by sector

Host economies	Mining	Manufacturing	Business services
PRC	0.005	0.980	0.014
Indonesia	0.005	0.796	0.200
Malaysia	0.020	0.955	0.022
Thailand	0.031	0.958	0.010
Vietnam	0.005	0.989	0.006
Hong Kong, China	0.008	0.311	0.674
Korea, Rep. of	0.035	0.930	0.030
Singapore	0.019	0.682	0.276
Taipei, China	0.027	0.918	0.055
India	0.012	0.587	0.399
Japan	0.014	0.784	0.201
Australia	0.053	0.828	0.114

PRC = People's Republic of China.

Note: Each row shows the fraction of foreign affiliates that export and import in country *i* in each sector. Rows may not exactly sum to one owing to statistical discrepancies.

Source: ADB (2016).

Table 4.3 highlights an important issue regarding the headquarters of parent companies and the activity of their foreign affiliates operating in EEA. Foreign affiliates with an EEA parent company, although limited in number, are much more likely to be engaged in international trade than are affiliates with non-East Asian parent companies. The effect arises from foreign affiliates of parent companies from high-income East Asian

economies (known as NIE [newly industrialised economies]). However, even foreign affiliates of middle-income South-East Asian multinationals are more engaged in international trade than those belonging to multinationals from outside Asia.

Table 4.3: Number of FDI firms by parent economy

Parent economy/region	Total number of FDI firms	Proportion that imports & exports (%)
Emerging East Asia	47,057	36.2
PRC	31,298	31.6
ASEAN-4	2,788	30.4
NIE	12,971	48.4
Rest of world	183,073	9.9
India	52,009	11.2
Japan	104,066	6.3
US	3,369	41.4
EU	6,128	48.4

Note: Based on global ultimate headquarters.

Source: Based on data from Ramondo (2016).

Strong trade and FDI linkages can be a channel for shock transmission. As the PRC has emerged as an important hub for intra-industry and intra-regional trade and investment in Asia, it is likely that economic interdependence between the PRC and the rest of Asia has also increased.

Financial integration and spillovers

Financial integration, in theory, offers many benefits, including better consumption smoothing through international risk sharing, more efficient allocation of capital for investment and enhanced macro-economic and financial discipline (Park & Lee, 2011). However, in practice, tighter financial linkages also generate a higher risk of cross-border financial contagion, as illustrated by the episodes of financial crisis.

Financial market integration is another important channel for shock transmission and a determinant of business cycle synchronisation. Therefore, the degree of financial integration among EEA equity and bond markets is empirically investigated, in terms of both quantity and prices.

With greater capital account openness, the shares of international portfolio assets and liabilities held by Asian economies have increased. Figure 4.6 shows the trend of the cross-border portfolio asset holdings of AXC countries by region since 2001, based on the International Monetary Fund's (IMF) coordinated portfolio investment survey data.⁴ The value of the region's foreign portfolio asset holdings surged from US\$331.9 billion in 2001 (2.6 per cent of the world's total foreign portfolio assets) to US\$2.6 trillion (5.6 per cent) in 2015. When the value is scaled by GDP, the size of AXC's foreign asset holdings increased from 26.3 per cent of GDP in 2001 to 67.7 per cent in 2015.⁵

Figure 4.6: AXC's cross-border portfolio asset holdings (US\$ billion)

AXC = emerging East Asia excluding PRC; PRC = People's Republic of China.

Note: AXC includes Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand. The PRC is not included because it only commenced reporting portfolio holdings in the first half of 2015.

Source: Park (2017).

The data on the asset holdings of a country can be also interpreted as liabilities by the counterpart country. For example, the Republic of Korea's holding of financial assets in Thailand can be interpreted as Thailand's liability to Korea. Figure 4.7 illustrates EEA's financial liabilities by

4 The coordinated portfolio investment survey is a voluntary data collection exercise conducted under the auspices of the IMF that collects an economy's data on its holdings of portfolio investment securities. Data are separately requested for equity and investment fund shares, long-term debt instruments and short-term debt instruments.

5 The PRC began reporting portfolio holdings in the first half of 2015. If the PRC's data is included, the value of EEA's foreign portfolio asset holdings for 2015 is US\$2.9 trillion (6.2 per cent of world foreign portfolio assets). When the value is scaled by GDP, the size of EEA's foreign asset holdings is 19.4 per cent in 2015.

their geographic destinations since 2001. The US and the EU comprise the major share of EEA's financial liabilities, which makes the region vulnerable to changes in their financial conditions. For example, during the GFC, tightening credit conditions in the US and the EU prompted repatriation of their investment funds in EEA.

Figure 4.7: EEA's cross-border portfolio liabilities (US\$ billion)

EEA = emerging East Asia; AXC = EEA excluding PRC; PRC = People's Republic of China.

Note: EEA includes the PRC; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; and Thailand.

Source: Park (2017).

Hong Kong (China), the Republic of Korea and Singapore are the three largest investors among the EEA economies. In 2015, Hong Kong held international portfolio assets of approximately US\$1.3 trillion, or 2.7 per cent of world total international portfolio assets, Singapore held US\$962 billion and the Republic of Korea held US\$236 billion. On average, an individual EEA economy held foreign portfolio assets worth US\$359 billion in 2015, which is much lower than the US\$738 billion average for an economy that is part of the EU.⁶

The EEA region's foreign portfolio asset holdings have become more geographically balanced since 2001. If EEA financial markets have become more regionally integrated, then a higher share of financial assets

6 EU member economies included in the database are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the UK. Data for Croatia are not available. Data for Ireland are not included because there are no data for 2015.

should be traded within the region and held by regional investors. The share of the EU and US economies as a percentage of EEA's total foreign assets has declined from 48 per cent in 2001 to 34.8 per cent in 2015 (32.8 per cent for AXC), whereas the share of the PRC and the rest of the world increased substantially during this period, from 34.8 per cent to 51.8 per cent (55.3 per cent for AXC). EEA's foreign portfolio assets are increasingly being invested in the region. Regional portfolio asset holdings increased from 14.7 per cent to 26.4 per cent from 2001 to 2015, with a large share invested in the PRC. Excluding the PRC, regional asset holdings are rather low and steady (they declined from 11.7 per cent of EEA's total foreign asset holdings in 2001 to 11.0 per cent in 2015).

The sharp increase in EEA's international portfolio asset holdings suggests a greater degree of financial openness and integration—both regionally and globally. However, the pace of financial integration in emerging Asia still lags behind that in Europe. The international portfolio asset holdings of an average EEA economy in 2015 were 19.4 per cent of its GDP, which is very low compared to the average EU country's holdings of 119 per cent of GDP. Moreover, the share of EEA's portfolio assets (both equities and debt securities) in the total international portfolio asset holdings of EEA in 2015 was much lower (26.1 per cent) than that of EU asset holdings of EU economies (61.4 per cent).

If financial markets are fully integrated, assets with similar risk characteristics should be priced similarly (after adjusting for risks). In other words, greater financial integration should be accompanied by the closer co-movement of financial asset prices. The data used to measure the degree of co-movement of financial asset returns comprise benchmark stock prices and bond return indexes, both sourced from Bloomberg. Correlations were computed between EEA and Japan and between the Eurozone and the US, as well as within EEA economies. For stock market returns, weekly log differences of benchmark stock price indexes were calculated to obtain continuously compounded weekly total returns from 1 January 1990⁷ to 19 August 2016. For bond returns, the total return indices of the JP Morgan Asia Diversified⁸ were used for EEA, and Bloomberg Barclays indices were used for G3 economies.

7 For Singapore and the Eurozone, the data series started from 31 August 1999 and 31 December 1996, respectively.

8 JP Morgan Asia Diversified is a suite of indices that tracks local currency government bonds issued by emerging and developed Asian countries (excluding Japan). See www.jpmorgan.com/country/PH/en/detail/1320549416493

Similarly to stock market returns, weekly log differences were computed for bond return indexes from 31 December 2004⁹ to 31 August 2016. Using weekly—as opposed to daily—data can help to avoid the potential problem of non-synchronous data.

Table 4.4 presents the simple correlations in equity and debt markets computed over the full sample period, together with sub-samples that exclude crisis periods. Correlation coefficients of EEA stock markets' returns with advanced economies increased sharply following the AFC, and continued after the GFC. Intra-regional correlation among the EEA economies also increased. These results illustrate the significant spillover effects of the crisis on EEA markets and their increased financial integration with advanced economies after 1998. In particular, remarkable increases in financial market correlations are noted for AXC and the PRC. Correlation of EEA bond market returns for EEA and G3 economies also rose after the GFC, although both intra- and inter-regional correlations remained generally lower than those of the stock market.

To account for the time-varying dynamics¹⁰ of financial market correlations, especially during episodes of financial crisis, we employ a simple model of dynamic conditional correlation (DCC).¹¹ The DCC model, developed by Engle (2002), Engle and Sheppard (2001) and Tse and Tsui (2002), is a dynamic specification based on conditional correlations within generalised autoregressive conditional heteroskedasticity (GARCH) or multivariate autoregressive conditional heteroskedasticity (ARCH) models. It is a recent method allowing simultaneous modelling of variances and conditional correlations of several series.

9 The data series for the Philippines started from 1 February 2008.

10 The descriptive statistics for the EEA economies indicate that the variances of the different series' returns nearly increased during the crisis. All series' returns are not normally distributed (Skewness $\neq 0$ and Kurtosis $\neq 3$).

11 The dynamic correlations are constructed as follows:

$$R_t = (1 - \alpha - \beta) \bar{R} + \alpha (\varepsilon_{i,t-1} \varepsilon_{j,t-1}) + \beta R_{t-1}$$

where α and β are key scalar parameters to be estimated and R_t is the time-varying correlation matrix, the elements of which are defined as follows:

$$\rho_{i,j,t} = q_{i,j,t} / \sqrt{q_{ii,t} q_{jj,t}}$$

where $\bar{R}$ is the unconditional expectation of $\varepsilon \varepsilon'$; $\rho_{i,j,t}$ is the conditional correlation between the asset returns of countries i and j at time t and $q_{i,j,t}$ is the off-diagonal elements of the variance-covariance matrix.

Table 4.4: Simple correlations in financial asset returns

	Full sample	Pre-AFC	Pre-GFC	Post-GFC
Equity market returns				
EEA–EEA	0.39	0.23	0.36	0.53
AXC–PRC	0.12	0.02	0.08	0.31
EEA–JPN	0.36	0.16	0.36	0.45
EEA–Eurozone	0.44	0.22	0.38	0.52
EEA–US	0.39	0.20	0.36	0.57
Bond market returns				
EEA–EEA	0.23	—	0.10	0.28
AXC–PRC	0.13	—	-0.01	0.17
EEA–JPN	0.17	—	0.15	0.20
EEA–Eurozone	0.21	—	0.23	0.24
EEA–US	0.25	—	0.17	0.29

AFC = Asian financial crisis; GFC = global financial crisis; JPN = Japan; EEA = emerging East Asia; AXC = EEA excluding the People's Republic of China.

Note: Owing to data constraints, EEA countries' bond market returns only include Indonesia, Malaysia, the Philippines, Thailand, the Republic of Korea, Singapore and the People's Republic of China.

Source: ADB calculations, using data from Bloomberg LP.

The estimation consisted of two steps. First, the conditional variance of each variable was estimated using a univariate ARCH procedure. Second, the standardised regression residuals obtained in the first step were used to model those conditional correlations that vary through time. The analysis attempted to infer how the region's financial markets moved in relation to financial fluctuations in these systemic countries.

Figure 4.8 shows that the relationship between EEA equity returns and the three major economies' equity returns strengthened post-AFC and continued to do so pre-GFC. After the GFC, the relationship slightly weakened but it eventually recovered to pre-GFC levels. The results also show that conditional correlations among EEA economies, especially between AXC and the PRC, have visibly strengthened since the AFC. Figure 4.9 illustrates that the conditional correlations of EEA bond returns are generally lower than those of equity returns and that they have been relatively steady—although they increased slightly in the post-GFC period.

Figure 4.8: Dynamic conditional correlations of equity market returns—EEA

EEA = emerging East Asia; AXC = EEA excluding PRC; PRC = People's Republic of China; JPN = Japan; US = United States.

Source: Park (2017).

Figure 4.9: Dynamic conditional correlations of bond market returns—EEA

EEA = emerging East Asia; AXC = EEA excluding PRC; PRC = People's Republic of China; JPN = Japan; US = United States.

Source: Park (2017).

Business cycle synchronisation and macro-economic interdependence

It is likely that deepening trade and financial linkages will influence the degree of macro-economic interdependence. Business cycle synchronicity may change over time, subject to the effects of trade openness, financial liberalisation and institutional set-ups, such as regional trade and investment agreements. Hirata, Kose and Otrok (2013) suggested that business cycle movements are driven by a combination of global, regional and country factors, and that the strength of each component can influence the degree of business cycle synchronisation at global and regional levels. The recent trends in Asia's global and regional trade and financial linkages suggest a stronger influence of both global and regional components in driving its business cycle. However, the progress of regional trade, financial integration and regional institution building, especially in Asia, could facilitate business cycle synchronisation more at regional levels than at the global level.

Asia's business cycle correlations within and beyond the region

This section examines the evolution of business cycle co-movements between EEA, the PRC and major industrialised economies. Figure 4.10 illustrates the correlations of quarterly real business cycles in EEA with Japan, the EU and the US, as well as among sub-regional groupings within EEA, using 12-quarter (three-year) moving averages. For example, the correlation in 2015Q4 is calculated as the average correlation between EEA and the US over a 12-quarter period ending in 2015Q4. Figure 4.10 also presents the average of the bilateral correlations within EEA and between EEA and G3 economies in the sample over three periods: (i) pre-AFC (1985Q1–1997Q1), (ii) pre-GFC (1999Q1–2007Q3) and (iii) post-GFC (2009Q3–2016Q2) to separate out the effect of the crisis on the business cycle co-movements.

Pre- and post-GFC can be also grouped as post-AFC (see Figure 4.10). The correlation analysis shows that business cycle correlations between EEA and G3 economies increased visibly in the post-AFC period, but generally declined post-GFC. EEA's intra-regional business cycle correlations also increased in the post-AFC period, but decreased slightly

post-GFC. The results also show that the co-movement between the business cycles of the PRC and the rest of EEA increased in the post-AFC period, but weakened in the post-GFC period.

Figure 4.10: Business cycle correlations—EEA

AFC = Asian financial crisis; AXC = EEA excluding PRC; EEA = emerging East Asia; EU = European Union; GFC = global financial crisis; JPN = Japan; PRC = People's Republic of China; US = United States.

Note: EEA includes ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand), NIE (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China) and the PRC. Three-year moving correlations are based on cyclical Hodrick–Prescott filtered, seasonally adjusted gross domestic product at constant prices.

Source: Park (2017).

Instead of average three-year moving bilateral correlations, the instantaneous quasi-correlation measure is also employed to remove the lagged effects of the financial crises that occur in moving averages when correlations are calculated over rolling windows of three years.¹² This measure was first proposed by Abiad, Furceri, Kalemli-Ozcan and Pescatori (2013) and used in Duval, Cheng, Oh, Saraf and Seneviratne (2014). Using annual data on real GDP growth rates, quasi-correlations within EEA and between EEA and Japan, the EU and the US since 1985 are depicted in Figures 4.11 and 4.12.

Consistent with findings from similar studies, it was found that business cycle correlations increased sharply during crisis times (Figure 4.11). The largest spikes occurred around the AFC for the EEA region's

12 The instantaneous quasi-correlation measure of business cycle synchronisation is computed as:

$$QCORR_{ijt} = \frac{(g_{it} - g_i^*) * (g_{jt} - g_j^*)}{\sigma_i^g * \sigma_j^g}$$

where $QCORR_{ijt}$ is the quasi-correlation of the real GDP growth rates of countries i and j in year t ; g_{it} denotes the output growth rate of countries i and j in year t ; and g_i^* and g_j^* represent the mean and standard deviation of the output growth rate of country i , respectively, during the sample period. The growth rate is the first difference of the log of real GDP (see Abiad et al., 2013; Duval et al., 2014).

economies, with correlations increasing intra-regionally for EEA and between AXC and the PRC. The region's business cycle correlations with the EU and the US were largest during the GFC. During normal times (excluding the crisis period), the instantaneous quasi-correlations were much smaller in general.

However, Figure 4.12 shows an increase in instantaneous quasi-correlations between EEA and the PRC, Japan and the EU after the GFC. The instantaneous quasi-correlation with the US increased after the AFC but declined after the GFC. The intra-regional correlation declined after the AFC, although it climbed higher after the GFC. Among the sub-regional groupings of EEA, the high-income NIE economies show particularly high business cycle correlations both intra- and inter-regionally.

Figure 4.11: Median instantaneous quasi-correlations of real GDP growth rates—EEA

AXC = EEA excluding PRC; EEA = emerging East Asia; GDP = gross domestic product; PRC = People's Republic of China; EU = European Union; JPN = Japan; US = United States.

Note: AXC includes the ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand) and NIE (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China). Based on the methodology of Abiad, Furceri, Kalemli-Ozcan and Pescatori (2013).

Source: Park (2017).

Business cycle synchronicity may increase during crisis periods because economies are exposed to common shocks. However, shocks that originate in one economy could also transmit to other economies. The analysis of various correlation measures suggests relatively stronger business cycle co-movements within EEA and between EEA and G3 economies after the AFC compared with the pre-AFC period, which is in line with previous studies (see Helbling et al., 2007; Kose et al., 2008).

Figure 4.12: Instantaneous quasi-correlations of real GDP growth rates—EEA (excluding crisis periods)

AFC = Asian financial crisis; AXC = EEA excluding the PRC; EEA = emerging East Asia; EU = European Union; GDP = gross domestic product; GFC = global financial crisis; JPN = Japan; PRC = People's Republic of China; US = United States.

Note: Pre-AFC covers 1985–96, pre-GFC covers 1999–2007 and post-GFC 2010–15. EEA includes ASEAN-4 (Indonesia, Malaysia, the Philippines and Thailand), NIE (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China) and the PRC. Based on the methodology from Duval, Cheng, Oh, Saraf and Seneviratne (2014) and Abiad, Furceri, Kalemli-Ozcan and Pescatori (2013).

Source: Park (2017).

The business cycle correlations declined somewhat in the 2000s, but increased again during the GFC. Our findings support the growing importance of regional components, especially of the PRC, in business cycle synchronicity. The correlations of the region's business cycles with those of the PRC increased following the AFC and were even more marked than those with the G3 after the GFC. International business cycle correlations are generally much higher for NIE countries, which are

more open to international trade and finance. The results also indicate the growing economic influence of the region's major economies (the PRC and Japan) in recent years.

Vector auto-regression model and results

A VAR model is employed to examine the inter- and intra-regional macro-economic interdependence of EEA over three different sample periods, reflecting the ongoing changes in the region's trade, investment and financial linkages within and beyond the region. VAR models can identify the relevant structural shocks—including those arising from US output, global financial risk (as measured by the Volatility Index (VIX) of the Chicago Board Options Exchange¹³), global trade volume growth, PRC output (as a proxy for regional shock) and the output of individual AXC economies—and analyse the effects of each shock on an individual variable in a systematic way.

Assume that an economy, i ($i=1, 2, \dots, 10$), is described by the following structural form equation:

$$G(L)y_t^i = d^i + e_t^i, \quad (1)$$

where $G(L)$ is a matrix polynomial in the lag operator Λ , y_t^i is an $m \times 1$ data vector, d^i is an $m \times 1$ constant matrix, m is the number of variables in the model and e_t^i denotes a vector of structural disturbances (Kim et al., 2011).

By assuming that structural disturbances are mutually uncorrelated, $\text{var}(e_t^i)$ can be denoted by Λ , which is a diagonal matrix, in which the diagonal elements are the variances of structural disturbances. The individual fixed effect, d^i , is introduced to control for the country-specific factors that are not included in the model. We are interested in examining the time-series relationship. Therefore, by including the individual fixed effects, we exclude the cross-sectional information in the estimation. We estimate the following reduced form VAR with the individual fixed effects:

13 VIX is the implied volatility of S&P 500 index options calculated by the Chicago Board Options Exchange. It is quoted in percentage points and translates, roughly, to the expected movement in the S&P 500 index over the next 30-day period, which is then annualised. Often referred to as 'the fear index', the VIX represents the market's expectation of stock market volatility. VIX is a registered trademark of the Chicago Board Options Exchange.

$$y_t^i = c^i + B(L)y_{t-1}^i + u_t^i, \quad (2)$$

where c^i is an $m \times 1$ constant matrix and $B(L)$ is a matrix polynomial in the lag operator L .

There are several ways of recovering the parameters in the structural form equation from the estimated parameters in the reduced form equation. The identification schemes under consideration impose recursive zero restrictions on contemporaneous structural parameters by applying the Cholesky decomposition to the reduced form residuals, Λ , as in Sims (1980).

For each of the AXC economies, a five-variable VAR model is constructed, in which US denotes US output (a proxy for the output of advanced economies), VIX denotes the volatility index, wtrade denotes global trade volume growth, PRC denotes PRC output and AXC_i denotes the output of each East Asian economy, excluding the PRC. The contemporaneously exogenous variables are ordered first. The first three variables, US, VIX and wtrade, are included to examine the relationship among external factors, and the fourth variable, PRC, is a proxy for a regional shock. The last variable, AXC_i , is included to examine the effects of the local factors on the output of individual East Asian economies.

Some orderings of the variables can be regarded as more natural than others. US output, VIX, global trade growth and PRC output are treated as contemporaneously exogenous to each individual AXC country's output, which is far smaller than US or PRC output. US output, VIX and world trade growth are all global factors that should naturally be exogenous to AXC output. The PRC output is considered as a regional factor. The model assumes that the PRC output is unaffected by individual AXC economy output, but is affected by US output, global risk and world trade growth. In contrast, it is assumed that the three global factors are not affected by PRC output contemporaneously.

We use quarterly data and estimate the model for the period before the AFC (1987Q1–1997Q1) and after it (1999Q1–2016Q2). A constant term and four lags are assumed. Real GDP is used as the measure of output. As we are interested in business cycle phenomena, we exclude the trend from the data by applying a Hodrick–Prescott filter to give seasonally adjusted GDP at constant prices (Hodrick & Prescott, 1997).

Figure 4.13 reports the aggregate impulse responses of the external shocks on individual AXC business cycles for the periods pre- and post-crises (both AFC and GFC). The aggregate impulse responses are computed as the simple average of impulse responses across AXC economies.

Figure 4.13: Impulse responses of AXC business cycles to external shocks (x-axis = number of quarters, y-axis = % change in GDP)

AFC = Asian financial crisis; AXC = emerging East Asia excluding PRC; PRC = People's Republic of China; US = United States.

Note: Pre-AFC covers 1987Q1–1997Q1. Post-AFC covers 1999Q1–2016Q2. US, PRC and individual AXC economy business cycles are based on the Hodrick–Prescott filtered seasonally adjusted GDP at constant prices.

Source: Park (2017).

The results show that the effects of a US shock on individual AXC economies are quite substantial. Higher US output creates a positive and persistent boost to AXC output, an effect that appears to strengthen considerably after the AFC, although it lessens in the period after the GFC. In response to a US output shock prior to the crisis, AXC output increases by 0.09 per cent on impact, peaks at 0.13 per cent after the second quarter, then decreases and returns to the initial level after three quarters. After the AFC, the effect is much higher—peaking at 0.68 per cent and remaining more persistent—after six quarters.

Higher global risks, as measured by higher levels of the VIX, exert a negative effect on AXC output. Again, the negative effect appears to be larger and longer after the AFC than before it. It lasts for around three quarters before the crisis and two years after.

The effect of higher world trade growth on AXC output becomes more significant and positive after the AFC, although, after the GFC, the effect softens but becomes more persistent. This reflects the region's strong trade growth and export-driven economic recovery following the AFC and GFC. After the AFC, the positive effect is higher—at around 0.2 per cent—and it dies down after a year. The pick-up in the expansion of global/regional value chains, together with the region's strong exports in the aftermath of the crisis, might explain this positive effect.

Finally, a positive shock to PRC output—after controlling for the effect of global factors—has different effects on AXC output before and after the AFC. Prior to the crisis, the effect is negative, although small, and it lasts for around three quarters. After the crisis, the effect is positive and substantial, at around 0.3 per cent, and it is more persistent, lasting for more than a year. This shift from negative to positive effects of a PRC output shock may reflect a shift in the PRC's role in the region's production value chain, as well as its growing investment and financial market influence. In the past two decades, the PRC has become increasingly more integrated into the regional value chain in the process of increasing its domestic production for the region's value chain supplies and final consumption imports.

Figure 4.14 shows the share of AXC output variances (the average share across 10 quarters) resulting from global, regional and domestic factors. It reveals that shocks to domestic factors tend to explain most of the output variance in the pre-AFC period, although the effect has weakened post-AFC, falling from 57.6 per cent to 40.8 per cent (Figures 2.14a, 2.14b). Of the four external factors, the shares of US output and PRC output—as a proportion of output variance—increased the most after the AFC. The share of US output increased from 12.2 per cent to 26.4 per cent over the two periods, and that of PRC output increased from 7.2 per cent to 12.7 per cent. Among individual AXC economies, the effects of a US output shock increased sharply for Hong Kong, Taipei, Singapore and Thailand (see Appendix A). The effects of a PRC output shock are also large for Hong Kong, the Republic of Korea, Malaysia and Taipei.

Figure 4.14: Share of AXC output variances resulting from external and local factors (% , x-axis = number of quarters)

AFC = Asian financial crisis; AXC = emerging East Asia excluding PRC; PRC = People's Republic of China; GFC = global financial crisis; US = United States.

Note: Pre-AFC covers 1987Q1–1997Q1. Post-AFC covers 1999Q1–2016Q2. Pre-GFC covers 1999Q1–2007Q3. Post-GFC covers 2009Q3–2016Q2. US, PRC and individual AXC economy business cycles are based on the Hodrick–Prescott filtered, seasonally adjusted GDP at constant prices.

Source: Park (2017).

When we separate the post-AFC period into pre- and post-GFC periods, the shares of global trade and financial shocks in AXC output variance become much more prominent (Figures 2.14c, 2.14d). In the pre-GFC period, the combined share of global financial volatility and world trade growth is 42.7 per cent (26.3 per cent and 16.4 per cent respectively). In the post-GFC period, the share is 41.8 per cent, with the share of global volatility at 33.2 per cent and that of world trade growth at 8.5 per cent. The share of US output increased from 17.6 per cent in the pre-GFC period to 23.0 per cent in the post-GFC period, and the corresponding shares of PRC output rose from 12.1 per cent to 15.8 per cent. However,

the share of domestic factors declined from 27.6 per cent to 19.5 per cent. The influence of global volatility increased considerably in Indonesia, Malaysia, Taipei and Thailand in the post-GFC period (Appendix B).

Conclusion

Nearly two decades ago, a devastating financial crisis swept across South-East and East Asia. Today, EEA stands strong, with a remarkable record of high and sustained economic growth since the crisis. Its average annual growth in GDP reached 7.6 per cent over the past two decades. The strength of the region's exports, especially with the PRC at the centre of tight regional production networks, has underpinned this performance. The post-crisis economic recovery has been based on strong trade and financial openness, and deeper economic integration in EEA has led to an expectation that the region will gain greater macro-economic independence from the US economy and become an independent growth source for the world economy.

The findings of this study suggest that intra-regional trade and financial linkages are, indeed, strengthening, and that the actions of the PRC, in moving up in the GVC and increasing self-production of manufacturing inputs, may lead to a more independent source of global growth. However, the findings provide no supporting evidence for Asia's decoupling from the world economy from the current structural and cyclical viewpoints.

The expansion of Asia's trade and investment links is still driven by the region's structurally linked production network to global final demand. EEA has become more, not less, integrated with the global economy and, as a result, the effect of a global shock, whether related to trade or financial markets, will be greater. Further, deeper regional economic integration facilitates the transmission of shocks across the economies of the region.

The PRC exerts a growing influence on both regional and global economies with its sizeable economy, but its export-driven growth remains structurally linked to the demand from major industrial countries. To the extent that the PRC imports a large share of primary and processed intermediate goods to serve final demand in the G3 economies, a slowdown in the G3 could have a negative effect on the PRC's exports, which would, in turn, reduce the PRC's imports from the rest of Asia. At the same time, to the extent that FDI flows are related to intra-firm and intra-industry

trade to serve external demand, FDI flows are likely to be responsive to the prospect of export growth. A sharp fall in exports and, subsequently, a reduction in FDI may harm the PRC's economy and then spill over to the rest of Asia.

Asian business cycles remain sensitive to external shocks. It is important that Asian countries maintain a stable macro-economic environment of low inflation and prudent fiscal balances, with modest levels of debt to allow room for policymakers to undertake macro-economic stabilisation measures whenever necessary. Greater macro-economic interdependence, through tighter trade and financial linkages, also requires greater cooperation in trade, finance and exchange rate policies—both regionally and globally. As economic and financial shocks travel more rapidly from a country to its trading partners through increased trade and financial linkages, it is in the common interest of all Asian countries to maintain prudent national macro-economic management, while strengthening regional policy cooperation. Synchronisation of real growth and inflation in the region should generate common interests to ensure close cooperation in macro-economic and exchange rate policies.

The rapid integration of the PRC into the regional and global economies presents the rest of Asia with challenges and opportunities. The PRC's growing economy will play an increasingly vital role in promoting regional growth through the expansion of intra-regional trade and financial flows. Although some Asian exporters may face non-negligible adjustment costs as they find their comparative advantages changing as a result of growing competition from the PRC economy, sound macro-economic management and comprehensive structural reform will ultimately contribute to higher economic efficiency and productivity and, therefore, to greater economic welfare.

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Appendices

Appendix A. Share of output variances resulting from external and local factors—pre-AFC versus post-AFC (% , x-axis = number of quarters)

Figure A4.1: Hong Kong, China

Figure A4.2: Indonesia

Figure A4.3: Republic of Korea

Figure A4.4: Malaysia

Figure A4.5: Philippines

Figure A4.6: Singapore

Figure A4.7: Taipei, China

AFC = Asian financial crisis; AXC = emerging East Asia excluding PRC; PRC = People's Republic of China; US = United States.

Note: Pre-AFC covers 1987Q1–1997Q1. Post-AFC covers 1999Q1–2016Q2. US, PRC and individual AXC economy business cycles are based on the Hodrick–Prescott filtered, seasonally adjusted GDP at constant prices. TRADE refers to world trade growth.

Source: ADB calculations using data from Bloomberg LP, IMF (n.d.-c) and Oxford Economics (n.d.).

Appendix B. Share of output variances resulting from external and local factors—pre-GFC versus post-GFC (% , x-axis = number of quarters)

Figure B4.1: Hong Kong, China

Figure B4.2: Indonesia

Figure B4.3: Republic of Korea

Figure B4.4: Malaysia

Figure B4.5: Philippines

Figure B4.6: Singapore

Figure B4.7: Taipei, China

AFC = Asian financial crisis; AXC = emerging East Asia excluding PRC; PRC = People's Republic of China; US = United States.

Note: Pre-AFC covers 1987Q1–1997Q1. Post-AFC covers 1999Q1–2016Q2. US, PRC and individual AXC economy business cycles are based on the Hodrick–Prescott filtered, seasonally adjusted GDP at constant prices.

Source: ADB calculations using data from Bloomberg LP, IMF (n.d.-c) and Oxford Economics (n.d.).

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