ASIAN ECONOMIC INTEGRATION REPORT 2017

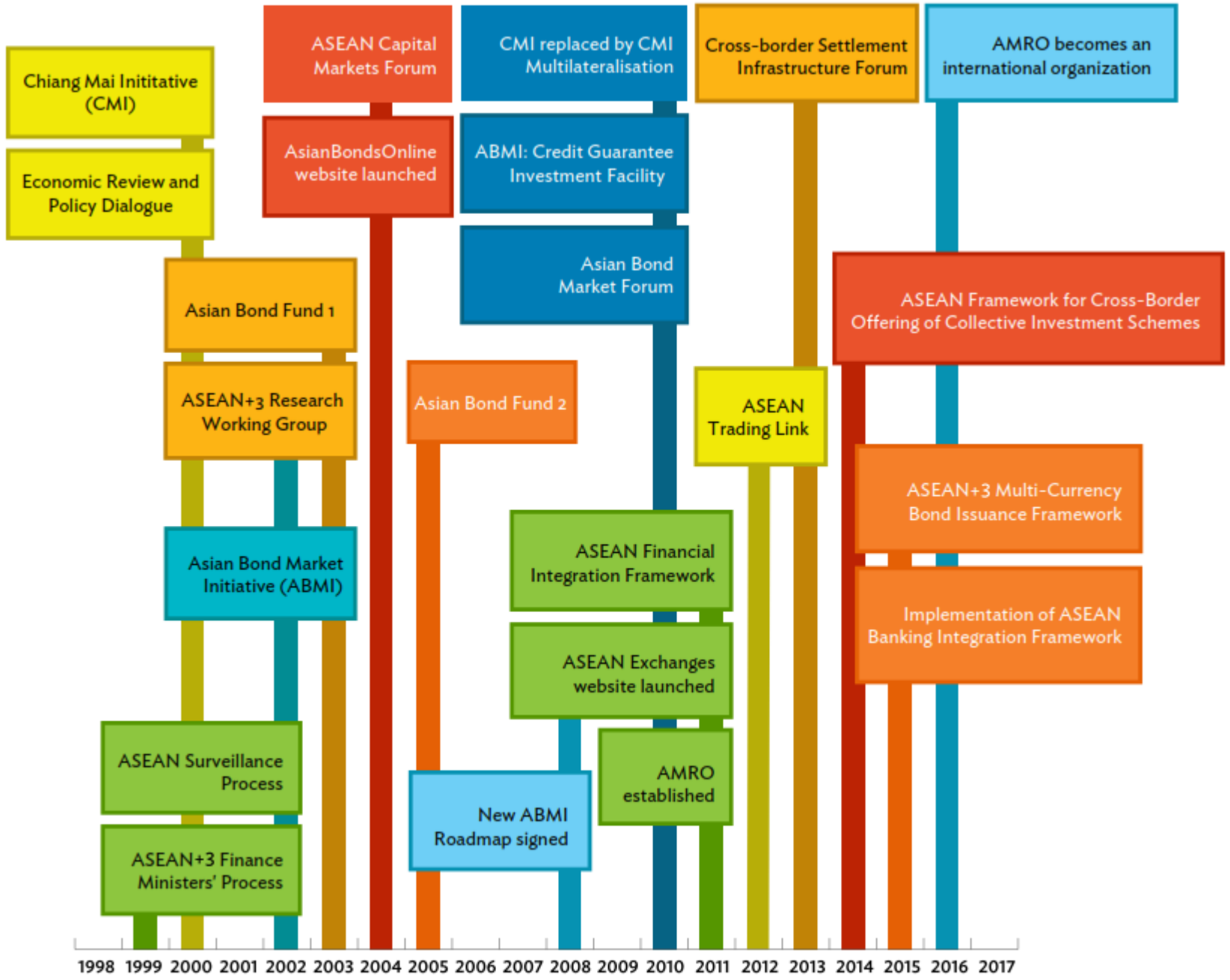
THE ERA OF FINANCIAL INTERCONNECTEDNESS
How Can Asia Strengthen Financial Resilience?

ASIAN DEVELOPMENT BANK

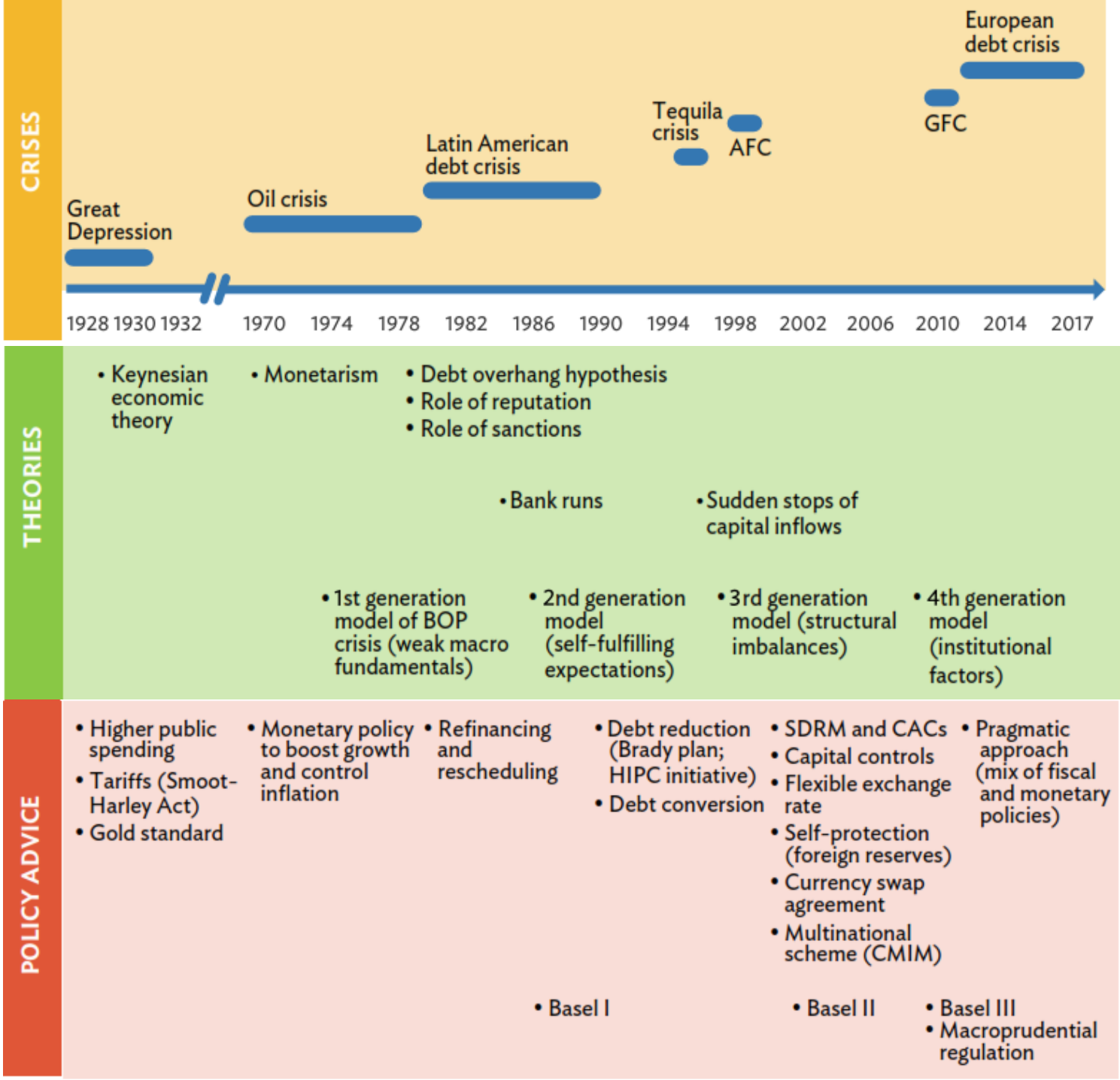
50 YEARS

ADB

Figure 8.15: Asia's Financial Integration Initiatives—Chronology



AMRO = ASEAN+3 Macroeconomic Research Office, ASEAN = Association of Southeast Asian Nations.
Source: Park et al. (2017)


CRISES
Great Depression
Oil crisis
Latin American debt crisis
Tequila crisis
AFC
GFC
European debt crisis
1928 1930 1932 1970 1974 1978 1982 1986 1990 1994 1998 2002 2006 2010 2014 2017
THEORIES
• Keynesian economic theory
• Monetarism
• Debt overhang hypothesis
• Role of reputation
• Role of sanctions
• Bank runs
• Sudden stops of capital inflows
• 1st generation model of BOP crisis (weak macro fundamentals)
• 2nd generation model (self-fulfilling expectations)
• 3rd generation model (structural imbalances)
• 4th generation model (institutional factors)
POLICY ADVICE
• Higher public spending
• Tariffs (Smoot-Harley Act)
• Gold standard
• Monetary policy to boost growth and control inflation
• Refinancing and rescheduling
• Debt reduction (Brady plan; HIPC initiative)
• Debt conversion
• SDRM and CACs
• Capital controls
• Flexible exchange rate
• Self-protection (foreign reserves)
• Currency swap agreement
• Multinational scheme (CMIM)
• Pragmatic approach (mix of fiscal and monetary policies)
• Basel I
• Basel II
• Basel III
• Macroprudential regulation

Trade and Investment

- Asia and the Pacific is leading a recovery in world trade amid the continued uncertainty surrounding the global trade policy environment.
- Asia's intraregional trade continued to strengthen in 2016.
- Amid a slowdown in total inward foreign direct investment to Asia, intraregional investment flows continue to rise.
- Asia's outward foreign direct investment rose 11% in 2016—to $482 billion from $434 billion in 2015.

Financial Integration

- Asia's portfolio investors continue to invest more outside the region.
- Cross-border banking activity in Asia is steadily increasing.
- The volatility of Asian equity market returns is explained more by variations in global than regional equity market returns.

Movement of People

- Remittances to the region dropped to $259 billion in 2016 from $269 billion in 2015—the largest drop since 2009.
- Tourism is growing rapidly in the region, with an increasing number of tourists traveling within the region.

Asia-Pacific Regional Cooperation and Integration Index

- This year's Asian Economic Integration Report introduces a new composite index to gauge the progress of regional cooperation and integration in Asia and the Pacific.
- The Asia-Pacific Regional Cooperation and Integration Index is constructed from 26 socioeconomic indicators grouped into six dimensions to capture the diversity of regional cooperation and integration.
- The EU has the highest regional integration score on all but one dimensional indexes; but Asia outranks both Africa and Latin America.

The Era of Financial Interconnectedness: How Can Asia Strengthen Financial Resilience?

- Twenty years after the Asian financial crisis, Asia stands strong—with more flexible exchange rates, higher foreign reserves, healthier financial systems, stronger regulations, deeper capital markets, and better regional financial cooperation mechanisms.
- Structural weaknesses continue to permeate Asian financial markets and systems.
- Over the past 20 years, Asian financial markets have become more interconnected—both globally and intraregionally.
- Growing financial interconnectedness can increase vulnerabilities to external shocks, financial contagion, or liquidity risks stemming from cross-border bank lending
- Continued high reliance on US dollar-denominated funding has significant implications for the transmission of global financial conditions to domestic financial and macroeconomic conditions.
- recent rise in nonperforming loans in several emerging Asian economies is a concern due to potential macrofinancial feedback effects.

1. Regional Outlook, Linkages, and Vulnerabilities

Figure 1.1: Developing Asia's Business Cycle Correlations

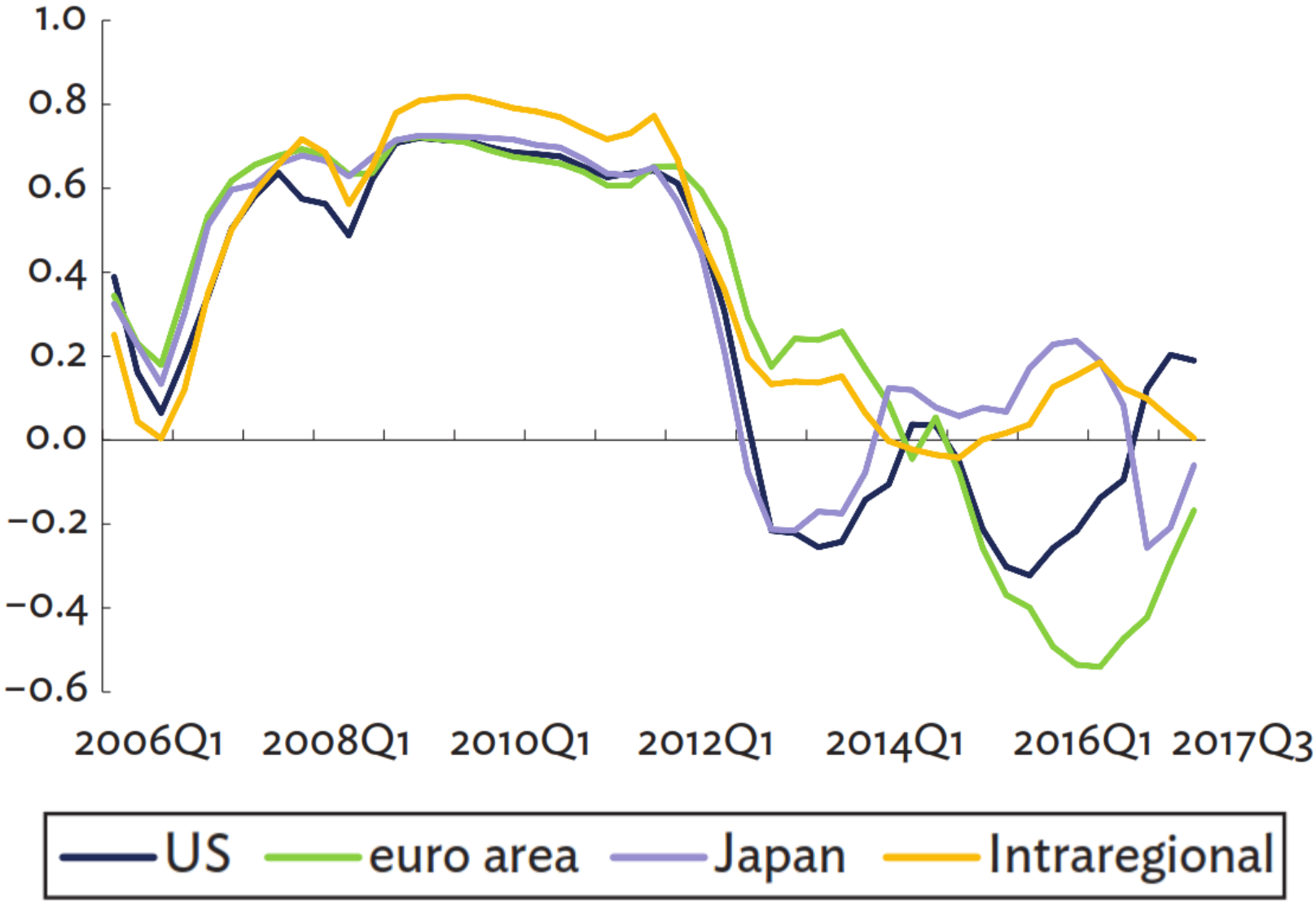
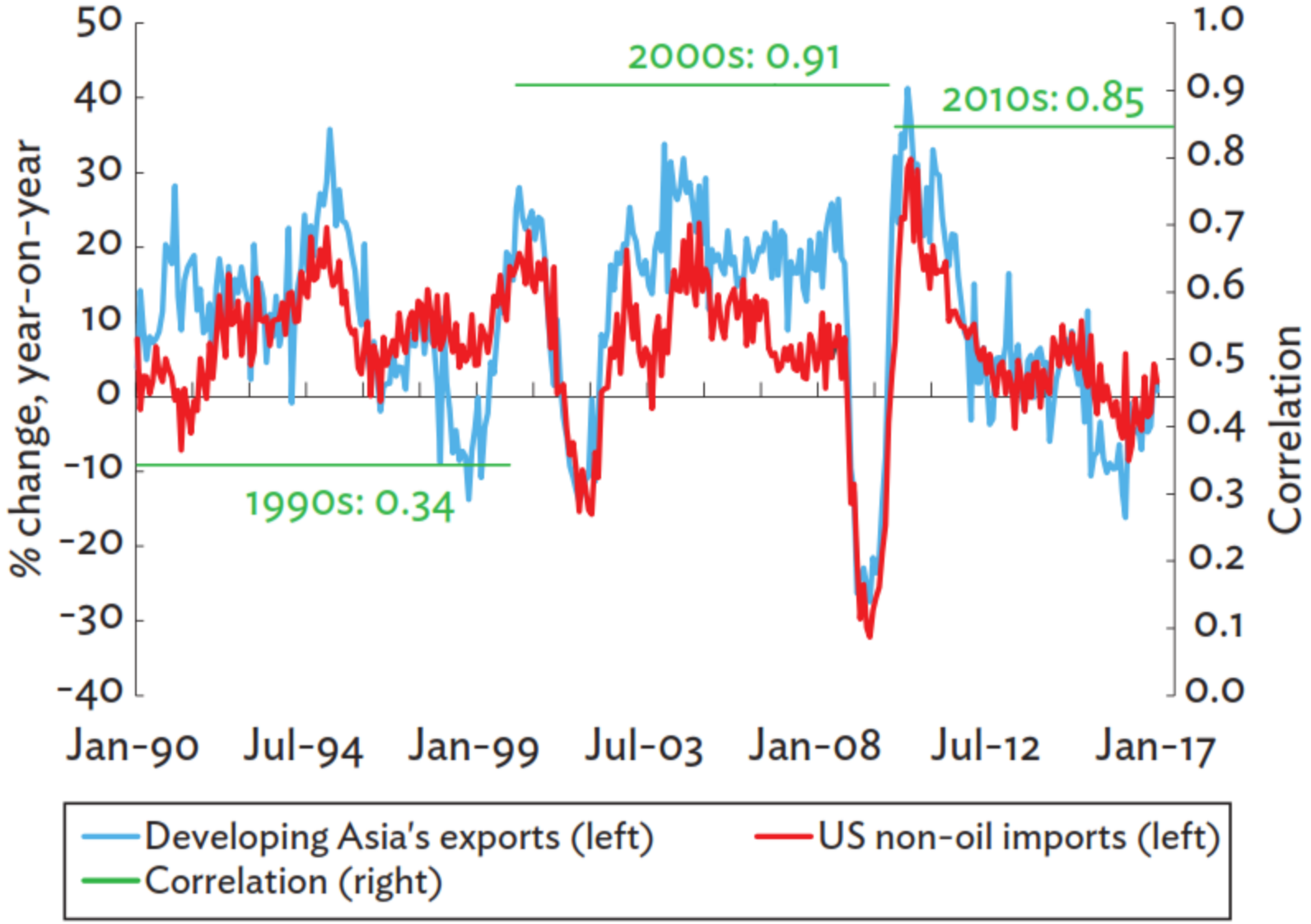


Figure 1.4: Correlation between US Non-oil Imports and Developing Asia's Exports



Trade Volume Growth (%, year-on-year)

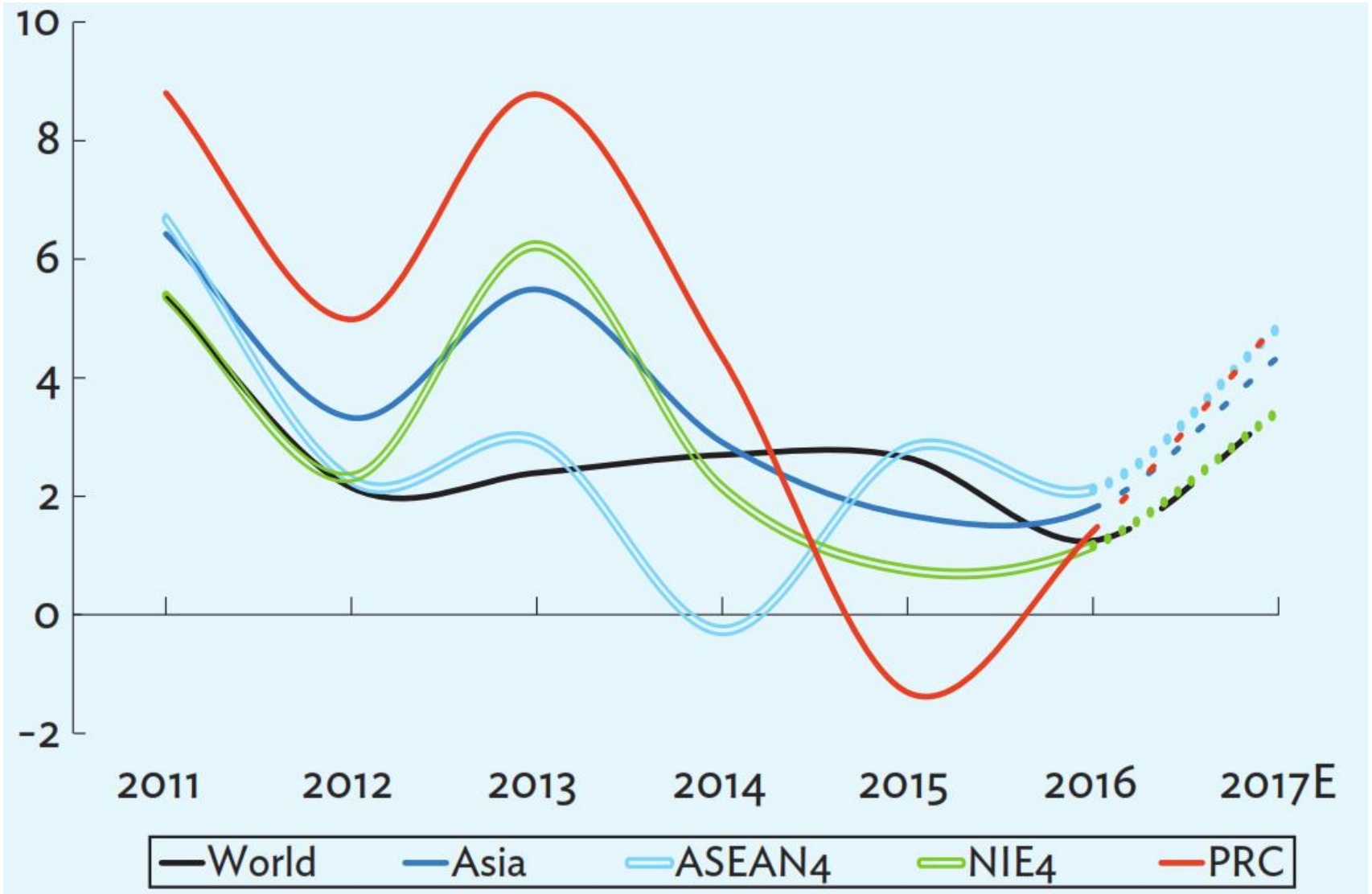


Figure 1.5: Foreign Holdings of Equity and Bonds, as of end 2016—Developing Asia (% of GDP)

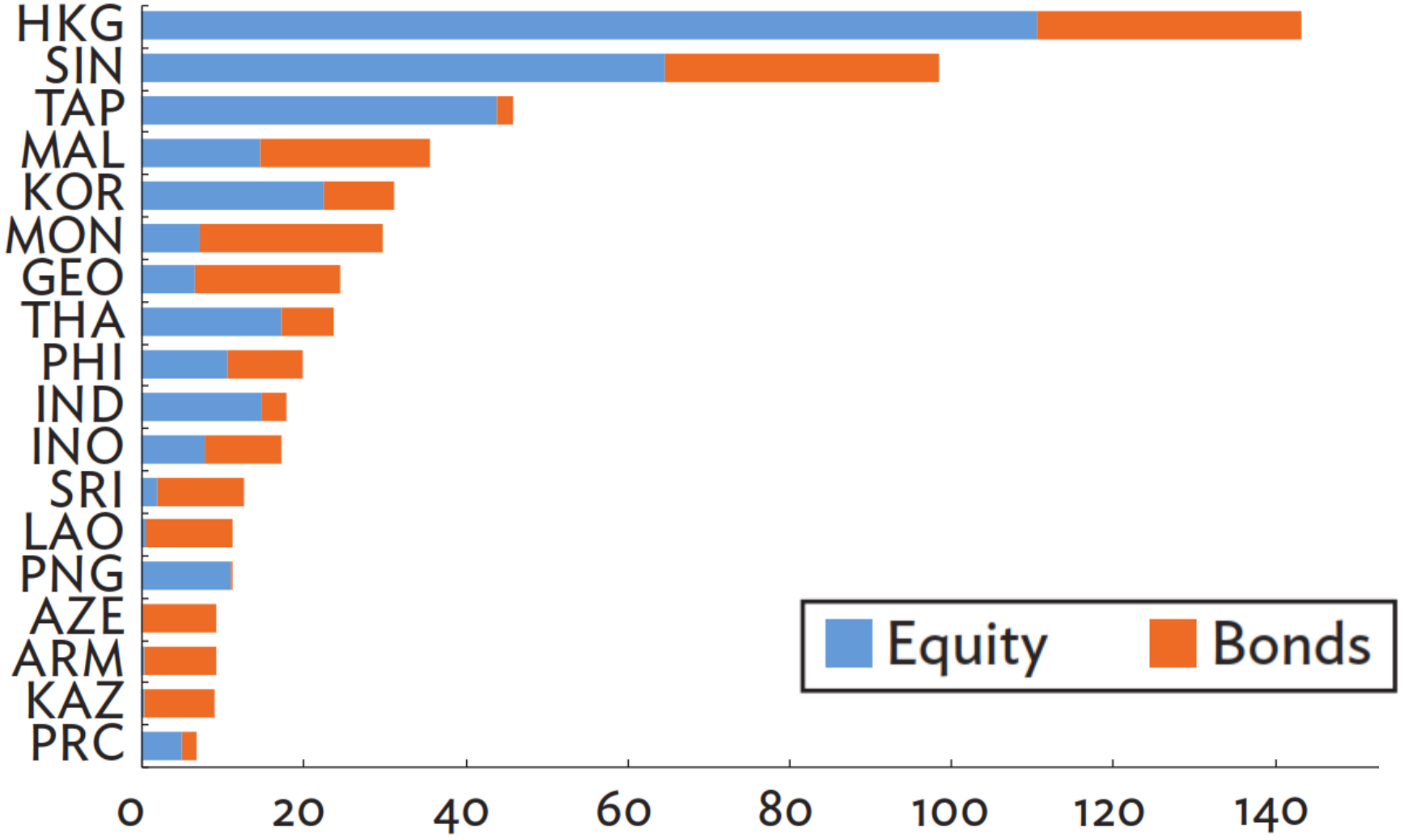


Figure 1.6: Loan-to-Deposit Ratio—Developing Asia (%)

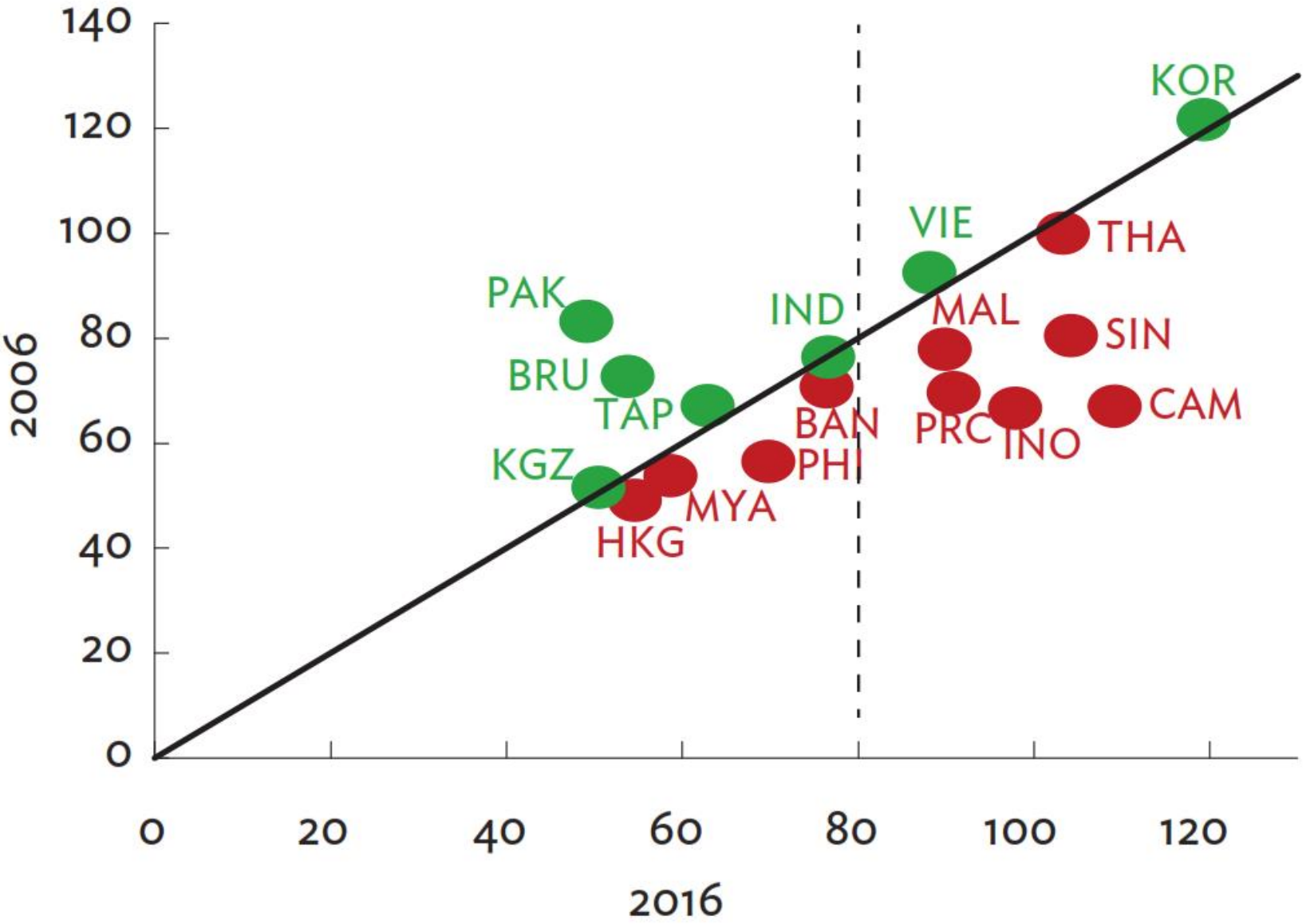
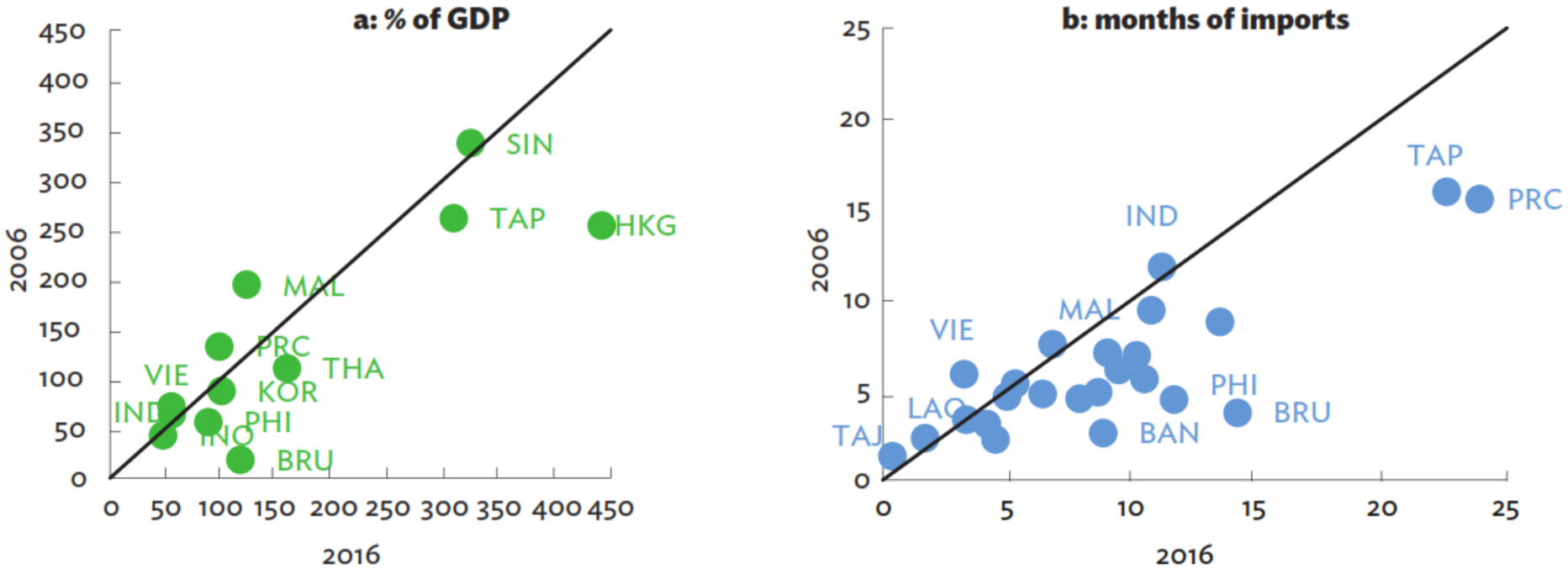


Figure 1.13: Gross International Reserves—Developing Asia



2. Trade and the Global Value Chain

Figure 2.3: Trade Value—Asia and World

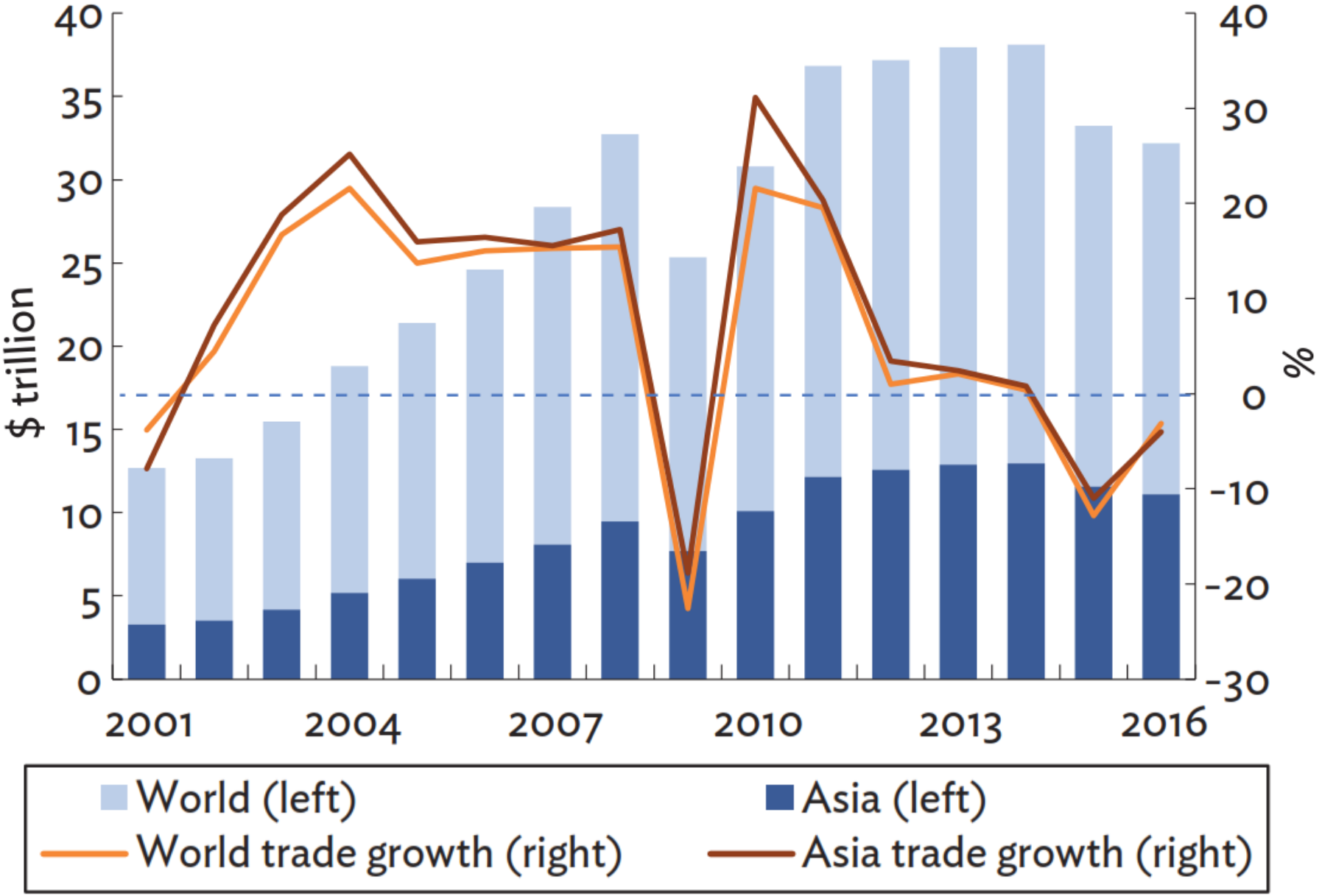


Figure 2.5: Intraregional Trade Share—Asia, European Union, North America (%)

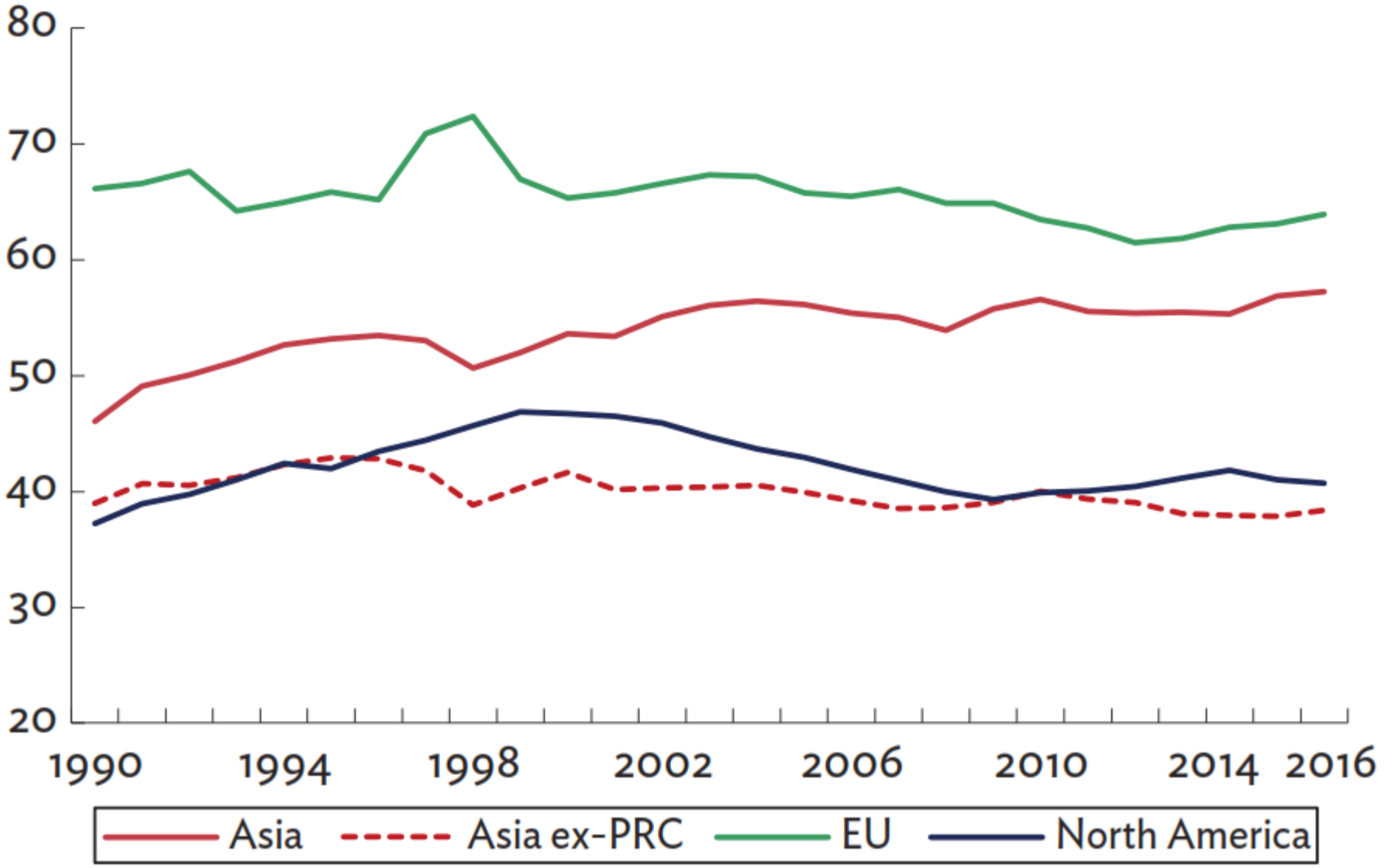
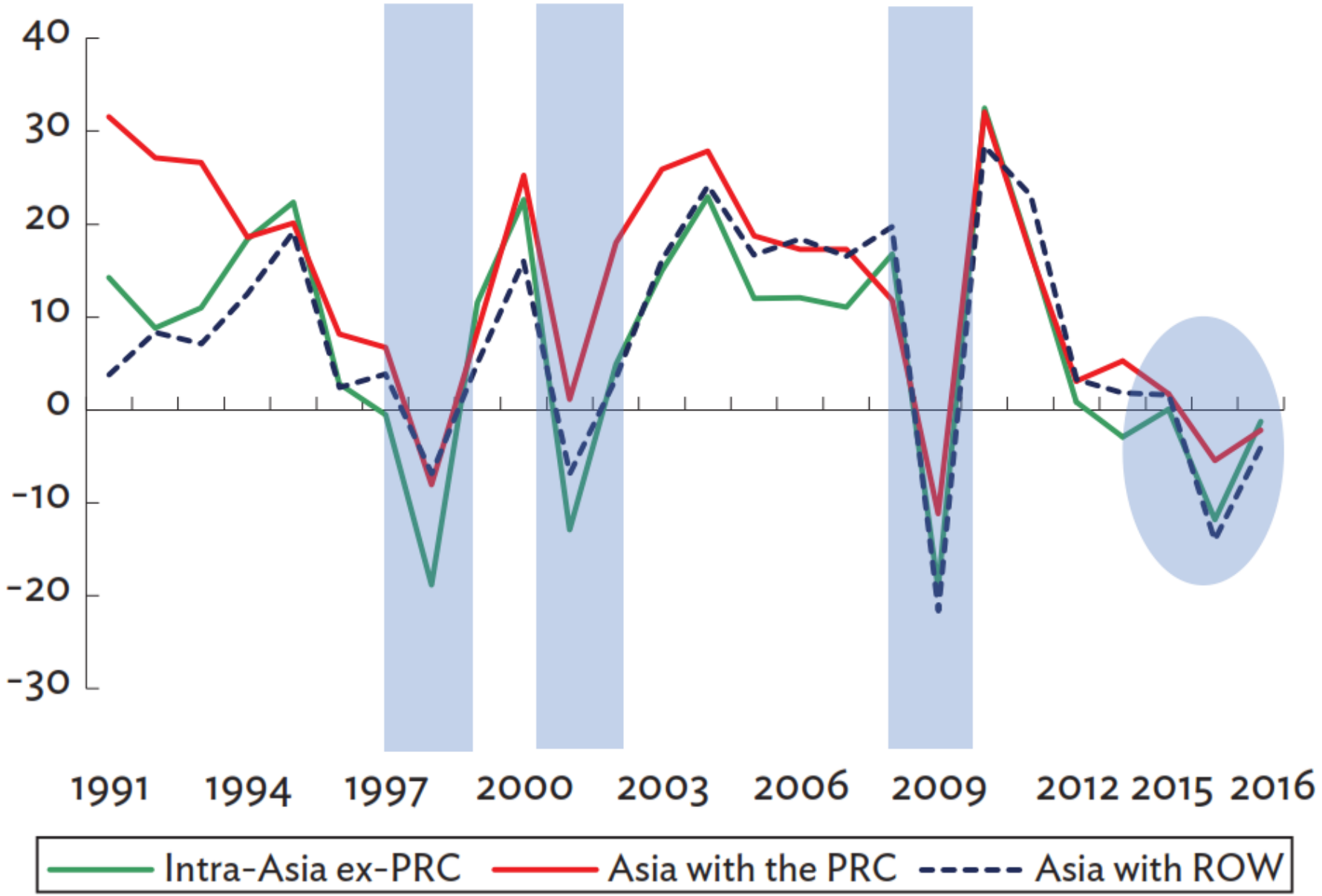


Figure 2.6: Asia Trade Value Growth, Intraregional and Extraregional (%)



1: Gravity Model Estimation Results, 2012–2016

Dependent Variable: Log(Bilateral Exports)

Variables	All Goods	Capital Goods	Consumption Goods	Intermediate Goods
Log(distance)	-1.65***	-1.65***	-1.72***	-1.70***
	(0.02)	(0.02)	(0.02)	(0.02)
Colonial relationship dummy	0.85***	0.90***	0.94***	0.89***
	(0.09)	(0.09)	(0.10)	(0.10)
Common language dummy	0.98***	0.93***	1.06***	0.90***
	(0.04)	(0.04)	(0.04)	(0.04)
Contiguity dummy	1.04***	1.18***	1.27***	1.13***
	(0.10)	(0.10)	(0.10)	(0.11)
Regional dummies (base: Asia to ROW)				
Both in Asia dummy	0.42 [0.95***]	0.31 [0.43]	0.40 [0.72***]	-0.34* [0.11]
	(0.34)	(0.33)	(0.35)	(0.33)
Importer in Asia dummy	1.09*	-1.41**	1.44**	0.55
	(0.56)	(0.68)	(0.62)	(0.65)
Both in ROW dummy	0.32	-2.16***	0.50	0.50
	(0.41)	(0.54)	(0.46)	(0.53)
Rho (sample selection term)	0.10***	0.29***	0.18***	0.16***
Sample size	172,492	172,492	172,492	172,492
Censored observations	21,546	66,817	43,577	40,067
Uncensored observations	150,946	105,675	128,915	132,425

*** = significant at 1%, ** = significant at 5%, * = significant at 10%, ROW = rest of the world. Estimates for 2011–2015 are in brackets. Robust standard errors in parentheses.

2: Gravity Model Estimation Results, 2012-2016: Intra- and Inter-subregional Trade (All Goods)

Variables	Central Asia	East Asia	South Asia	Southeast Asia	The Pacific and Oceania
Intra-subregional Trade Dummy	3.77***	6.37***	0.48	4.45***	1.02
	[3.65***]	[6.27***]	[1.01**]	[4.66***]	[0.43]
Inter-subregional Trade Dummy	-0.18	0.30	3.75***	0.40	-0.58
	[0.53]	[0.78***]	[3.92***]	[0.87***]	[-0.75]

*** = significant at 1%, ** = significant at 5%, * = significant at 10%. Estimates for 2011–2015 are in brackets.

Notes: Base category (benchmark) is the subregion's trade with economies outside Asia. The usual gravity model variables and time-varying economy dummies are included but not shown for brevity. Heckman sample selection estimation was used to account for missing bilateral economy-pair data. Data cover 173 economies, of which 43 are from Asia. Trade data based on Broad Economic Categories.

Sources: ADB calculations using data from Institute for Research on the International Economy. http://www.cepii.fr/CEPII/en/cepii/cepii.asp (accessed May 2017); and United Nations. Commodity Trade Database. https://comtrade.un.org (accessed July 2017).

Figure 2.8: Components of Gross Exports (%)

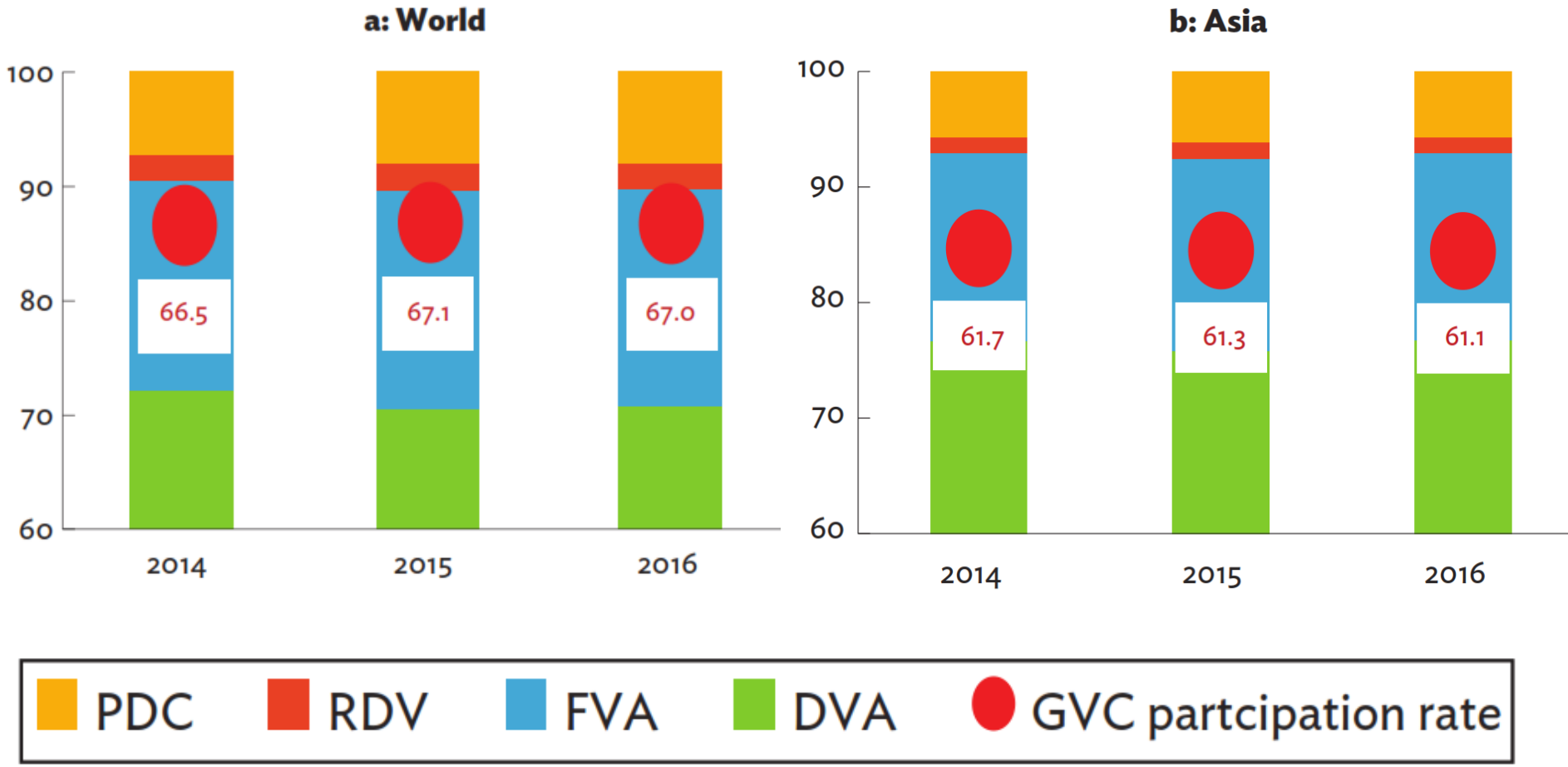
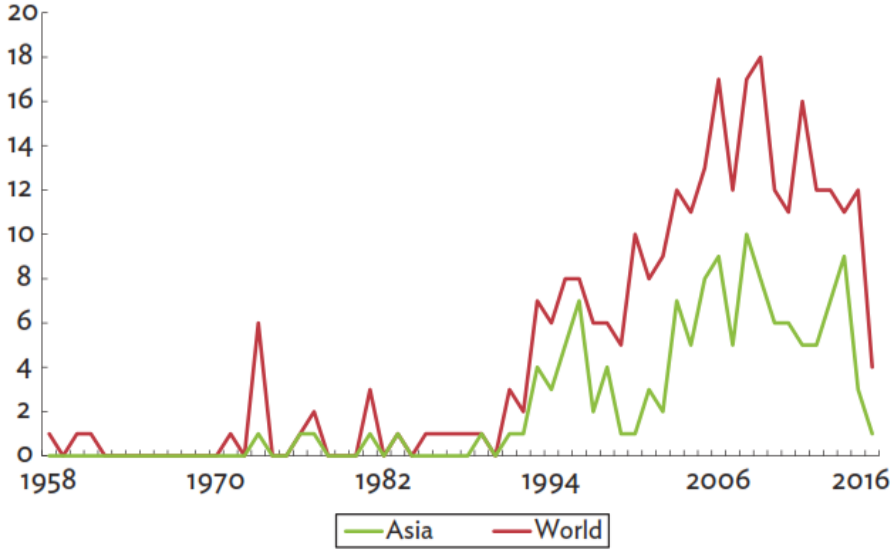
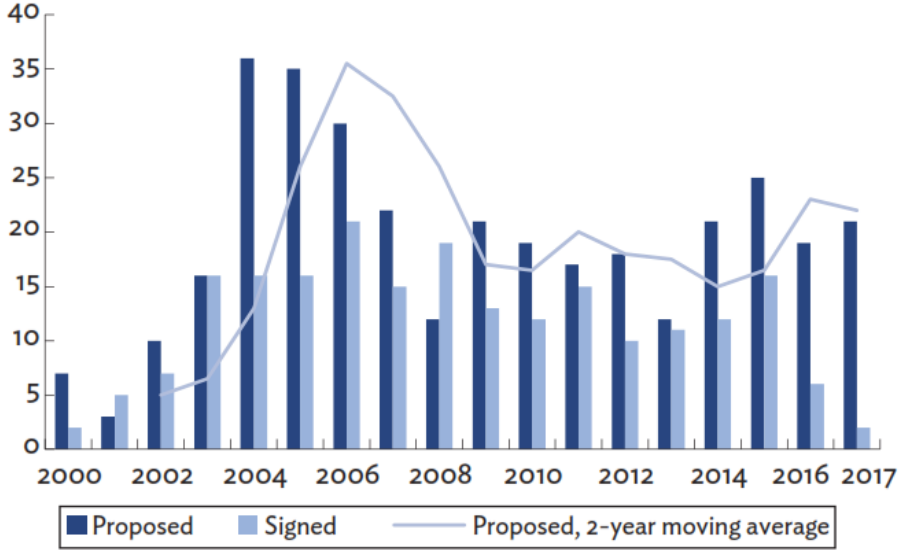


Figure 2.9: Number of Newly Effective FTAs—Asia and World



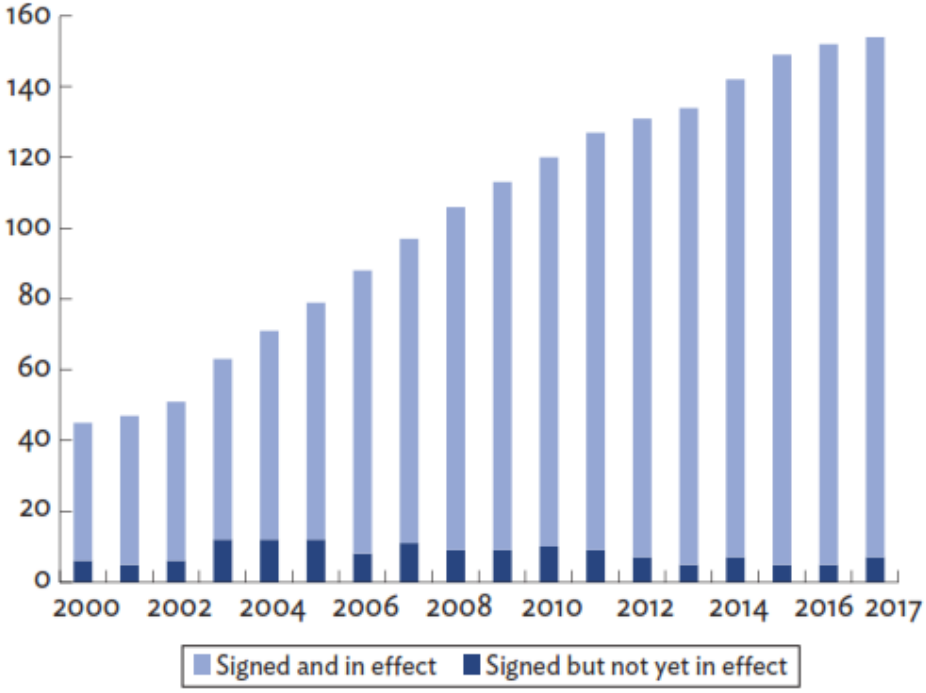
FTA = free trade agreement.

Figure 2.10: Number of FTAs Proposed and Signed by Year—Asia



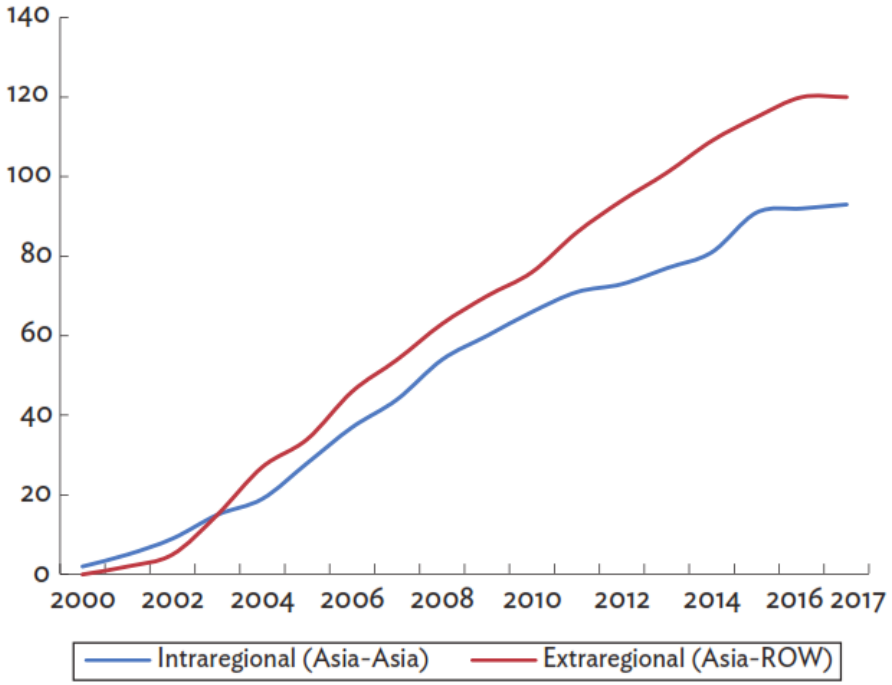
FTA = free trade agreement.

Figure 2.11: Number of Signed FTAs— Asia
(cumulative since 1975)



FTA = free trade agreement.

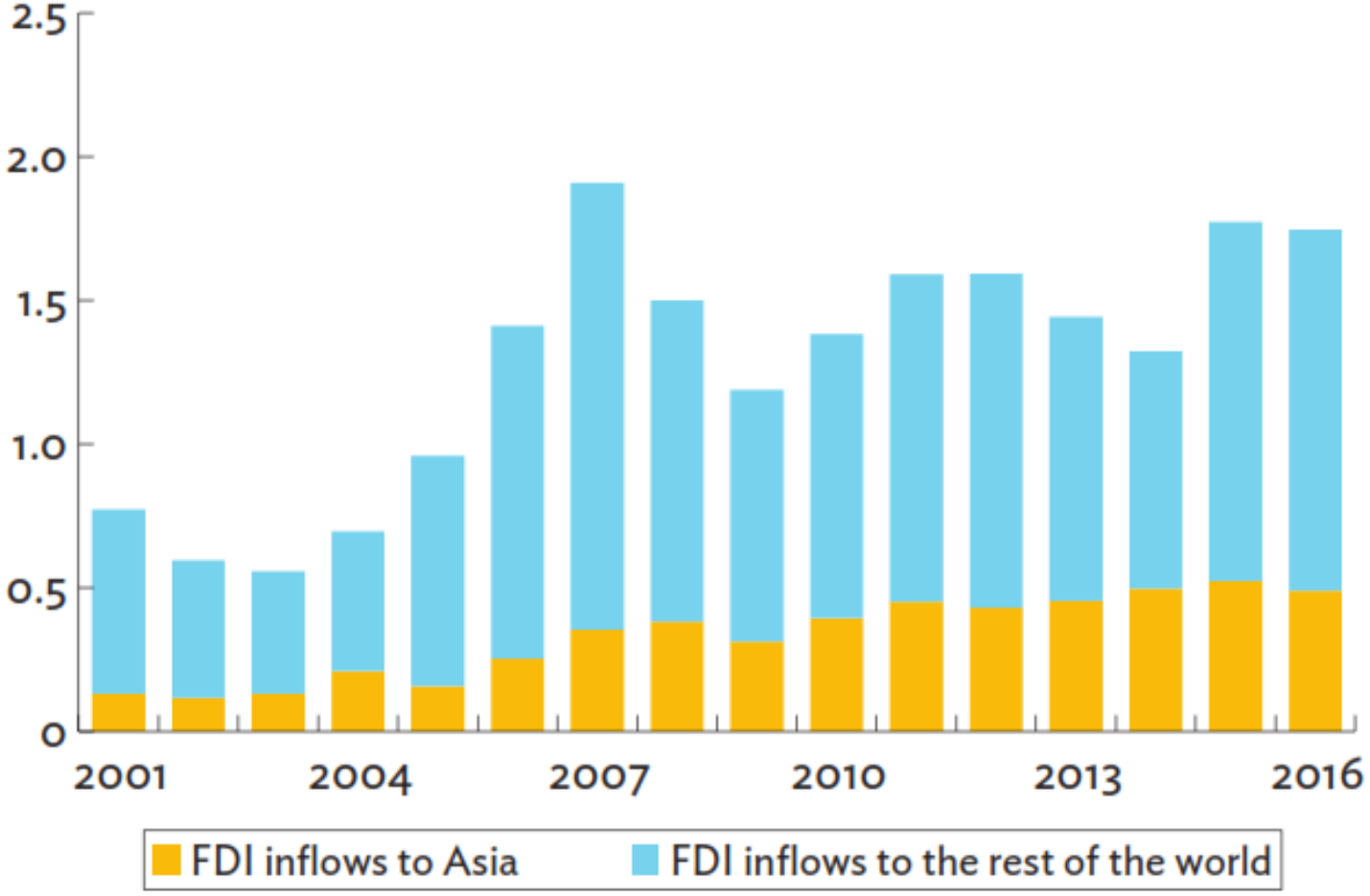
Figure 2.12: Number of Signed FTAs, Intraregional and Extraregional (cumulative since 2000)



FTA = free trade agreement, ROW = rest of the world.

3. Cross-border Investment

Figure 3.1: Total Inward FDI ($ trillion)



FDI = foreign direct investment.

Top 10 Destinations of Global and Asian FDI ($ billion)

Global	2016	2015	2010
United States	391.1	348.4	198.0
United Kingdom	253.8	33.0	58.2
PRC	133.7	135.6	114.7
Hong Kong, China	108.1	174.4	70.5
Netherlands	92.0	68.8	-7.2
Singapore	61.6	70.6	55.1
British Virgin Islands	59.1	28.9	50.5
Brazil	58.7	64.3	83.7
Australia	48.2	19.5	36.4
Cayman Islands	45.0	63.4	9.4

Top 10 Destinations of Global and Asian FDI ($ billion)

Asia	2016	2015	2010
PRC	133.7	174.4	114.7
Hong Kong, China	108.1	135.6	70.5
Singapore	61.6	70.6	55.1
Australia	48.2	19.5	36.4
India	44.5	44.1	27.4
Viet Nam	12.6	11.8	8.0
Japan	11.4	-2.3	-1.3
Republic of Korea	10.8	4.1	9.5
Malaysia	9.9	11.1	9.1
Kazakhstan	9.1	4.0	11.6

Figure 3.5: Global Inward FDI to Asia by Subregion ($ billion)

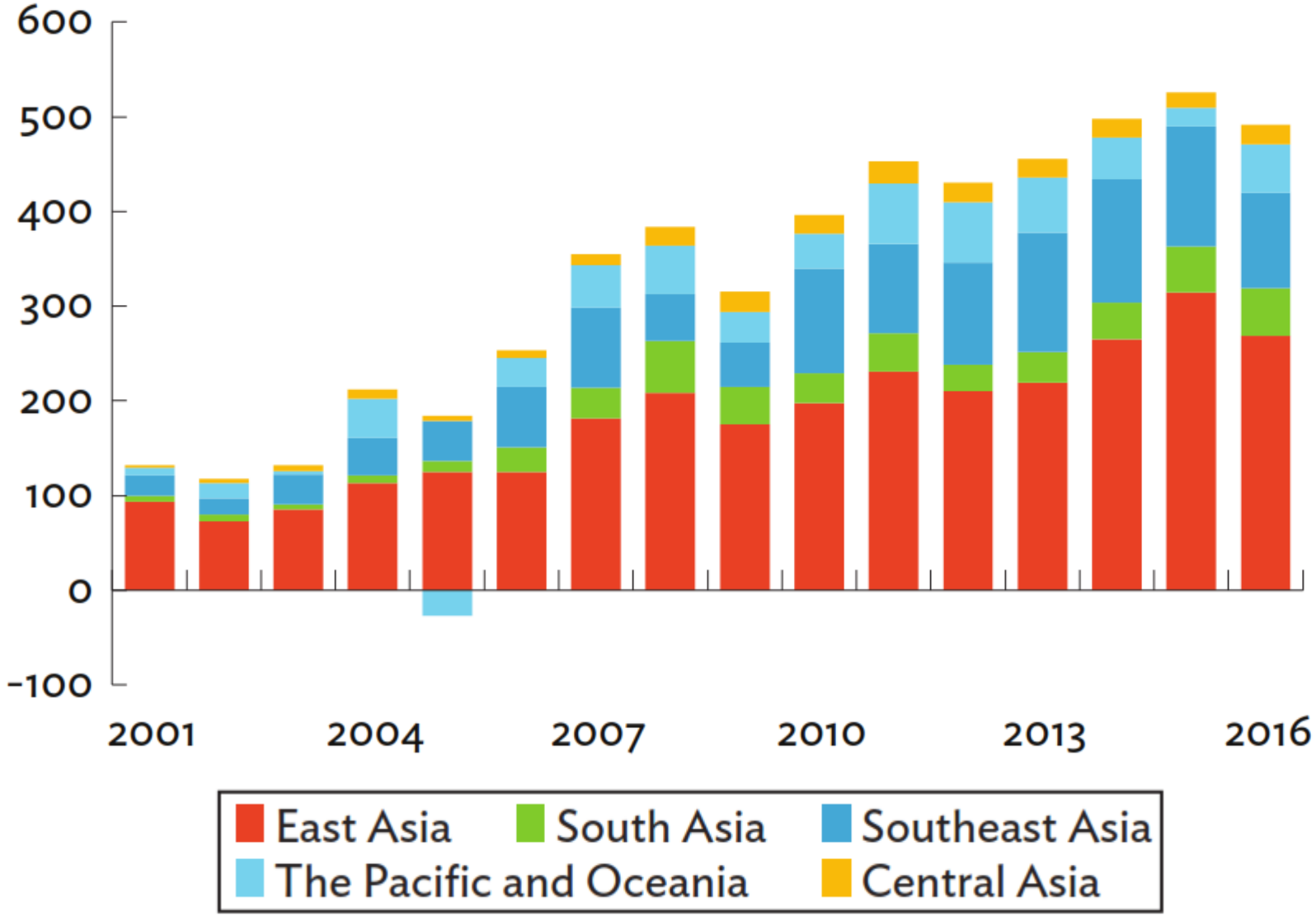
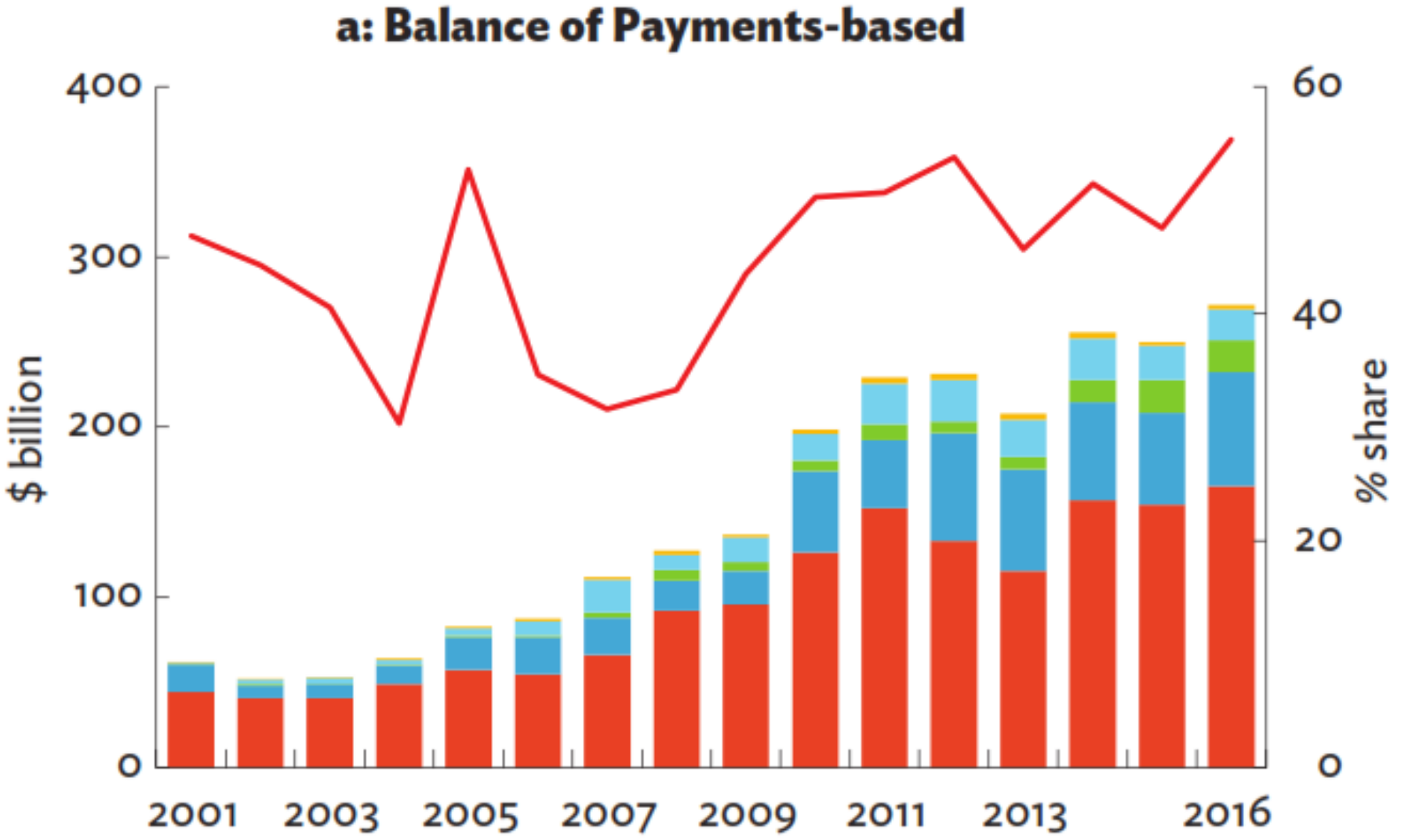


Figure 3.6: Intraregional FDI Inflows—Asia



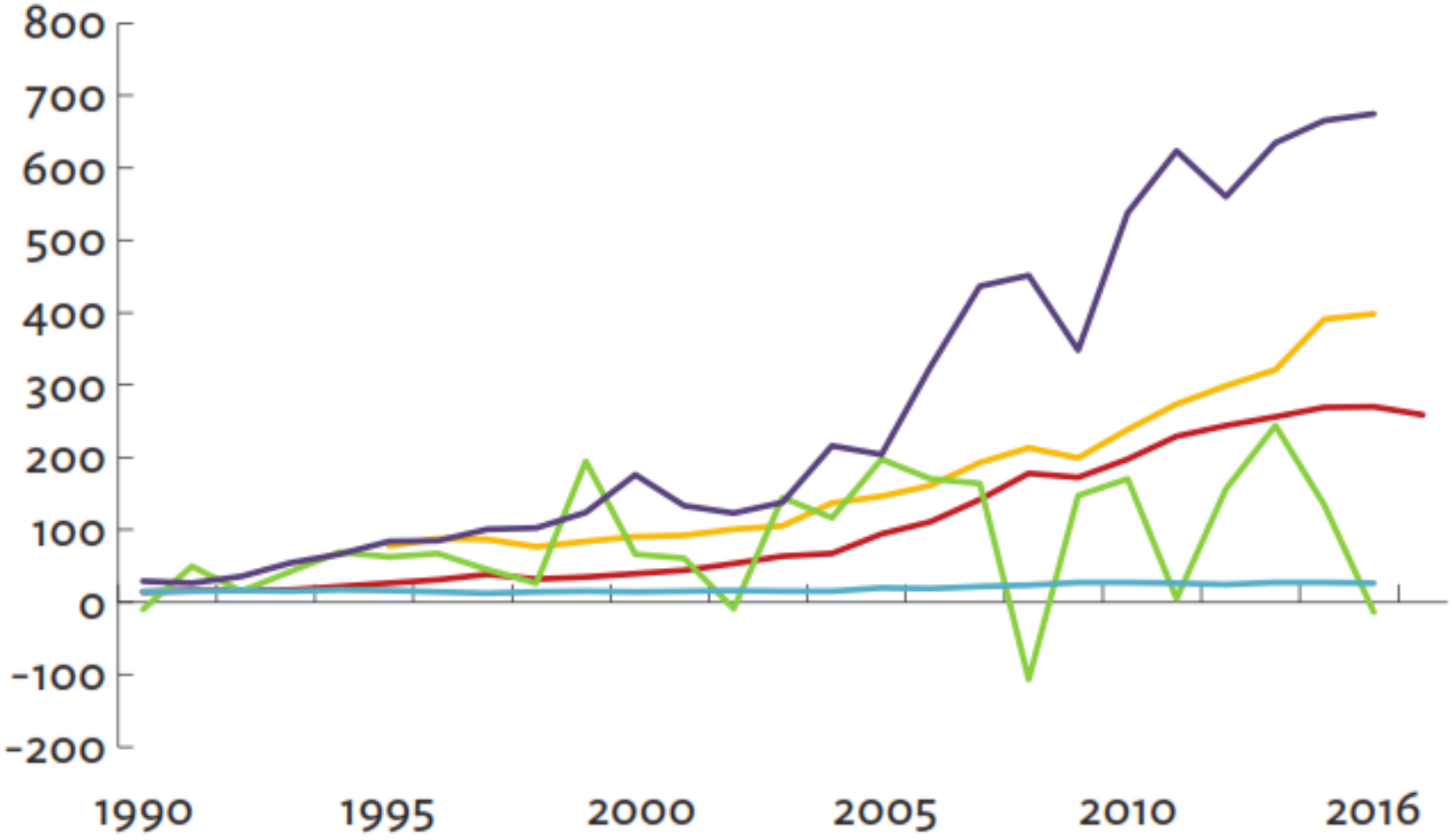
Effects of Governance and Business Environment on FDI

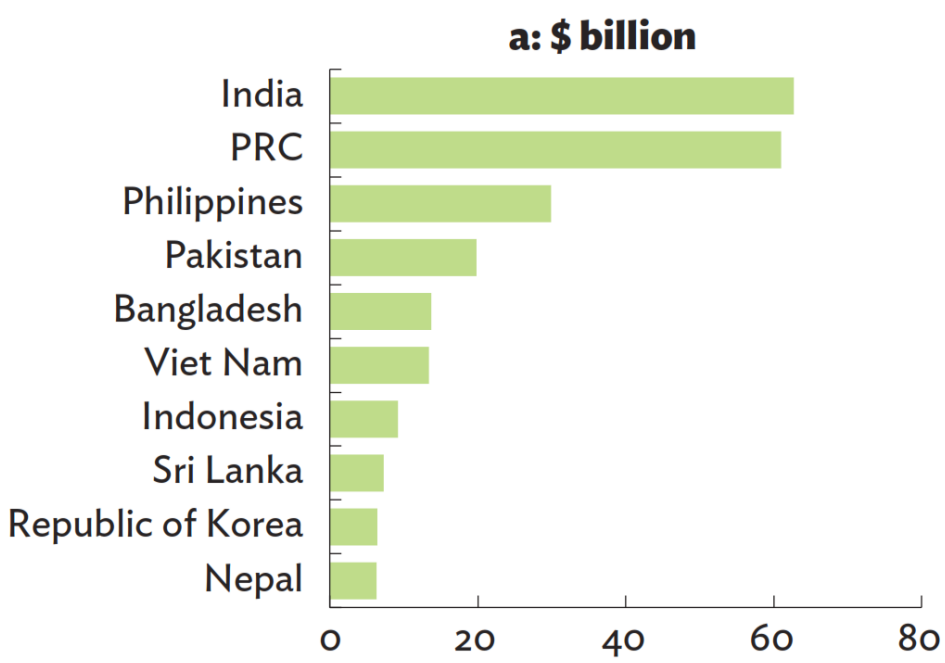
Dependent variable: Total number of FDI projects	Overall			Primary			Manufacturing			Services		
	All sample	Source: Asia	Intra-Asia	All sample	Source: Asia	Intra-Asia	All sample	Source: Asia	Intra-Asia	All sample	Source: Asia	Intra-Asia
Overall Ease of Doing Business Index - host (expected sign = plus)	0.022*** (0.004)	0.028*** (0.009)	0.021 (0.015)	0.013 (0.009)	-0.005 (0.012)	-0.060*** (0.016)	0.022*** (0.005)	0.036*** (0.012)	0.058*** (0.020)	0.024*** (0.005)	0.030*** (0.010)	-0.003 (0.010)
Overall World Governance Index - host (expected sign = plus)	0.012*** (0.004)	0.016*** (0.005)	0.024** (0.010)	0.000 (0.012)	0.027** (0.011)	0.052*** (0.014)	0.010** (0.004)	0.012* (0.007)	0.005 (0.013)	0.015*** (0.005)	0.020*** (0.005)	0.048*** (0.009)
log(Population - host)	0.669*** (0.020)	0.595*** (0.038)	0.439*** (0.036)	0.345*** (0.031)	0.306*** (0.074)	0.201*** (0.068)	0.776*** (0.017)	0.731*** (0.037)	0.600*** (0.050)	0.686*** (0.026)	0.569*** (0.050)	0.372*** (0.037)
log(PCGDP - host)	0.263*** (0.046)	0.078 (0.078)	-0.143 (0.120)	0.386*** (0.120)	0.238** (0.115)	0.409** (0.159)	0.277*** (0.047)	0.039 (0.116)	-0.308** (0.154)	0.270*** (0.053)	0.111 (0.073)	-0.117 (0.120)
Growth Rate - host	2.158** (0.902)	2.703** (1.105)	5.392*** (1.469)	1.638 (1.625)	1.656 (3.532)	0.863 (1.931)	1.526* (0.863)	2.296 (1.439)	5.224** (2.073)	2.613*** (0.983)	5.143*** (1.086)	8.087*** (1.301)
Inflation Rate - host	0.000 (0.001)	-0.010 (0.018)	-0.051*** (0.017)	0.001*** (0.000)	-0.002 (0.015)	-0.048** (0.024)	-0.001 (0.004)	-0.017 (0.027)	-0.054** (0.022)	0.000 (0.002)	-0.010 (0.015)	-0.062*** (0.017)
log(Distance between source and host)	-0.449*** (0.039)	-0.489*** (0.086)	-0.415*** (0.116)	-0.023 (0.115)	-0.009 (0.221)	0.016 (0.167)	-0.473*** (0.033)	-0.432*** (0.100)	-0.379*** (0.142)	-0.522*** (0.049)	-0.572*** (0.097)	-0.561*** (0.117)
Common language (=1 if yes)	0.724*** (0.113)	0.870*** (0.116)	0.824*** (0.129)	1.036*** (0.202)	1.104*** (0.422)	-0.152 (0.335)	0.463*** (0.100)	0.727*** (0.121)	0.855*** (0.161)	0.921*** (0.122)	1.034*** (0.118)	0.933*** (0.140)
Contiguity (=1 if yes)	-0.062 (0.137)	0.301* (0.177)	0.382** (0.164)	0.292 (0.337)	0.291 (0.415)	0.017 (0.294)	0.086 (0.110)	0.350 (0.239)	0.510*** (0.177)	-0.208 (0.182)	0.371* (0.204)	0.442** (0.213)
Constant	-16.758*** (0.629)	-10.981*** (1.210)	-8.009*** (1.172)	-10.317*** (1.352)	-10.727*** (3.519)	-4.975** (2.309)	-12.642*** (0.524)	-13.141*** (1.388)	-8.859*** (2.049)	-13.960*** (0.551)	-7.949*** (1.461)	-6.892*** (1.348)
Number of observations	19015	4485	1653	2994	717	275	7645	1884	649	8357	1878	725
R-squared	0.509	0.437	0.453	0.352	0.221	0.603	0.792	0.770	0.845	0.779	0.667	0.726

*** = significant at 1%, ** = significant at 5%, * = significant at 10%, FDI = foreign direct investment, PCGDP = per capita gross domestic product.

5. Remittances and Tourism Receipts

Figure 5.1: Financial Inflows to Asia by Type ($ billion)




a: $ billion
India
PRC
Philippines
Pakistan
Bangladesh
Viet Nam
Indonesia
Sri Lanka
Republic of Korea
Nepal
0
20
40
60
80

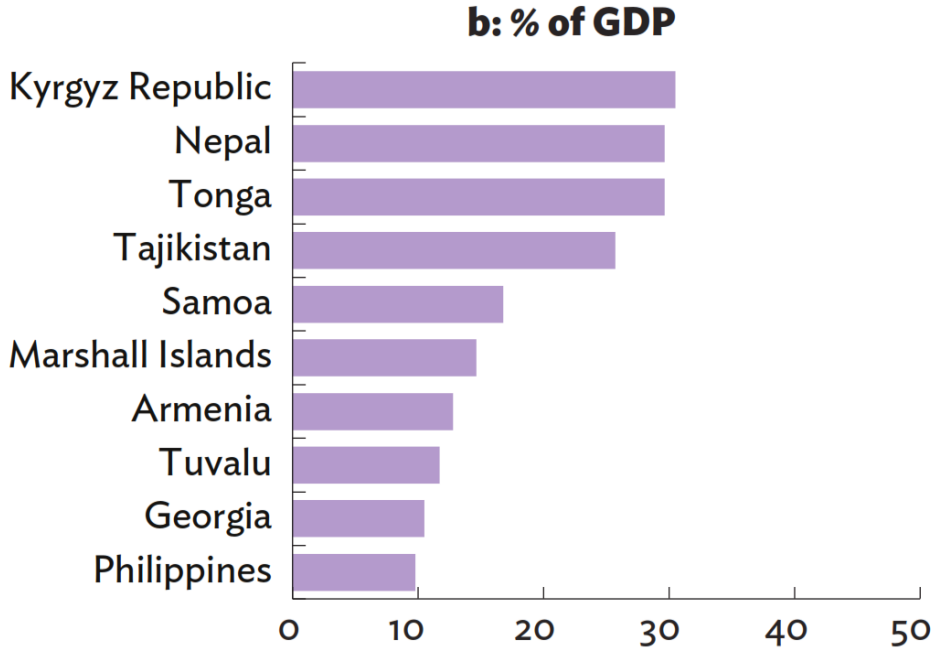
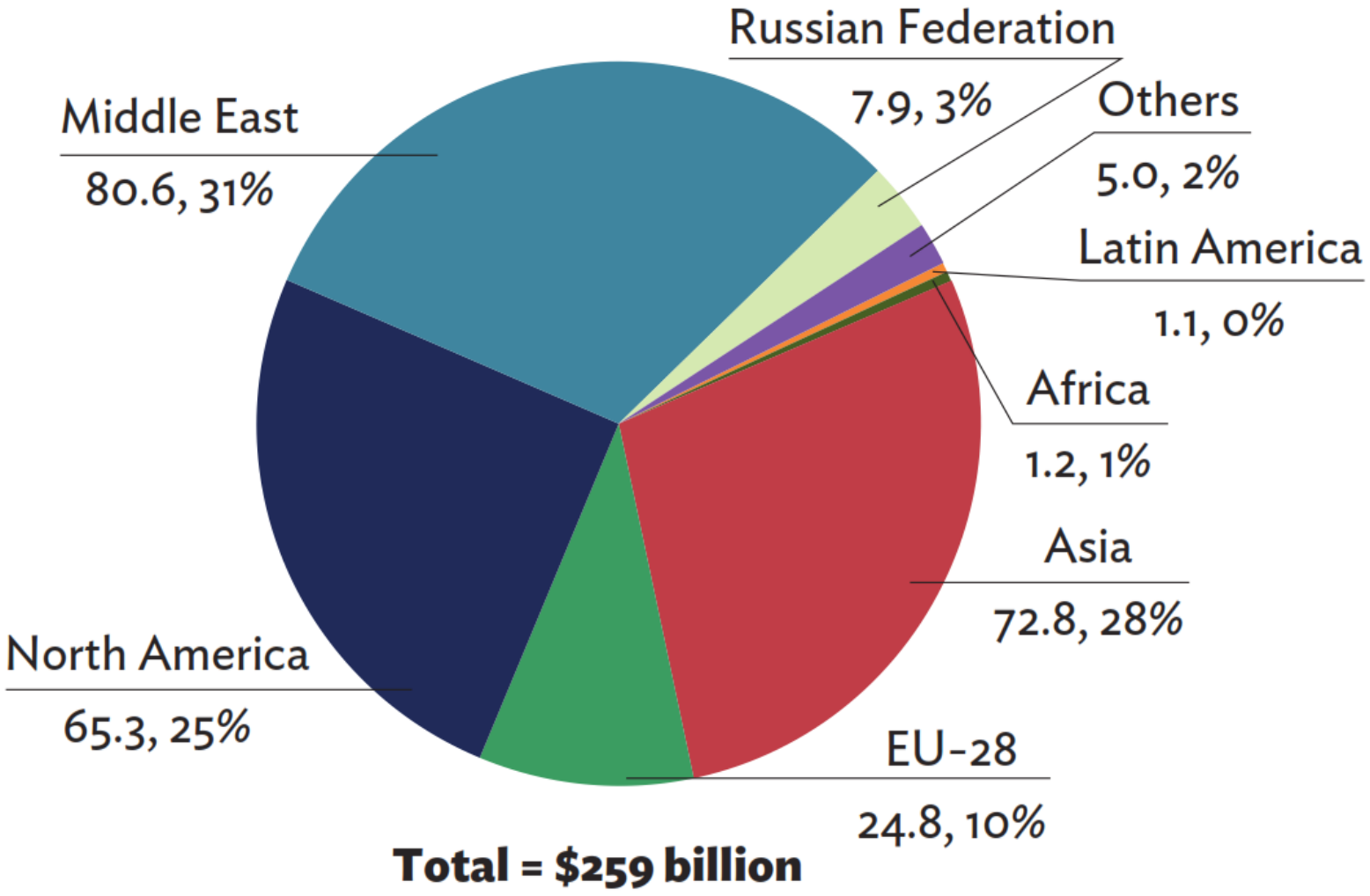

b: % of GDP
Kyrgyz Republic
Nepal
Tonga
Tajikistan
Samoa
Marshall Islands
Armenia
Tuvalu
Georgia
Philippines
0
10
20
30
40
50

Figure 5.4: Remittance Inflows to Asia by Source, 2016
($ billion, % share)



Sources of Volatility in Remittance Inflow (Dependent Variable = 3 year rolling SD of remittance annual growth)

	Coefficients
Migrant population (% growth)	0.046*
	(0.027)
Ratio (%) of migrants in top destination (TOP)	-0.970**
	(0.427)
TOP_squared	0.010**
	(0.005)
Female migration dummy (= 1 if % female migration>55)	-10.214**
	(4.387)
Natural disaster occurrences	0.253
	(0.819)
Property rights assurance at origin country (= rule of law index)	-4.052*
	(2.285)
Proportion of migrants against total population (%)	-18.459
	(15.817)
Proportion of migrants in OECD countries (%)	0.022
	(0.064)
Proportion of college graduates among migrants (%)	-1.335
	(3.259)
GDP, exchange rate, and interest rate volatilities of origin and destination countries	Yes
Year dummy	Yes
Subregion dummy	Yes
Constant	63.720***
	(-17.801)
Number of observations	378
R-squared	0.257

*** = significant at 1%, ** = significant at 5%, * = significant at 10%, GDP = gross domestic product, OECD = Organisation for Economic Co-operation and Development, SD = standard deviation.

Figure 5.8: Tourism Receipts by Region ($ billion)

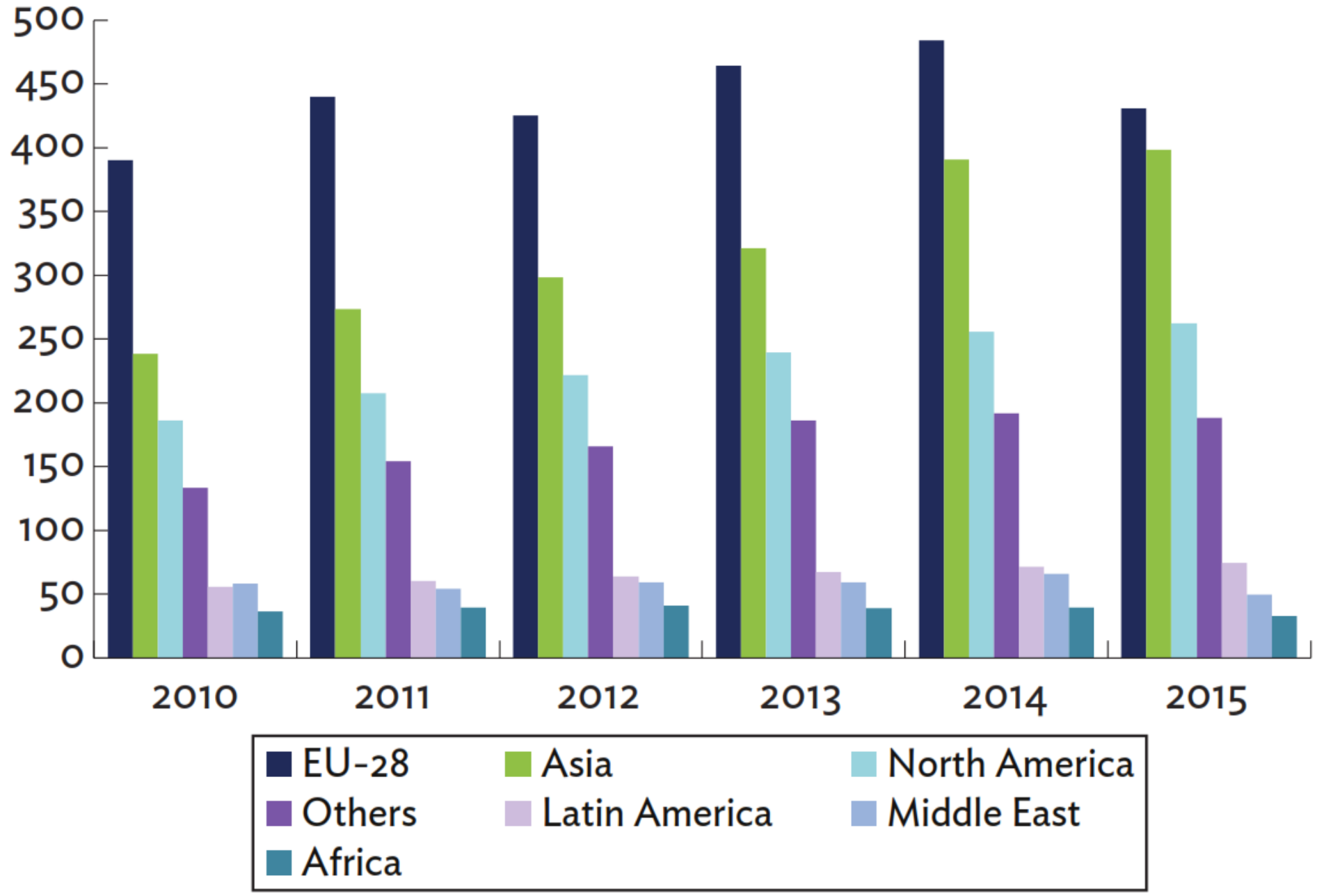
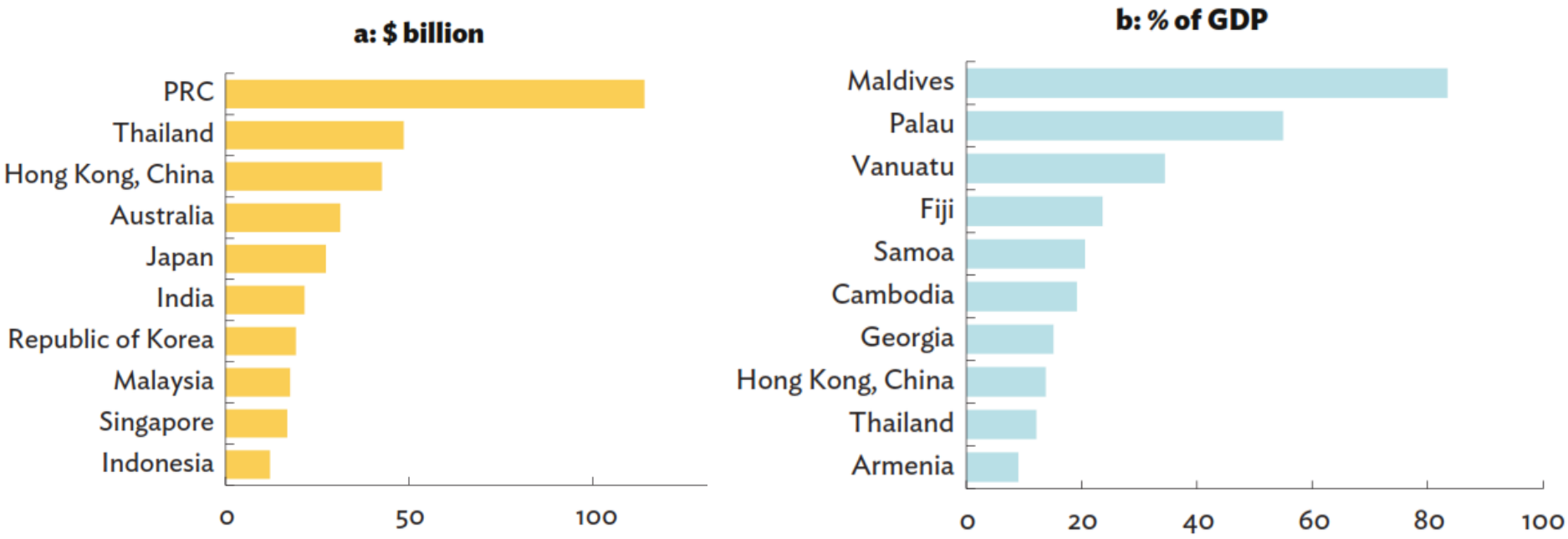


Figure 5.10: Economies by Tourism Receipts—Asia (2015)

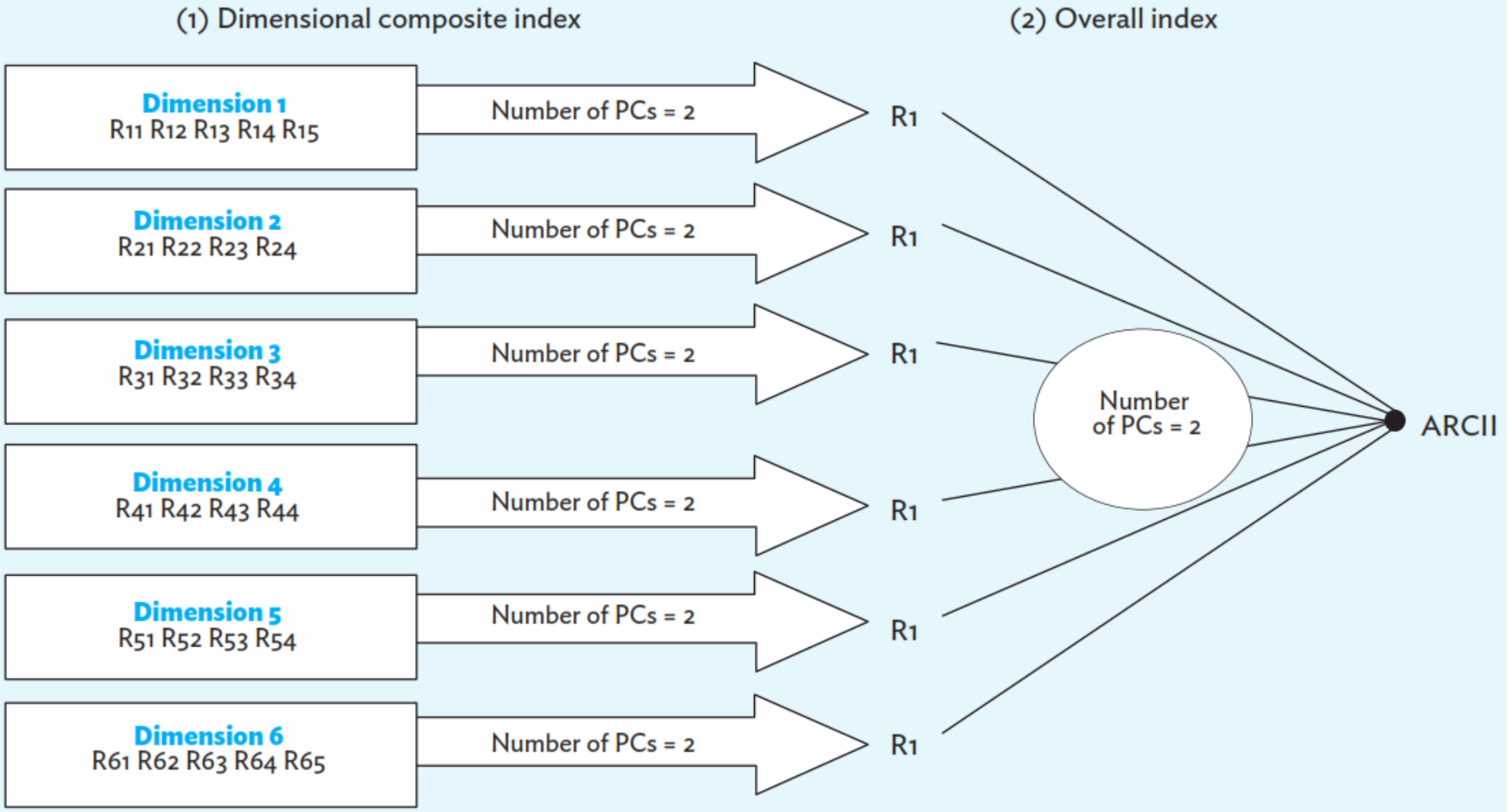


7. Asia-Pacific Regional Cooperation and Integration Index

Design of the Asia-Pacific Regional Cooperation and Integration Index

R1. Trade and Investment	R11	Proportion of intraregional goods exports to total goods exports
	R12	Proportion of intraregional goods imports to total goods imports
	R13	Intraregional trade intensity index
	R14	Proportion of intraregional foreign domestic investment (FDI) inflows to total FDI inflows
	R15	Proportion of intraregional FDI inflows plus outflows to total FDI inflows plus outflows
R2. Money and Finance	R21	Proportion of intraregional cross-border equity liabilities to total cross-border equity liabilities
	R22	Proportion of intraregional cross-border bond liabilities to total cross-border bond liabilities
	R23	Pairwise dispersion of deposit rates average regionally relative to that averaged globally
	R24	Pairwise correlation of equity returns average regionally minus that averaged globally
R3. Regional Value Chain	R31	Ratio between the average trade complementarity index over regional trading partners and the averaged trade complementarity index over all trading partners
	R32	Ratio between the average trade concentration index over regional trading partners and the averaged trade concentration index over all trading partners
	R33	Proportion of intraregional intermediate goods exports to total intraregional goods exports
	R34	Proportion of intraregional intermediate goods imports to total intraregional goods imports
R4. Infrastructure and Connectivity	R41	Ratio between the average trade cost over regional trading partners and the average trade cost over all trading partners
	R42	Ratio between the average liner shipping connectivity index over regional trading partners and the average liner shipping connectivity index over all trading partners
	R43	Logistics performance index (overall)
	R44	Doing Business Index (overall)
R5. Movement of People	R51	Proportion of intraregional outbound migration to total outbound migration
	R52	Proportion of intraregional tourists to total tourists (inbound plus outbound)
	R53	Proportion of intraregional remittances to total remittances
	R54	Proportion of other Asian economies that do not require an entry visa
R6. Institutional and Social Integration	R61	Proportion of other Asian economies with which there is a signed free trade agreement
	R62	Proportion of other Asian economies that have an embassy
	R63	Proportion of other Asian economies with which there is a signed business investment treaty
	R64	Proportion of other Asian economies with which there is a signed double taxation treaty
	R65	Cultural proximity with other Asian economies relative to that with all other economies

Computing for ARCII



ARCII = Asia-Pacific Regional Cooperation and Integration Index, PCs = principal components.
Source: Huh and Park (2017).

$$\begin{aligned}\Delta y_{i,t} = \alpha_i + \delta \Delta y_{i,t-1} + \alpha_1 \Delta BER_{t-1} + \alpha_2 \Delta NEER_{i,t-1} \\ + \beta \Delta CPI_{t-1} + \gamma \Delta IP_{t-1} + \theta \Delta r_{i,t-1} \\ + \eta_1 \Delta VIX_{t-1} + \eta_2 \Delta CPIUS_{t-1} + \eta_3 \Delta IPUS_{t-1} \\ + \eta_4 \Delta MMUS_{t-1} + \mu_i + \varepsilon_{i,t}\end{aligned} \quad (1)$$

Effect of Bilateral Exchange Rate Against US Dollar on Financial Conditions

	(1)	(2)	(3)	(4)	(5)
$\Delta BER_{i,t-1}$	-0.0561***	0.00848			0.00495
	(0.0171)	(0.0104)			(0.0103)
$\Delta NEER_{i,t-1}$	0.0873***		0.0390***	0.0340***	
	(0.0188)		(0.0115)	(0.0113)	
$\Delta BER\_orth_{i,t-1}$				-0.0833***	
				(0.0191)	
$\Delta NEER\_orth_{i,t-1}$					0.0784***
					(0.0195)
ΔVIX_{t-1}	0.00115*	0.00117*	0.00127**	0.00113*	0.00119*
	(0.000631)	(0.000635)	(0.000635)	(0.000627)	(0.00063

*** = significant at 1%, ** = significant at 5%, * = significant at 10%. Standard errors in parentheses.

8. The Era of Financial Interconnectedness: How Can Asia Strengthen Financial Resilience?

Figure 8.1: Corporate Financing as % of GDP—Emerging Asia (excluding HKG and SIN)

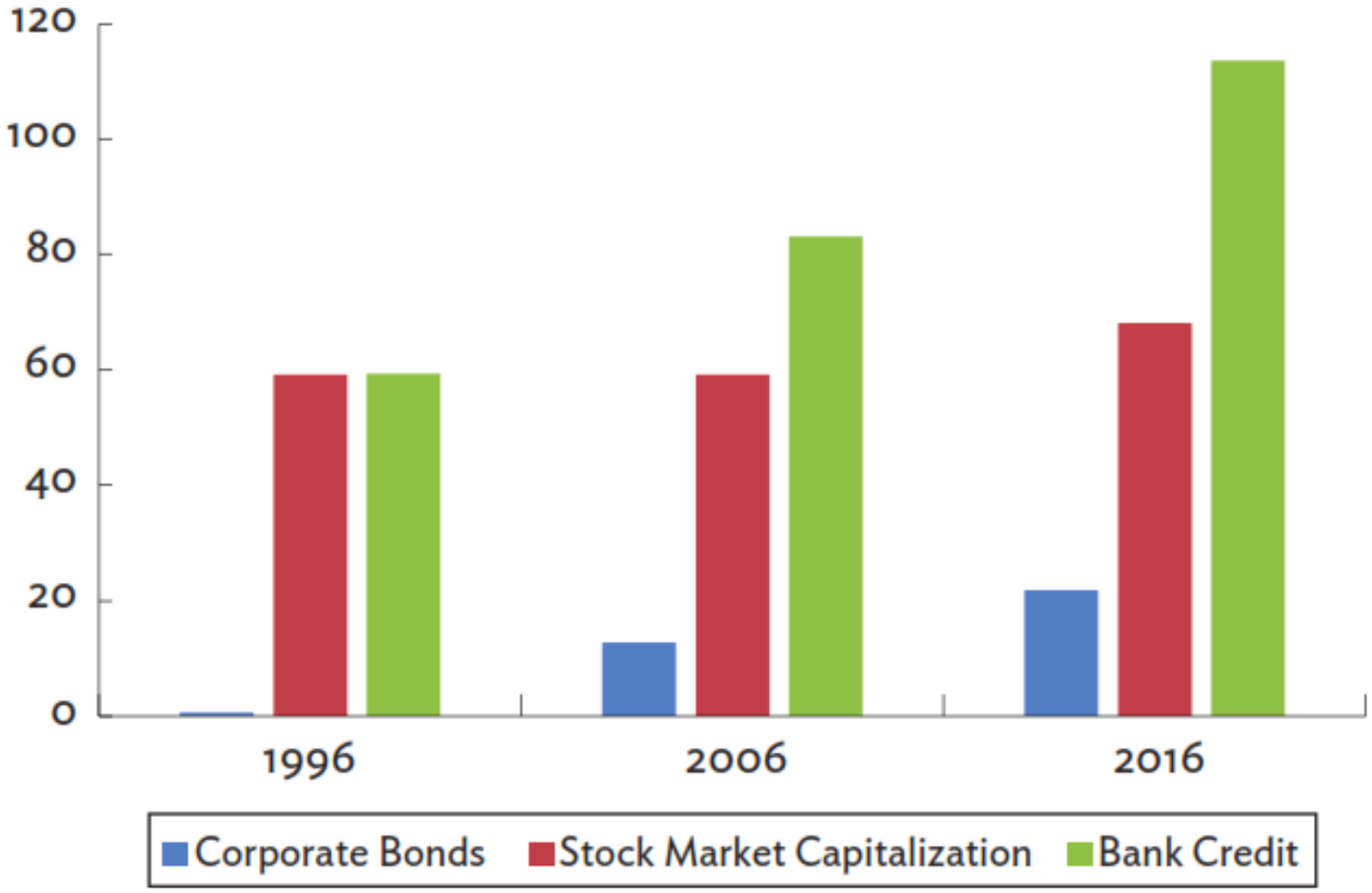
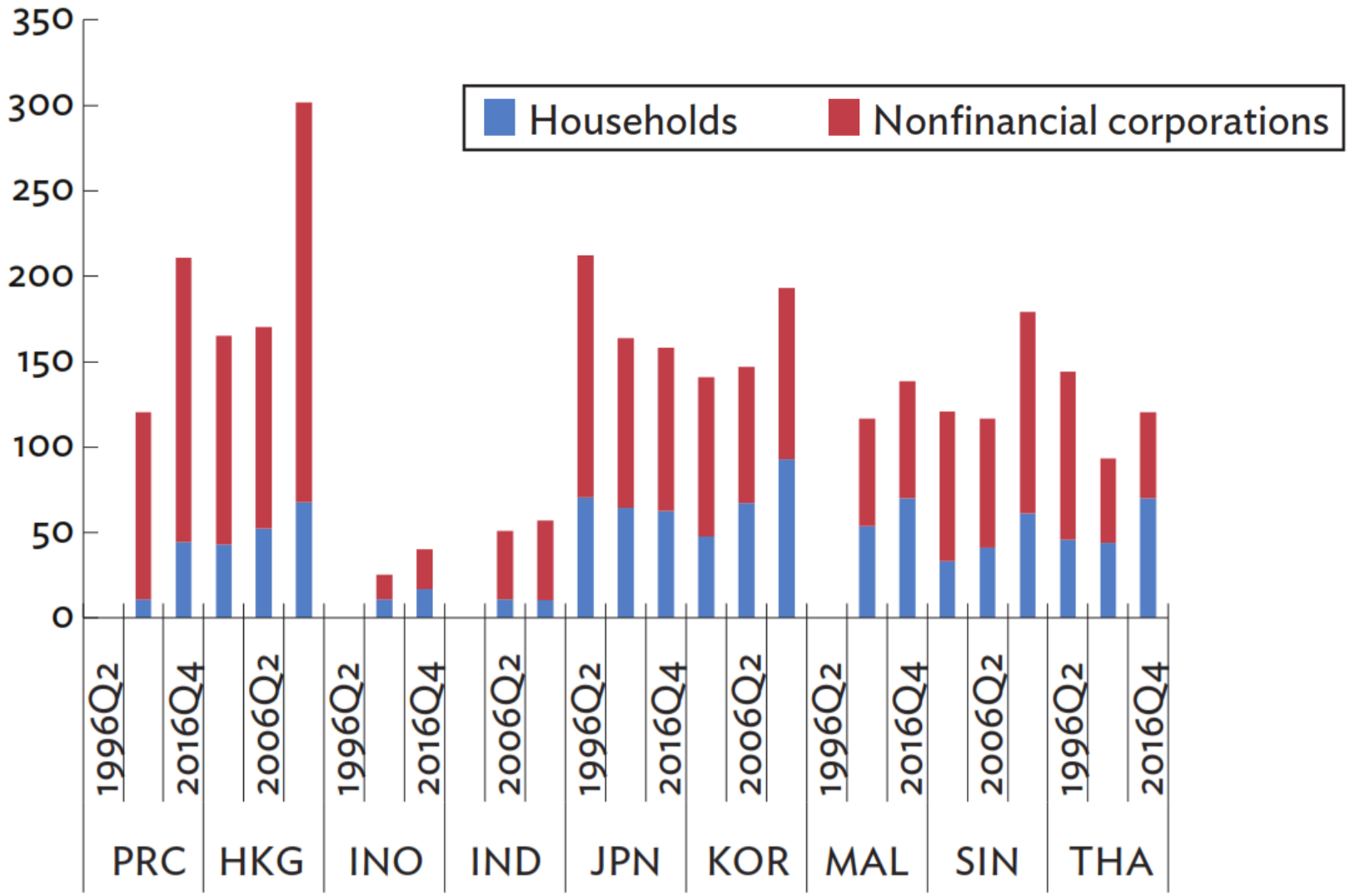
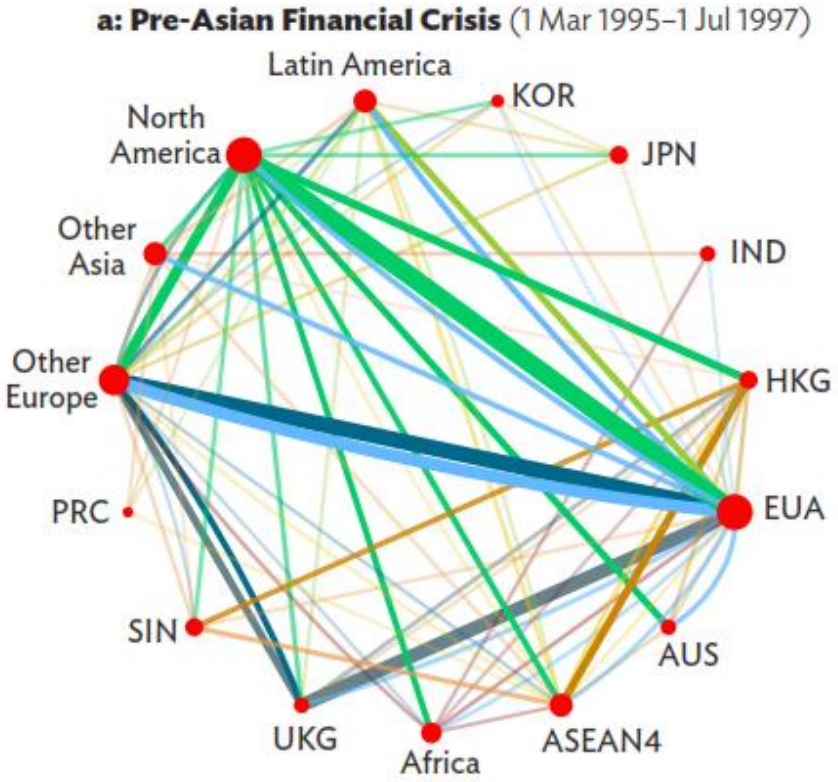
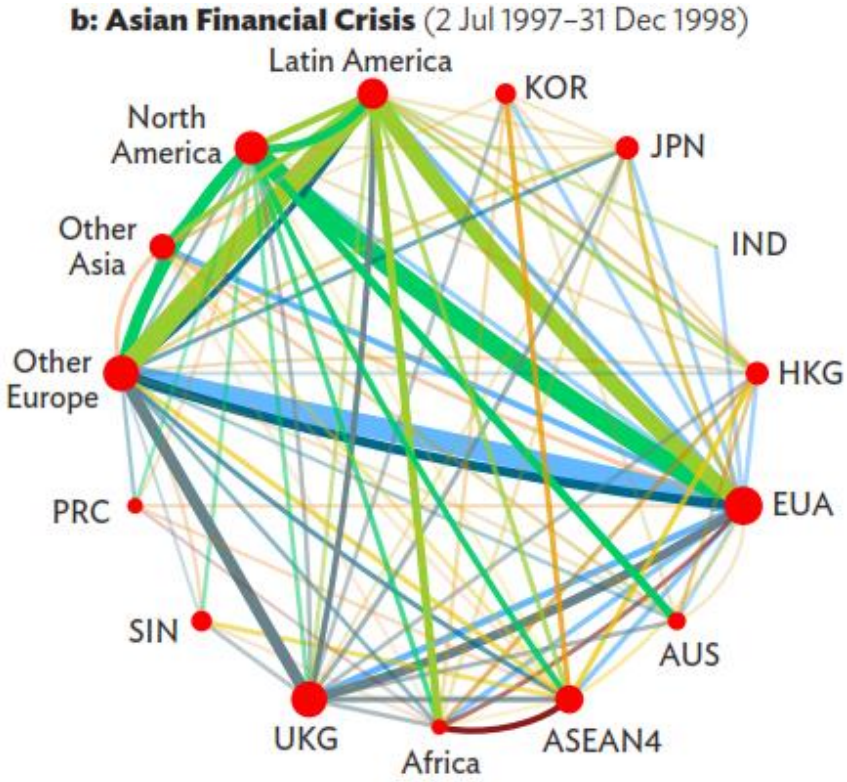


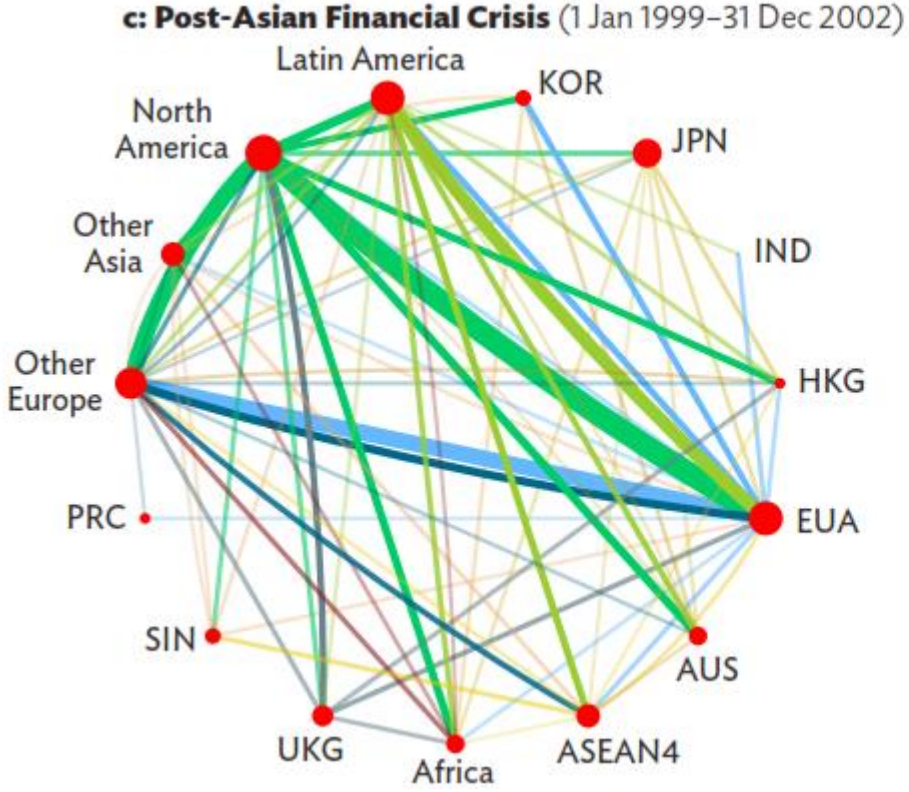
Figure 8.3: Credit to Private Nonfinancial Sector—Selected Asian Economies (% of GDP)



- First, a 1% appreciation of the domestic nominal effective exchange rate increases the LC spread by 8.7 basis points, indicating that exchange rates affect the economy through the trade channel.
- Second, a 1% appreciation of the domestic bilateral exchange rate against the US dollar decreases the LC spread by 5.6 basis points, thereby loosening domestic financial conditions.
- These results show exchange rates affect the economy through both trade and financial channels.
- Column (2) shows that without controlling for the trade channel, the bilateral exchange rate against the US dollar has a negligible net effect on financial conditions.
- On the other hand, column (3) indicates that without controlling for the change of bilateral exchange rate against the US dollar, the nominal effective exchange rate still has a significant impact on domestic financial conditions.
- Horse-race regressions between ΔNEER vs. BER_orth and ΔBER vs. NEER_orth reported in columns (4) and (5) further demonstrate pronounced pure effects of the financial and trade channels.
- In sum, the regression results are qualitatively matched with the findings of Hofmann, Shim, and Shin (2017)—that emerging Asian financial markets are particularly susceptible to changes in global dollar funding conditions.


a: Pre-Asian Financial Crisis (1 Mar 1995–1 Jul 1997)
Latin America
KOR
North America
JPN
Other Asia
IND
Other Europe
HKG
PRC
EUA
SIN
AUS
UKG
Africa
ASEAN4


b: Asian Financial Crisis (2 Jul 1997–31 Dec 1998)
Latin America
KOR
North America
JPN
Other Asia
IND
Other Europe
HKG
PRC
EUA
SIN
AUS
UKG
Africa
ASEAN4


c: Post-Asian Financial Crisis (1 Jan 1999–31 Dec 2002)
Latin America
KOR
North America
JPN
Other Asia
IND
Other Europe
HKG
PRC
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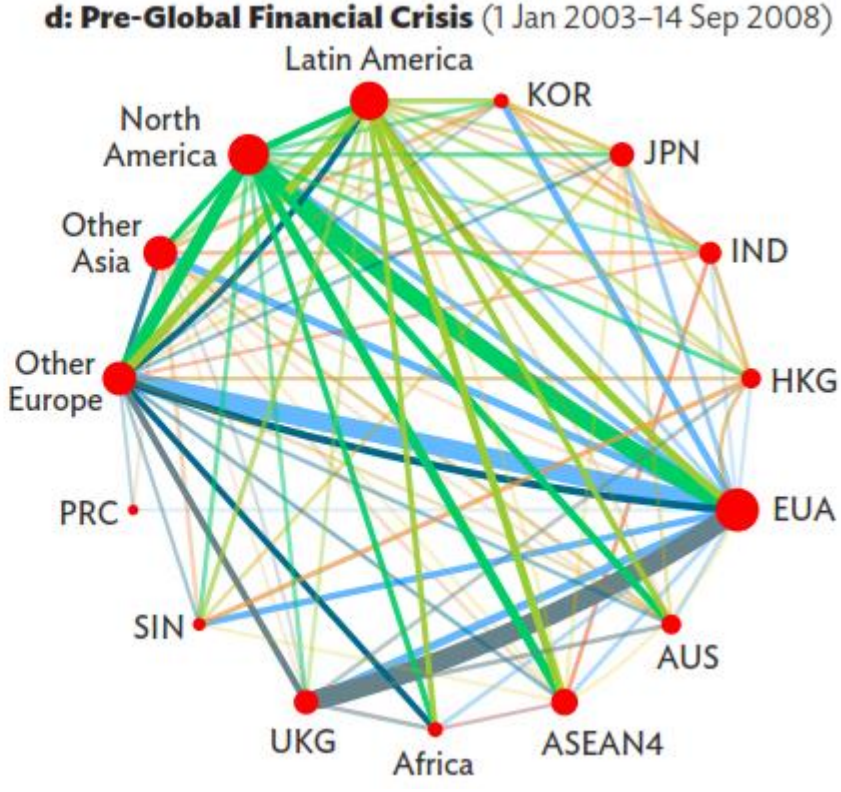
SIN
AUS
UKG
Africa
ASEAN4


d: Pre-Global Financial Crisis (1 Jan 2003–14 Sep 2008)
Latin America
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JPN
Other Asia
IND
Other Europe
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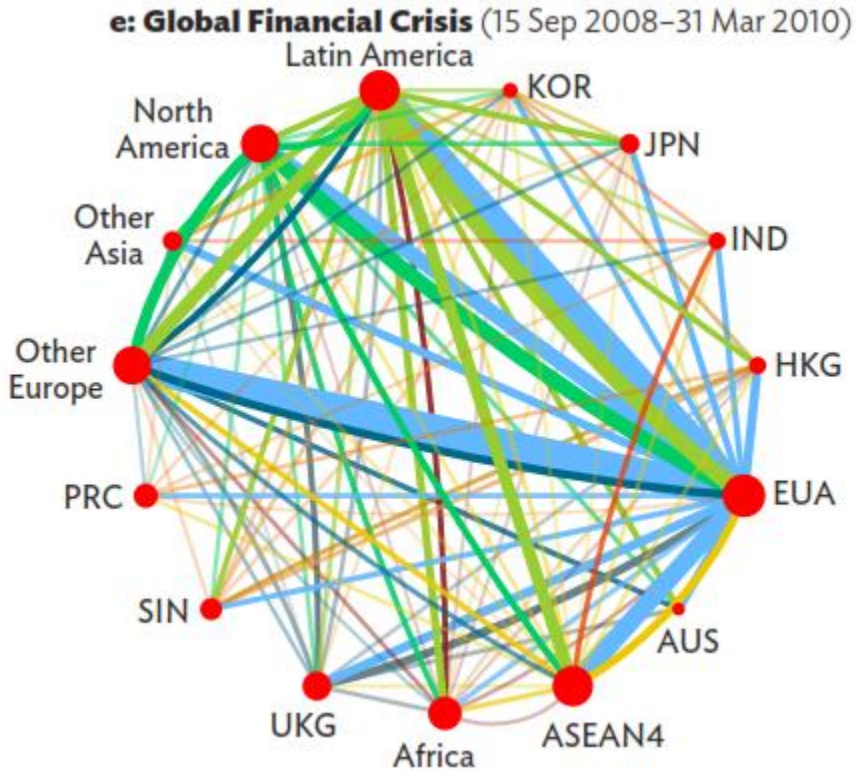
PRC
EUA
SIN
AUS
UKG
Africa
ASEAN4


e: Global Financial Crisis (15 Sep 2008–31 Mar 2010)
Latin America
KOR
North America
JPN
Other Asia
IND
Other Europe
HKG
PRC
EUA
SIN
AUS
UKG
Africa
ASEAN4

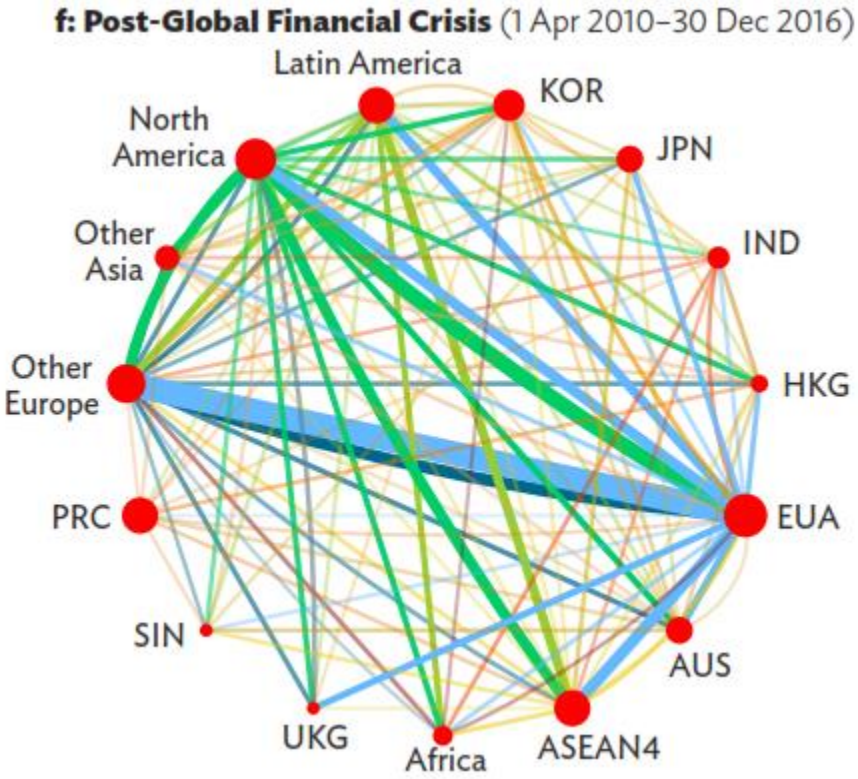

f: Post-Global Financial Crisis (1 Apr 2010–30 Dec 2016)
Latin America
KOR
North America
JPN
Other Asia
IND
Other Europe
HKG
PRC
EUA
SIN
AUS
UKG
Africa
ASEAN4

Table 8.2: Network Statistics

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Panel A						
Average strength	0.0260	0.0235	0.0236	0.0276	0.0260	0.0225
Number of edges	210	305	214	237	389	306
Completeness	0.2570	0.2252	0.1820	0.2034	0.2734	0.1990
Panel B						
Phase 1 to Phase 2	**Phase 2 to Phase 3**	**Phase 3 to Phase 4**	**Phase 4 to Phase 5**	**Phase 5 to Phase 6**		
Edges Formed						
0.0194	0.0169	0.0208	0.0225	0.0211		
264	159	180	306	233		
0.1608	0.0968	0.1163	0.1864	0.1424		
Edges Removed						
0.0206	0.0196	0.0180	0.0207	0.0229		
169	250	157	154	316		
0.1640	0.1536	0.1020	0.0994	0.1957		

Notes: The average link strength is estimated from the connectedness of each respective network. The number of edges was calculated using bivariate Granger causality tests between network nodes (entities). For the definition of phases 1-6, see Box 8.2.

Sources: ADB calculations using data from Bloomberg (accessed February 2017): and methodology based on Dungey et al. (2017a).

- The analysis shows the complexity of expanding financial networks and highlights a growing internationalization and interconnectedness of Asian financial markets.
- Overall, the empirical results show interconnectedness increases during periods of stress, followed by a decrease during recovery phases, with the average strength of linkages growing pre-crisis, before declining significantly.
- The changing magnitude of the linkages is also worth noting, as the strength of market connections change from being very tight to being loose, with the number of weak links growing and the number of strong links decreasing.
- The number of links common to two adjacent time periods—the Jaccard similarity statistic also increases over time before decreasing following the GFC.
- During the GFC, the number of links jumped dramatically to 389 before declining again to a level similar to the AFC.

To measure the extent to which capital outflows from emerging economies during the GFC were triggered by direct and indirect exposures vis-à-vis crisis-affected advanced economies, the following regression equation for all three exposure definitions is applied:

$$Koutflow_i = \beta_0 + \beta_1 DE^j_{i,2007} + \beta_2 IDE^j_{i,2007} + \beta_3 X_{i,2007} + \varepsilon_i, j=f,b,s$$

where $DE^j_{i,2007}$ and $IDE^j_{i,2007}$ are measures of direct and indirect exposure in Q4 2007, while $X_{i,2007}$ captures other control variables of economy *i* at time *t*, that include aggravation of current account balances, real exchange rate appreciation before the GFC, increase in domestic credit-to-gross domestic product (GDP) ratio, inflation rate, and real GDP growth rate.[j]

Table 8.4: Impact of Direct and Indirect Exposures of the Banking Sector on Capital Outflows during the Global Financial Crisis

Variables	(1) Outflow	(2) Outflow	(3) Outflow	(4) Outflow
Direct exposure of banking sector	0.257*** [0.075]	0.228** [0.085]	0.282*** [0.078]	0.253*** [0.086]
Indirect exposure of banking sector			0.722** [0.285]	0.359 [0.269]
Increase in current account deficit (2004–2007)		-0.006 [0.004]		-0.005 [0.004]
Average change in real exchange rate (% annual, 2003–2007)		-0.676* [0.366]		-0.667* [0.355]
Increase in credit to GDP ratio (2004–2007)		0.005** [0.002]		0.004** [0.002]
GDP growth (% annual, 2007)		-0.017* [0.009]		-0.016 [0.010]
Inflation rate (2007)		-0.023*** [0.008]		-0.022*** [0.008]
Chinn-Ito Index (2007)		0.124** [0.060]		0.126** [0.061]
S&P Sovereign Local Currency Credit Rating (2007)		-0.021** [0.010]		-0.020** [0.010]
Observations	60	49	60	49
R-squared	0.111	0.459	0.212	0.483

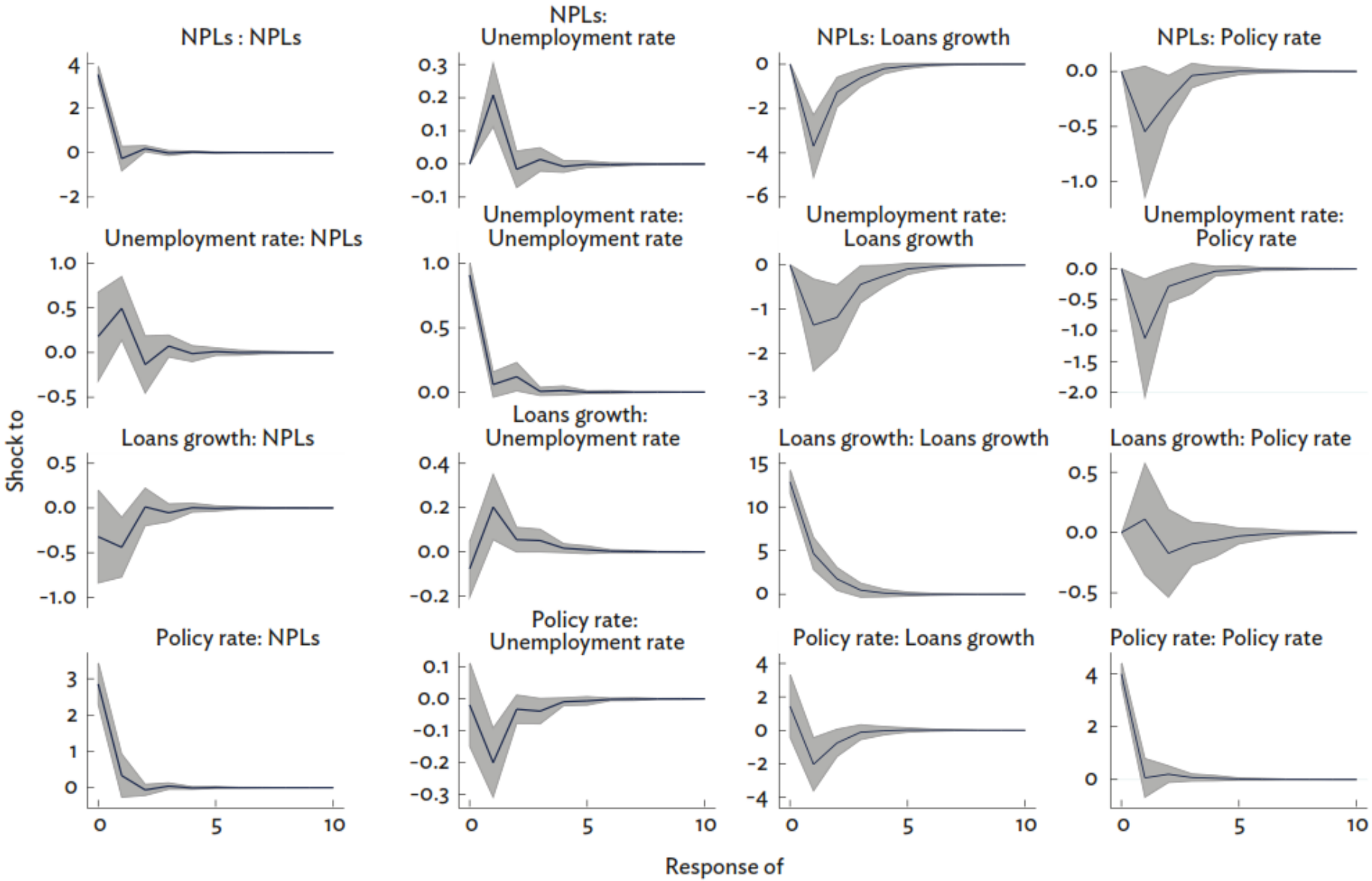
*** = significant at 1%, ** = significant at 5%, * = significant at 10%. GDP = gross domestic product. Robust standard errors in brackets.

The following economy-level data on financial and macroeconomic variables were used:

nplr	NPL ratio defined as the ratio of NPLs to total loans of the economy's overall banking system
Δnplr	Change in NPL ratio
Δloans	Loan growth rate defined as the year-on-year growth rate of loans of the overall banking system
Δgdp	Real gross domestic product (GDP) growth rate
unemployment rate	The number of unemployed as percentage of total labor force
Δunemp	Change in the unemployment rate
Policyrate	Policy rate
Δpolicyrate	Change in policy rate
inf	Inflation rate defined as the year-on-year growth rate of the consumer price index
Δinf	Change in inflation rate

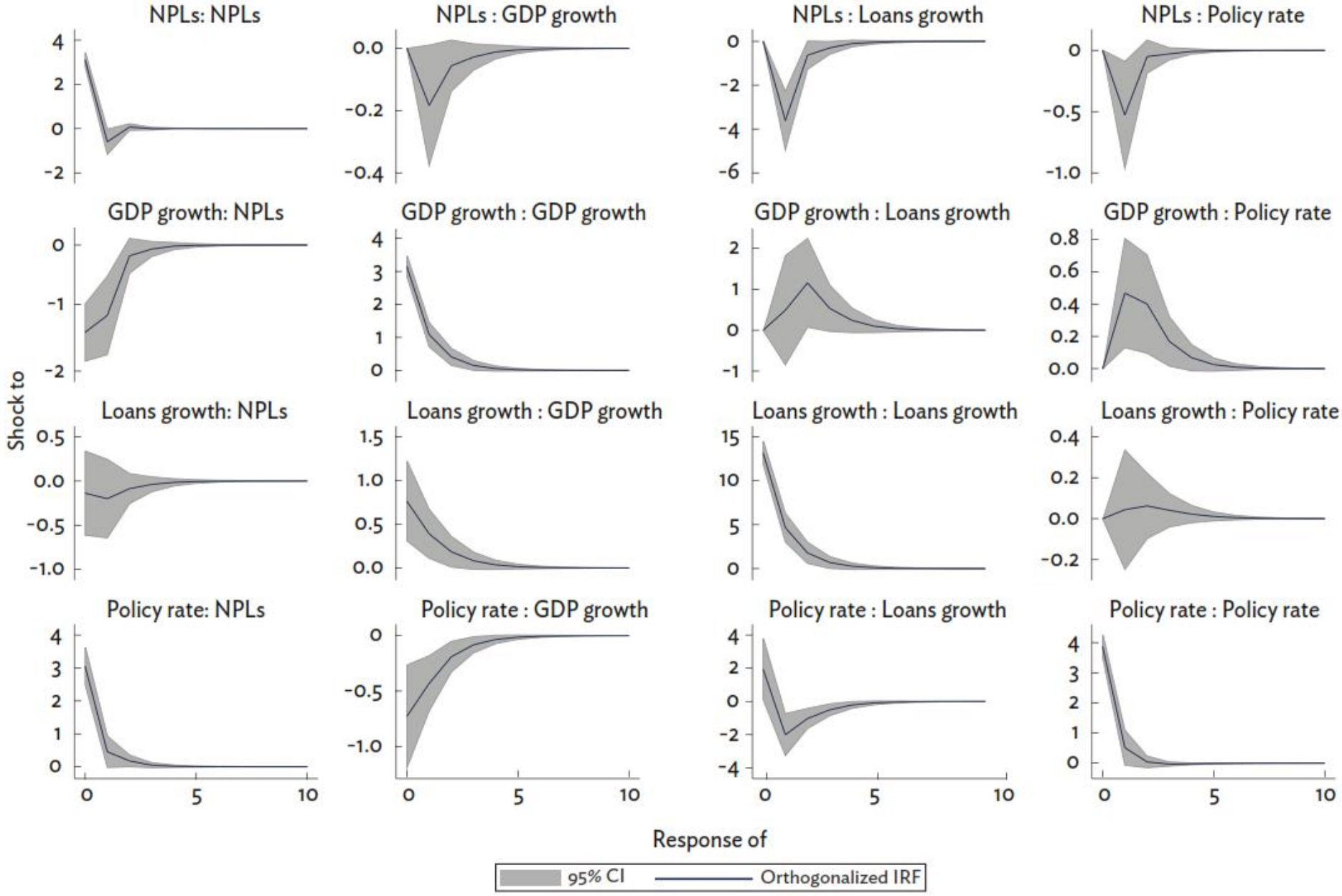
Source: CEIC and Bankscope.

Figure 8.13: Orthogonalized Impulse Response Functions—Baseline Specification



CI = confidence interval, GDP = gross domestic product, IRF = impulse response functions, NPLs = nonperforming loans. Responses are denoted in percentage points.
Note: 95% CI are generated by Monte Carlo draws with 5000 repetitions. Empirical results are derived using Stata 13.
Source: Lee and Rosenkranz (2017).

Figure 8.14: Orthogonalized Impulse Response Functions—Specification 2



- The macrofinancial impact of NPLs may spillover to other economies, transmitted through various channels.
- In an increasingly integrated global financial system, financial shocks can be transmitted across borders with greater speed and frequency.
- The cross-border transmission of the impact of NPLs operates through various channels:

  (i) cross-border bank lending

  (ii) changes in investor confidence

  (iii) changes in bank asset (or liability) value due to financial market fluctuations

  (iv) a trade channel where lower growth in high NPL economies translates into lower import demand (Martin 2017, IMF 2015).