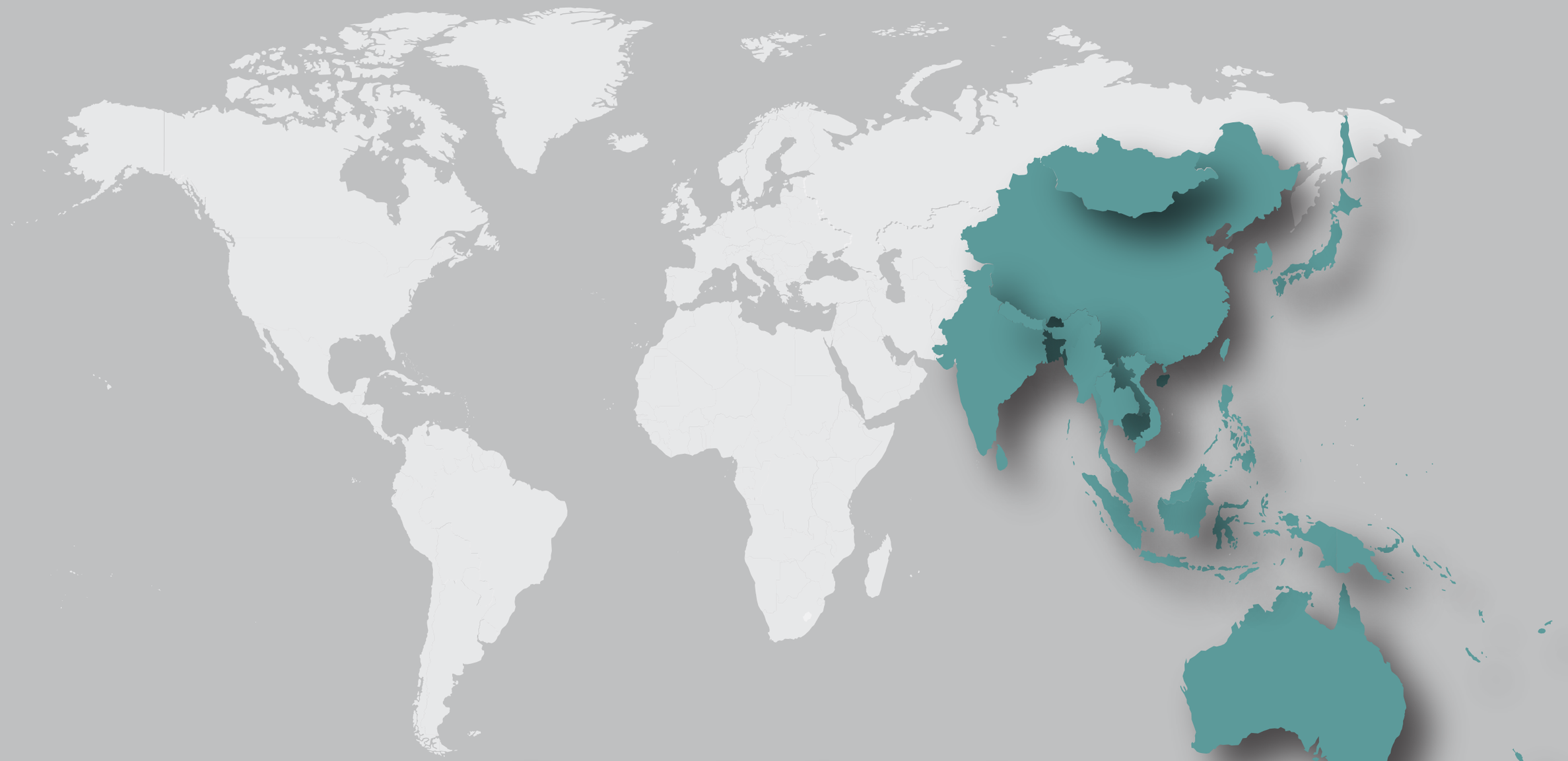
IMF Asia and Pacific Department

Does Growing Trade and Financial Integration Make Asian Economies More Sync?



Romain Duval

April 28, 2014

Key Questions

[1] Have changes in trade and financial integration increased business cycle co-movement in Asia?

[2] What role is China playing for business cycle co-movement in Asia?

[3] What are the policy implications for the future, at both country and regional levels?

Roadmap

Is activity moving more in sync in Asia?

Th rise in trade integration: stylized facts

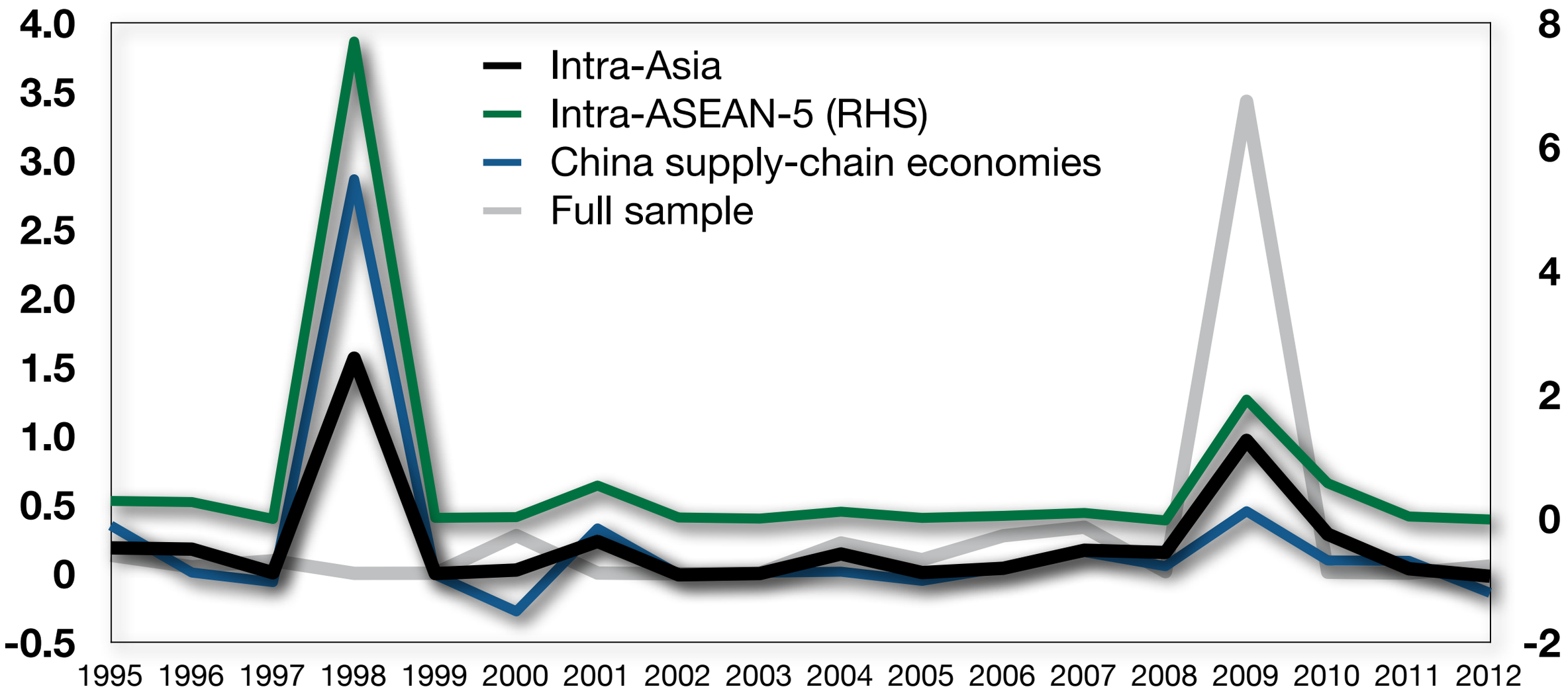
Estimated impact on business cycle co-movement

The role of spillovers from China

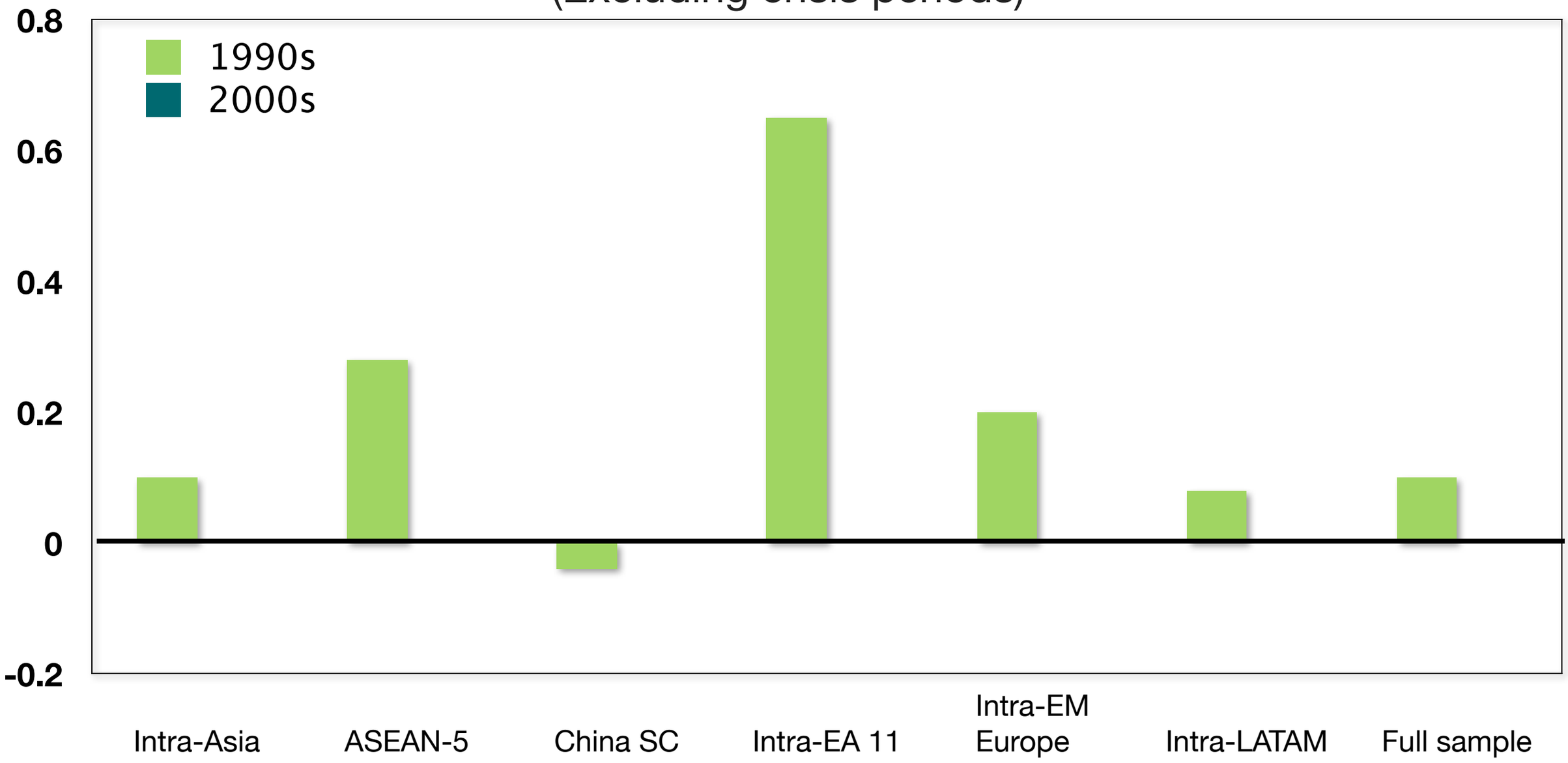
Implications: the future

Co-movement spikes during crises

Median Instantaneous Quasi-correlations by Region



But co-movement is also on the rise in normal times

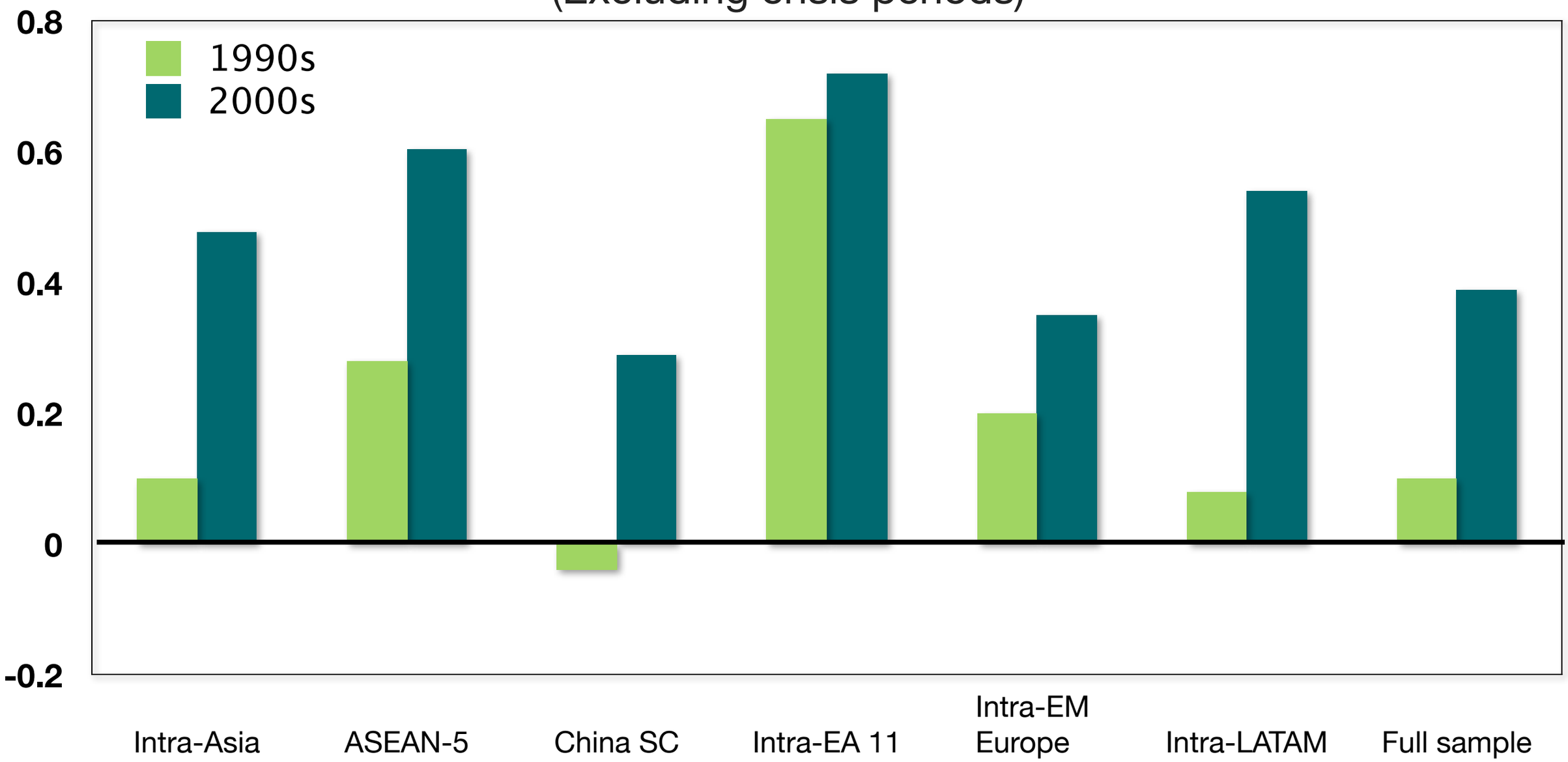


Business cycle co-movement

But co-movement is also on the rise in normal times

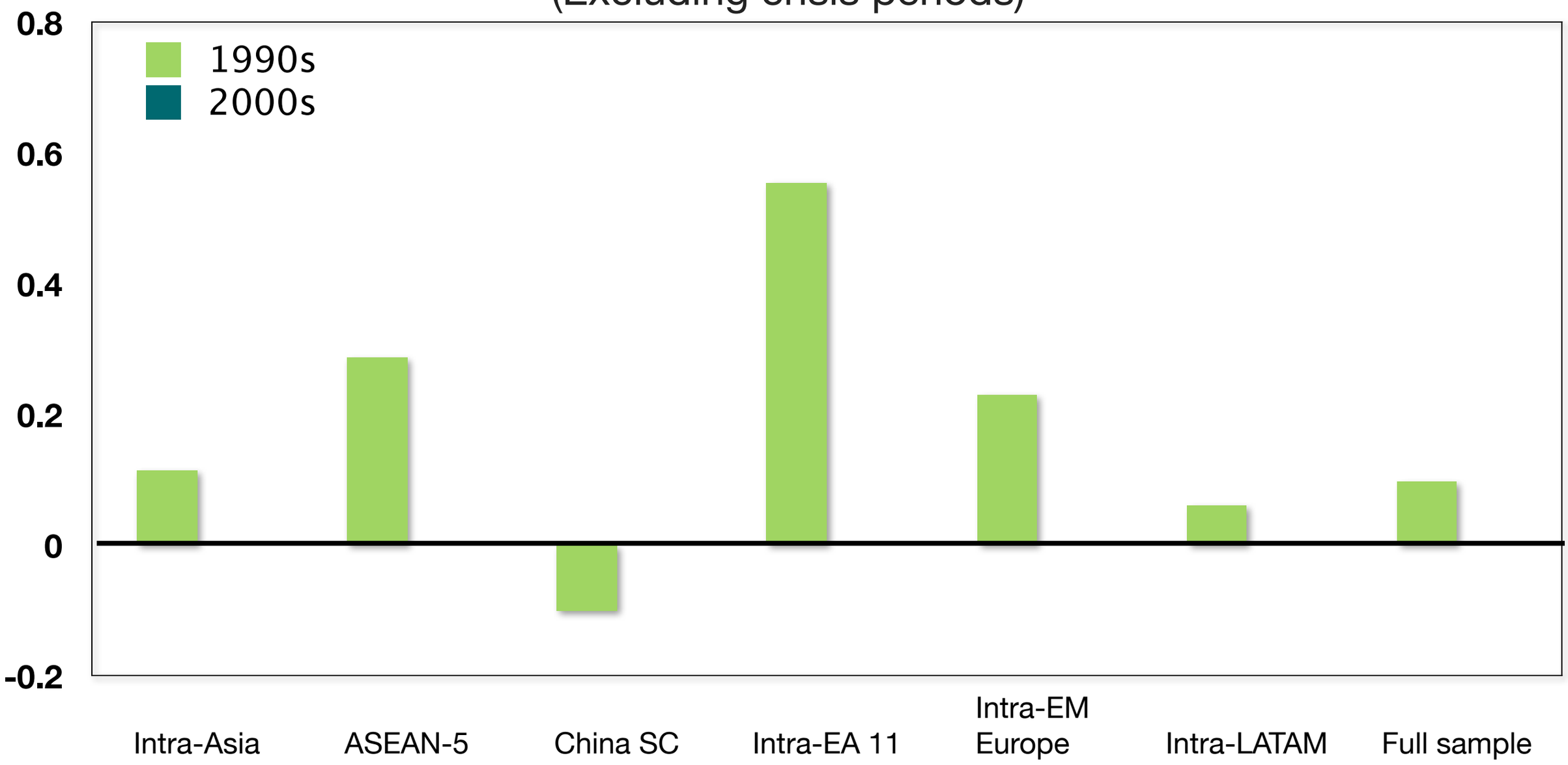
Instantaneous Quasi-Correlation by Region

(Excluding crisis periods)



Business cycle co-movement

...whatever co-movement definition is used



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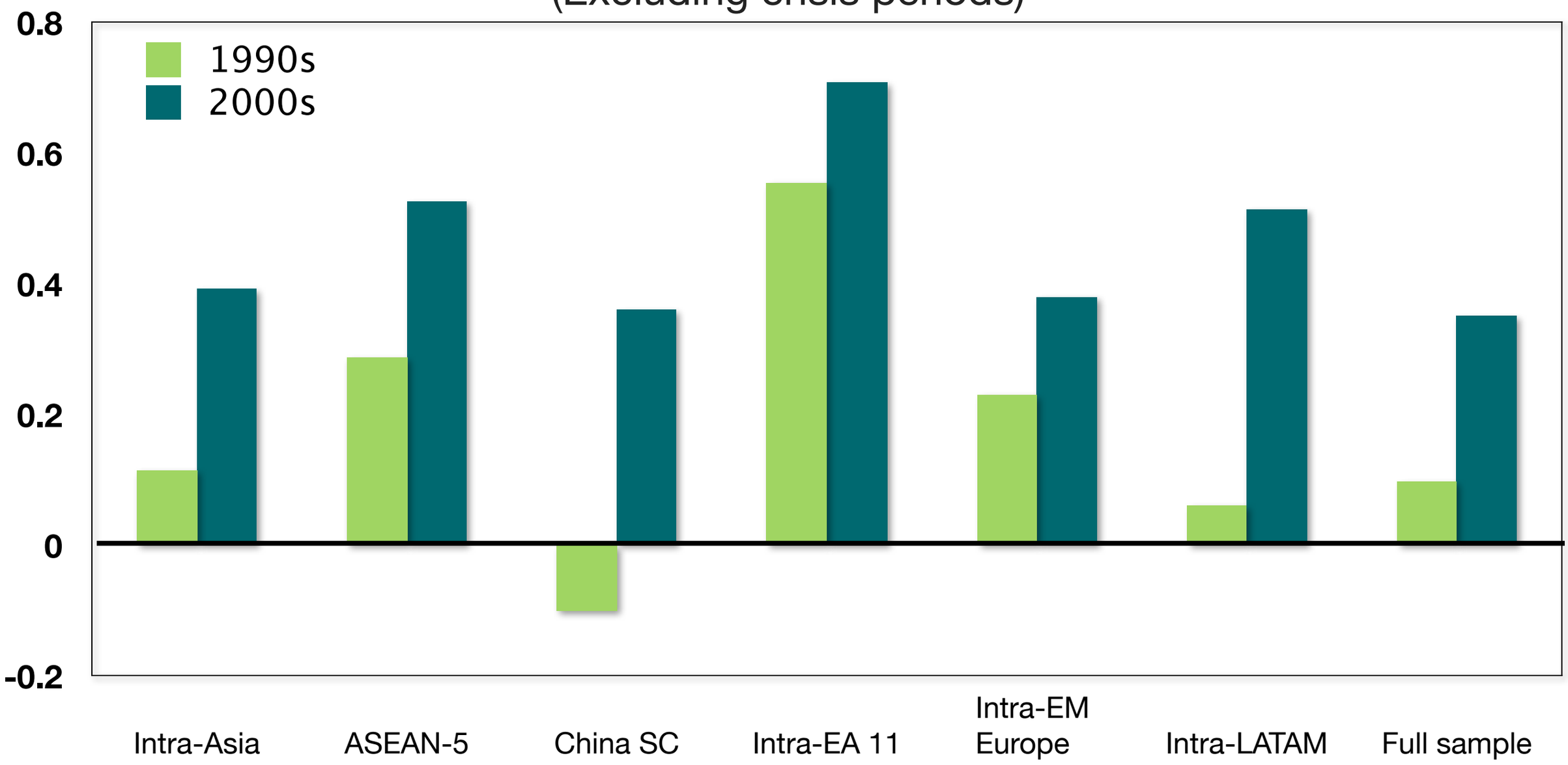
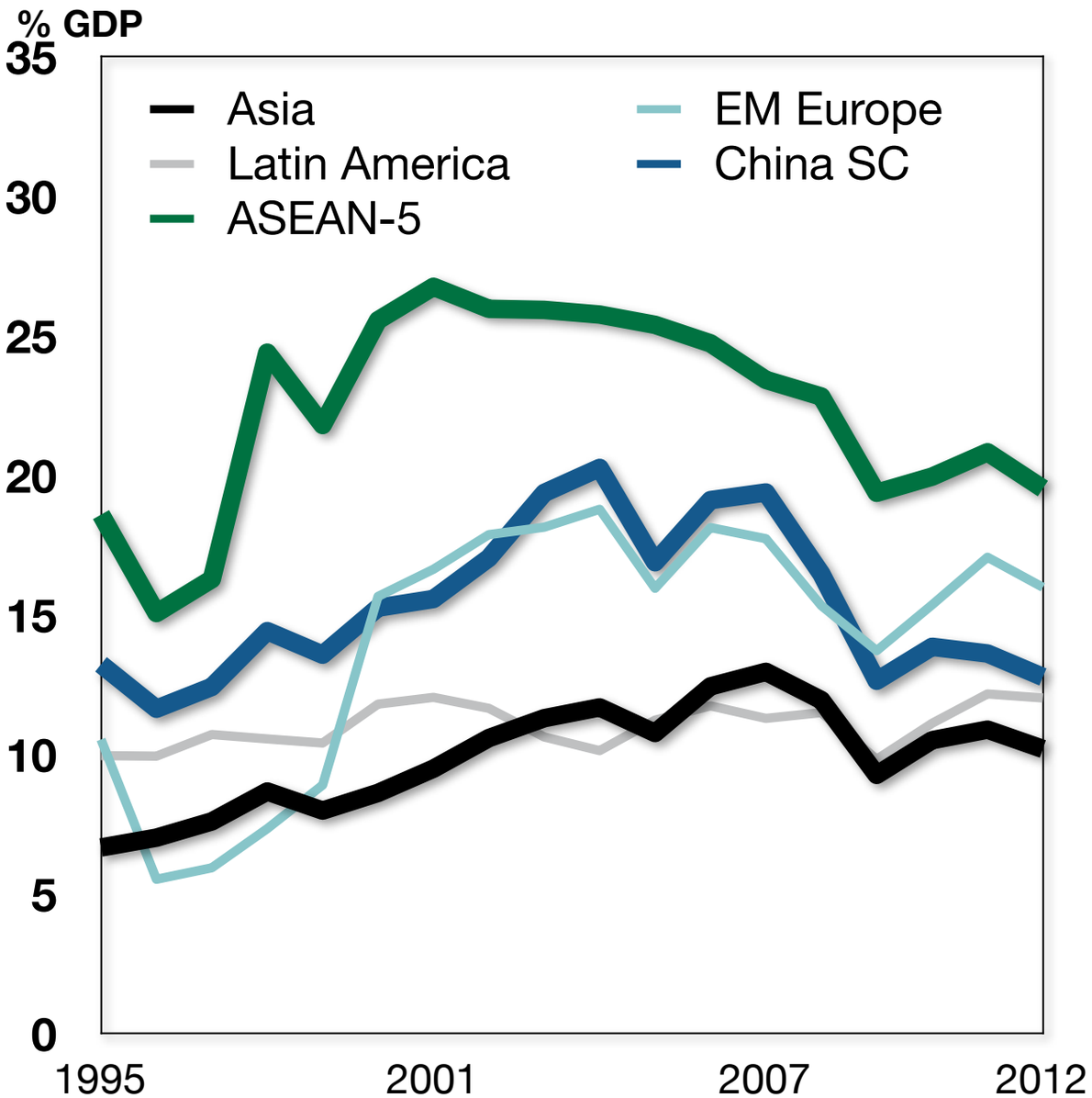
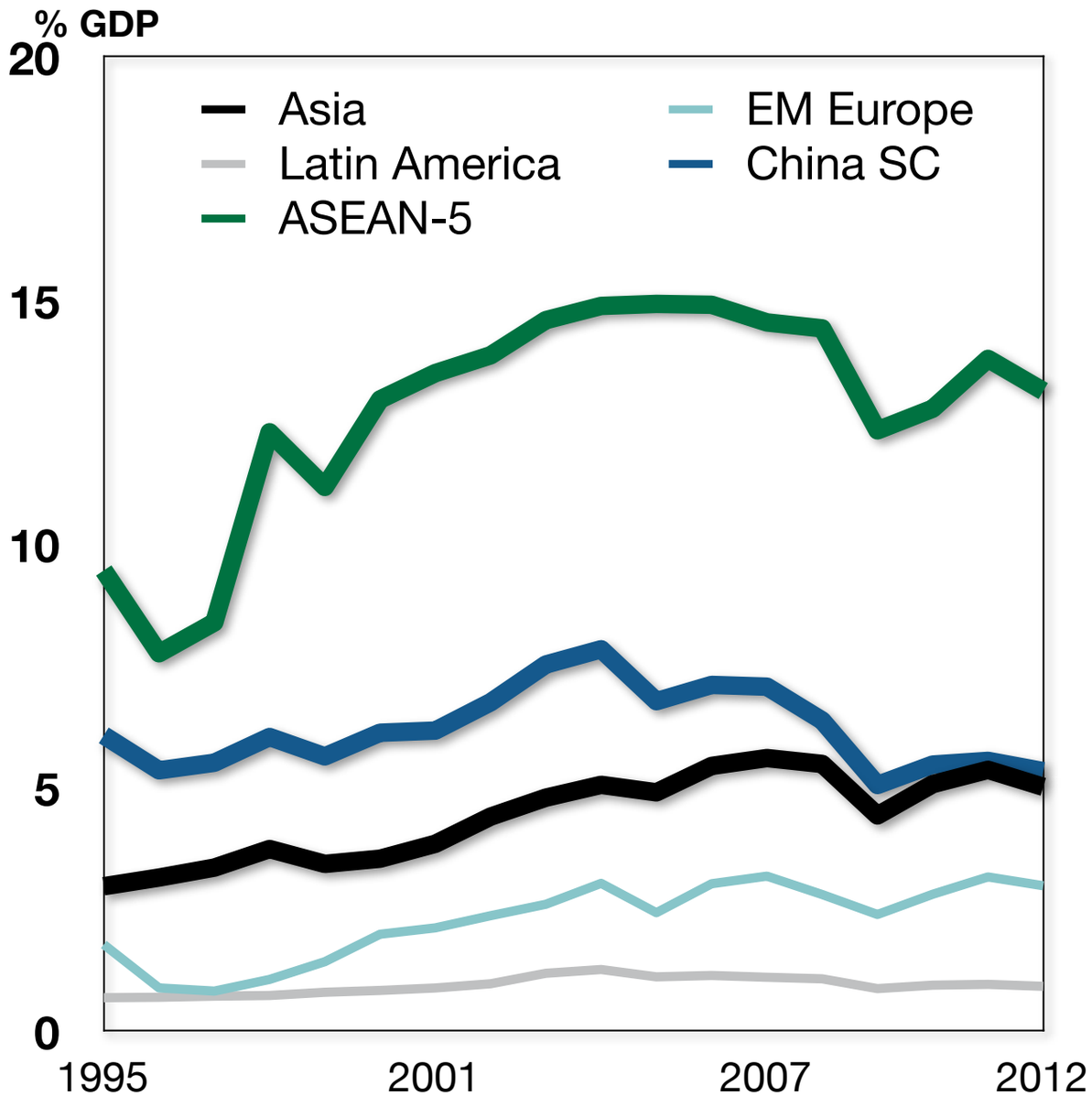


Asia's degree of trade integration: high and rising, although not since the 2000s

Trade Intensity with the World

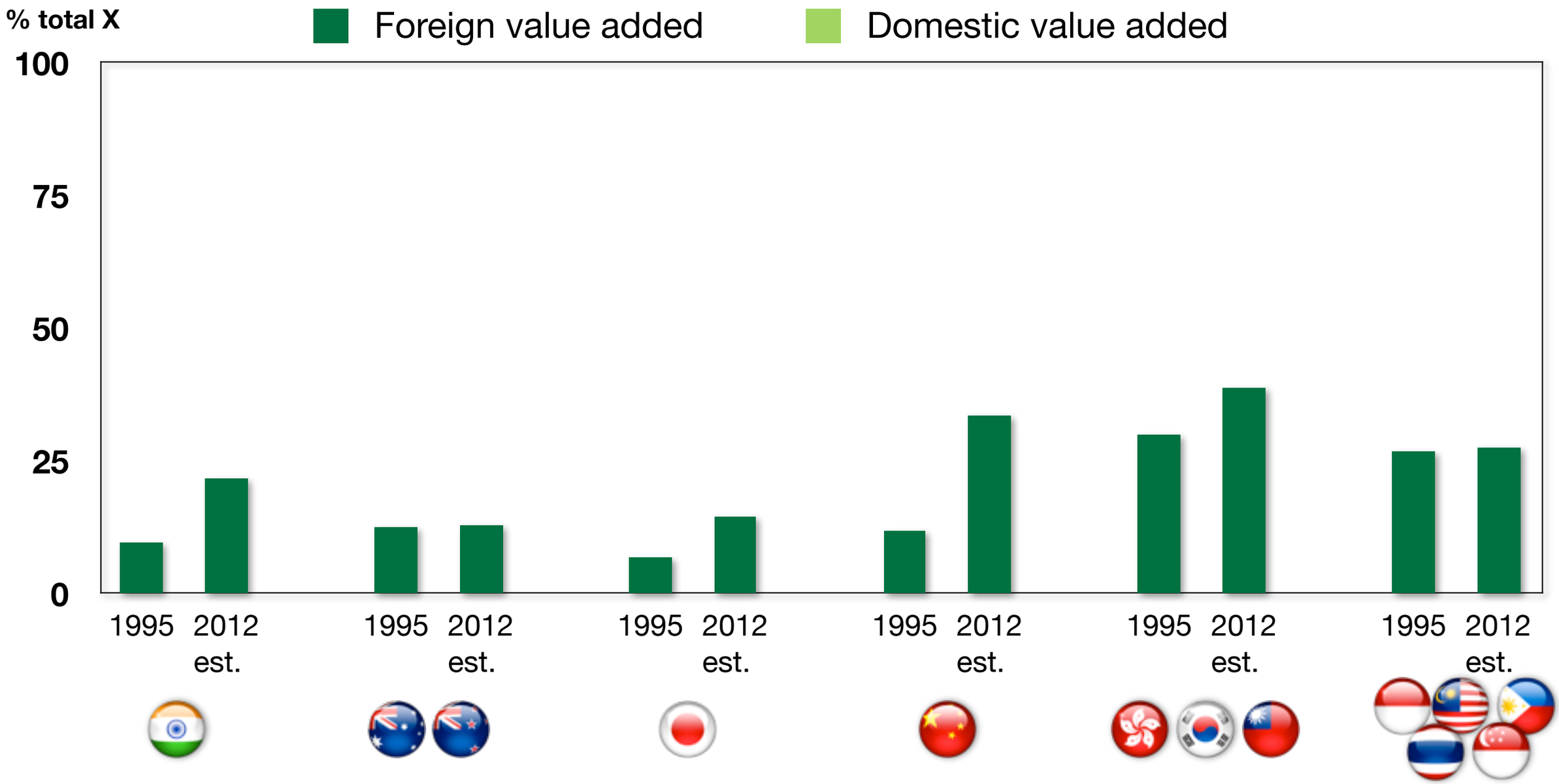


Intra-regional Trade Intensity



Key role of vertical integration, especially the “China supply chain”

Domestic and Foreign Value Added Embodied in Exports



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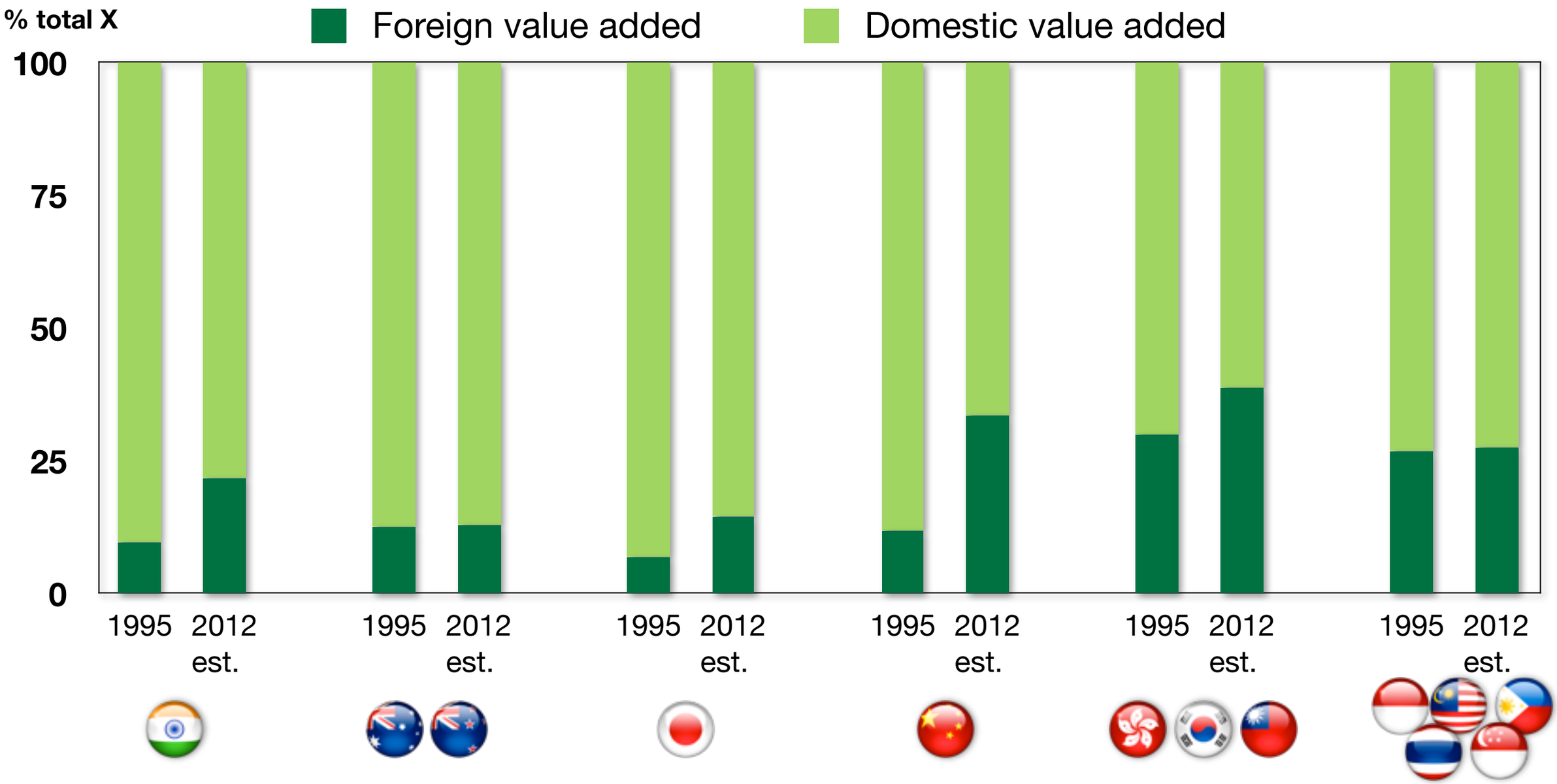
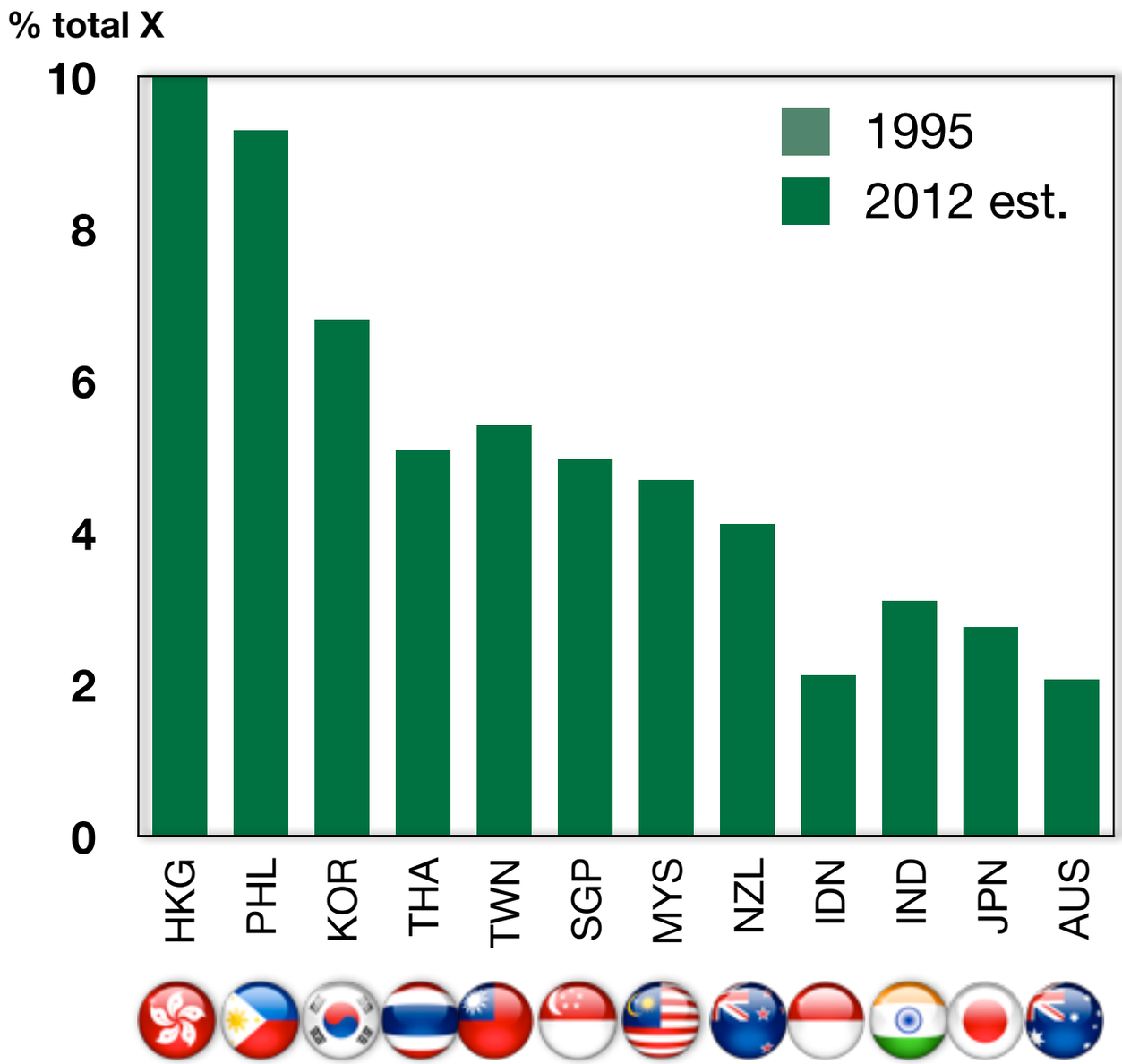
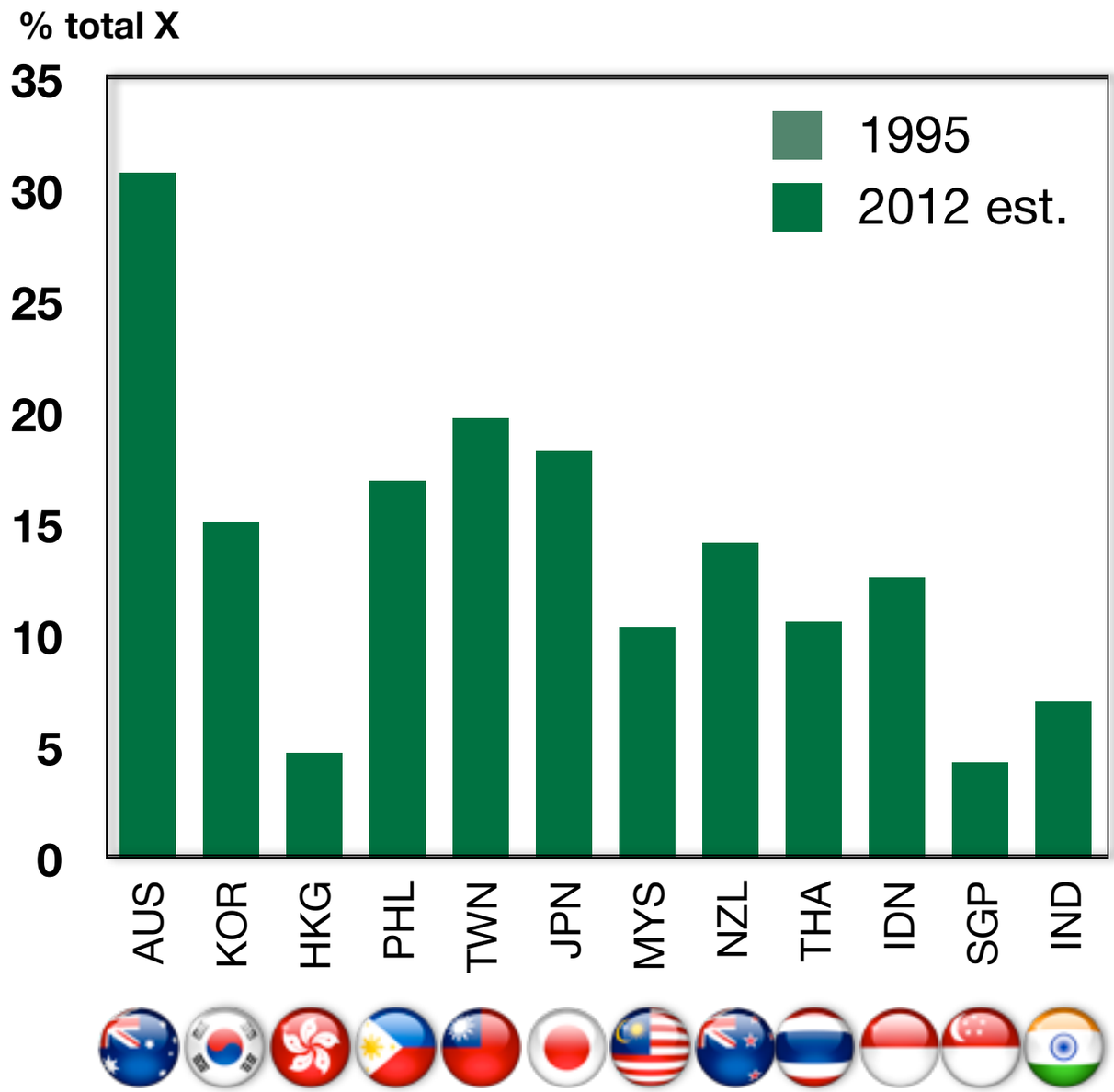


Growing integration with, and dependence on, China...

Foreign Value Added Embodied in each Economy's exports that come from China



Domestic Value Added Embodied in each Economy's exports to China



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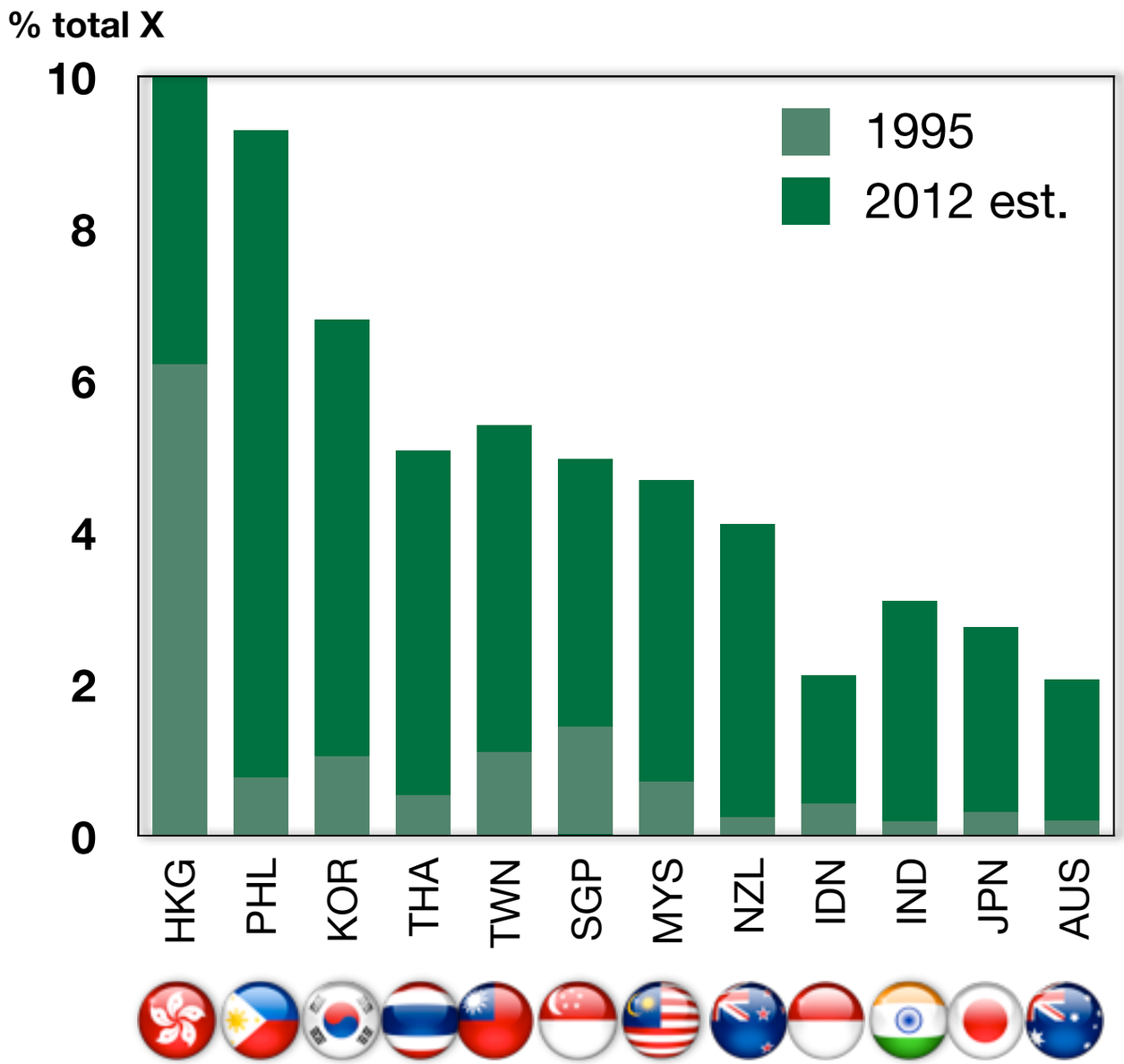

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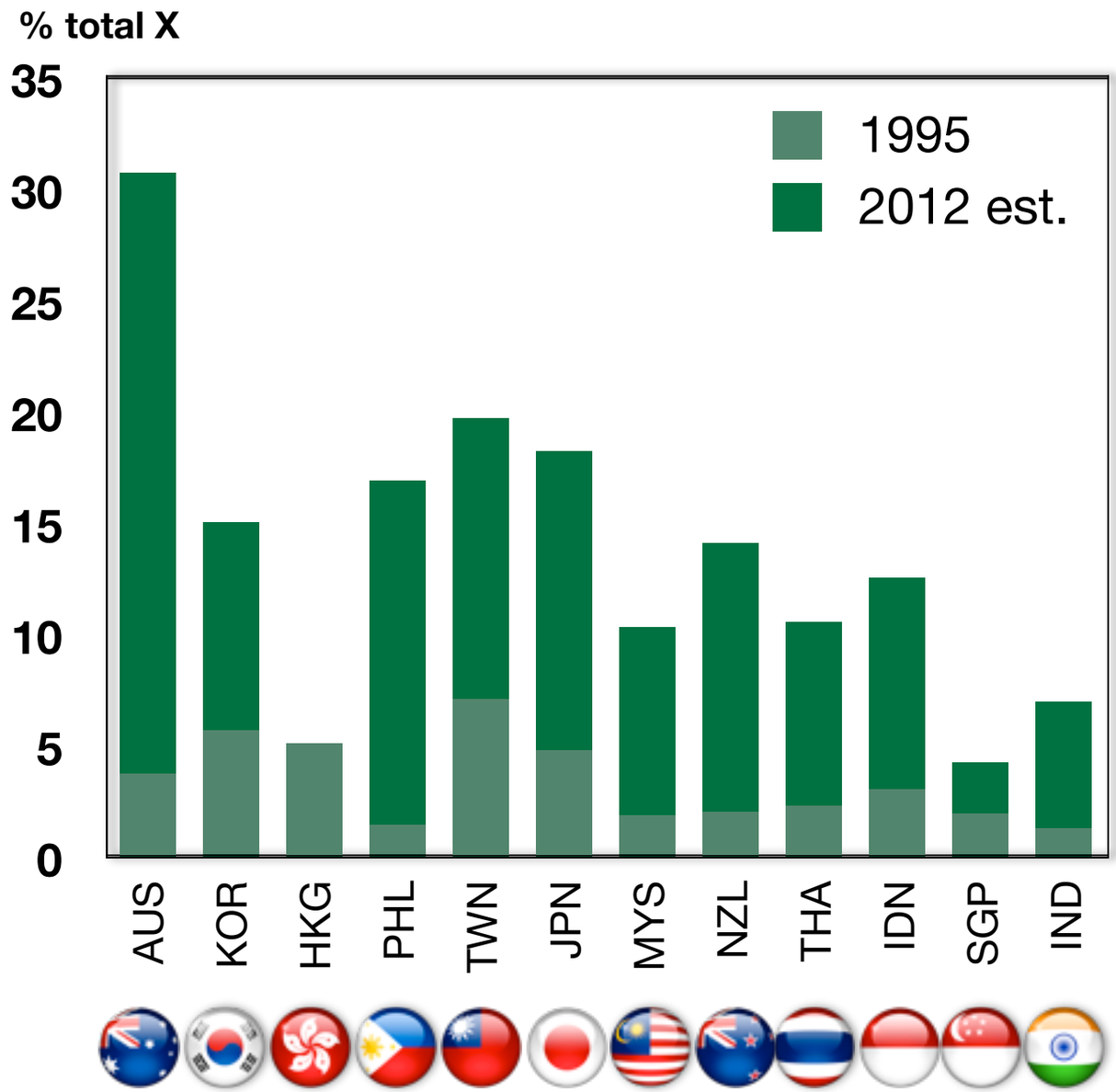

...and declining integration with, and dependence on, Japan

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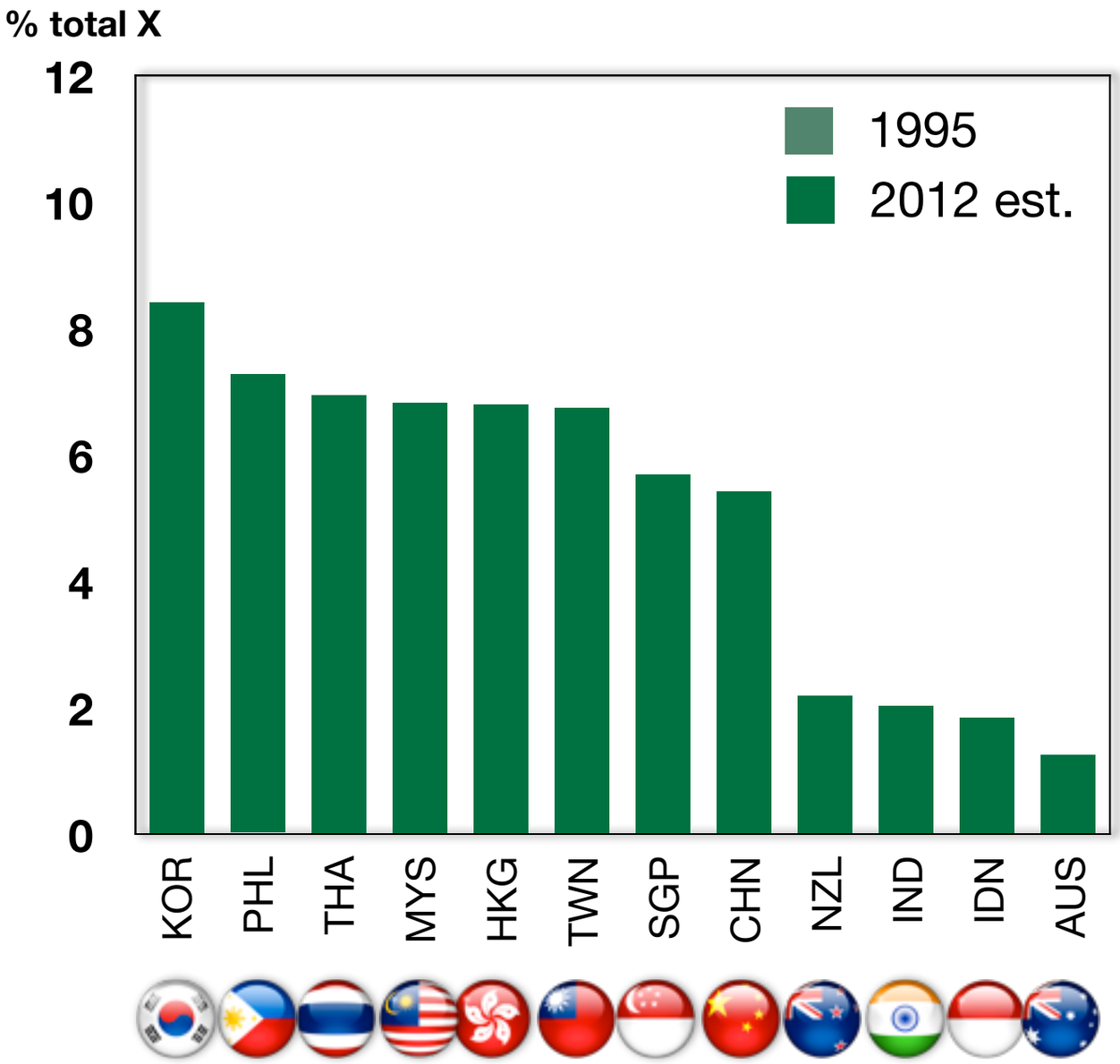

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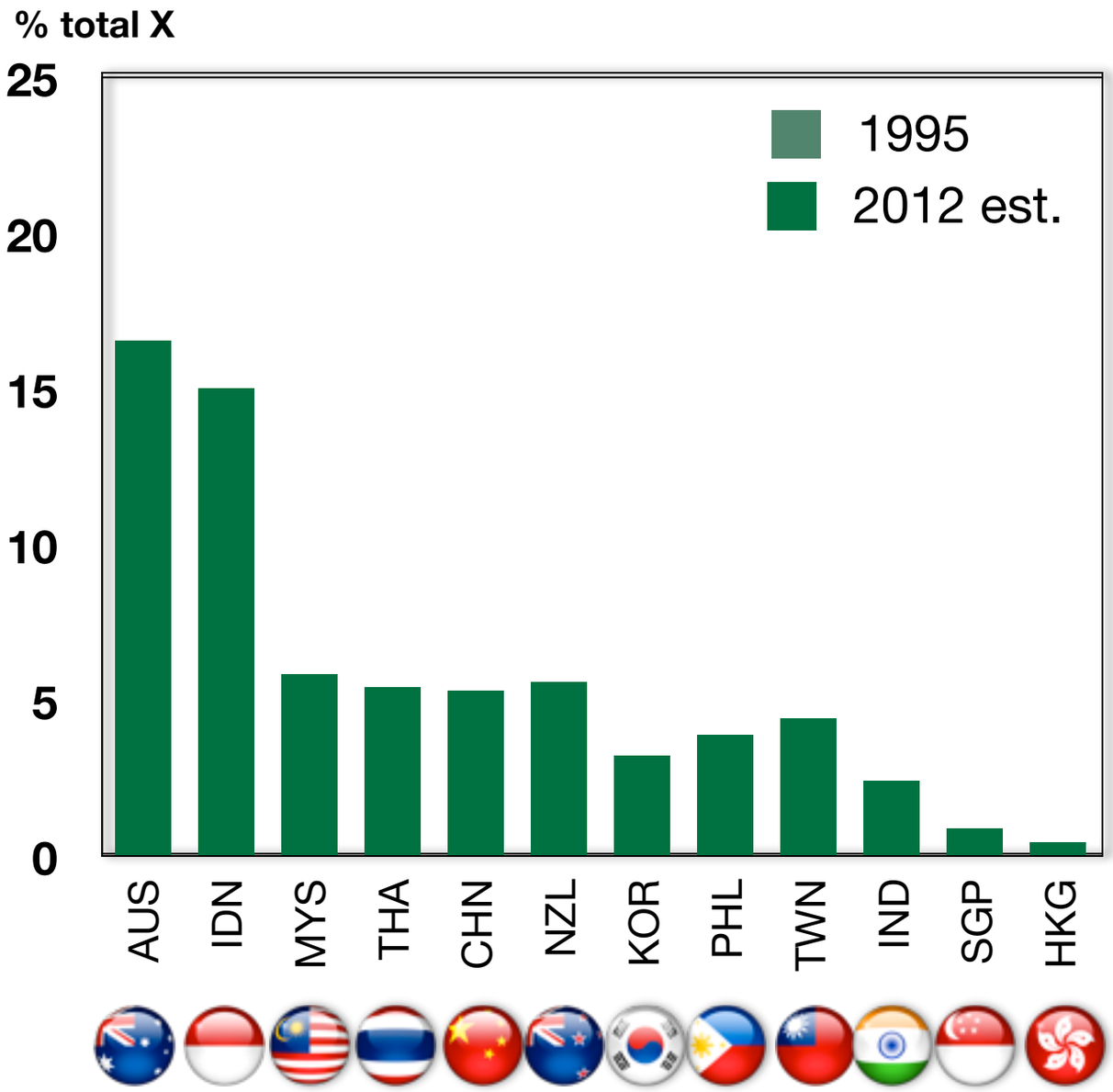

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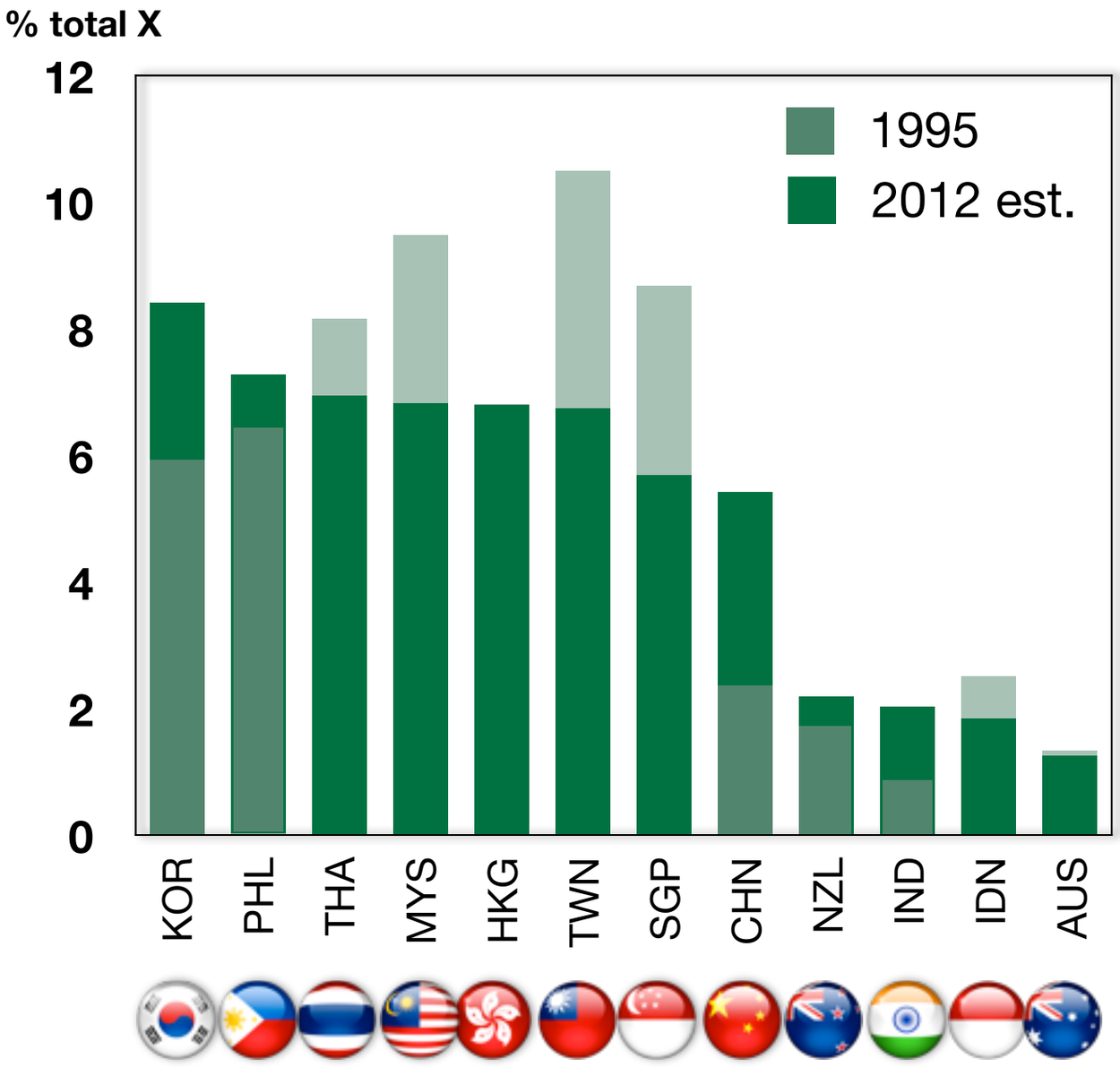

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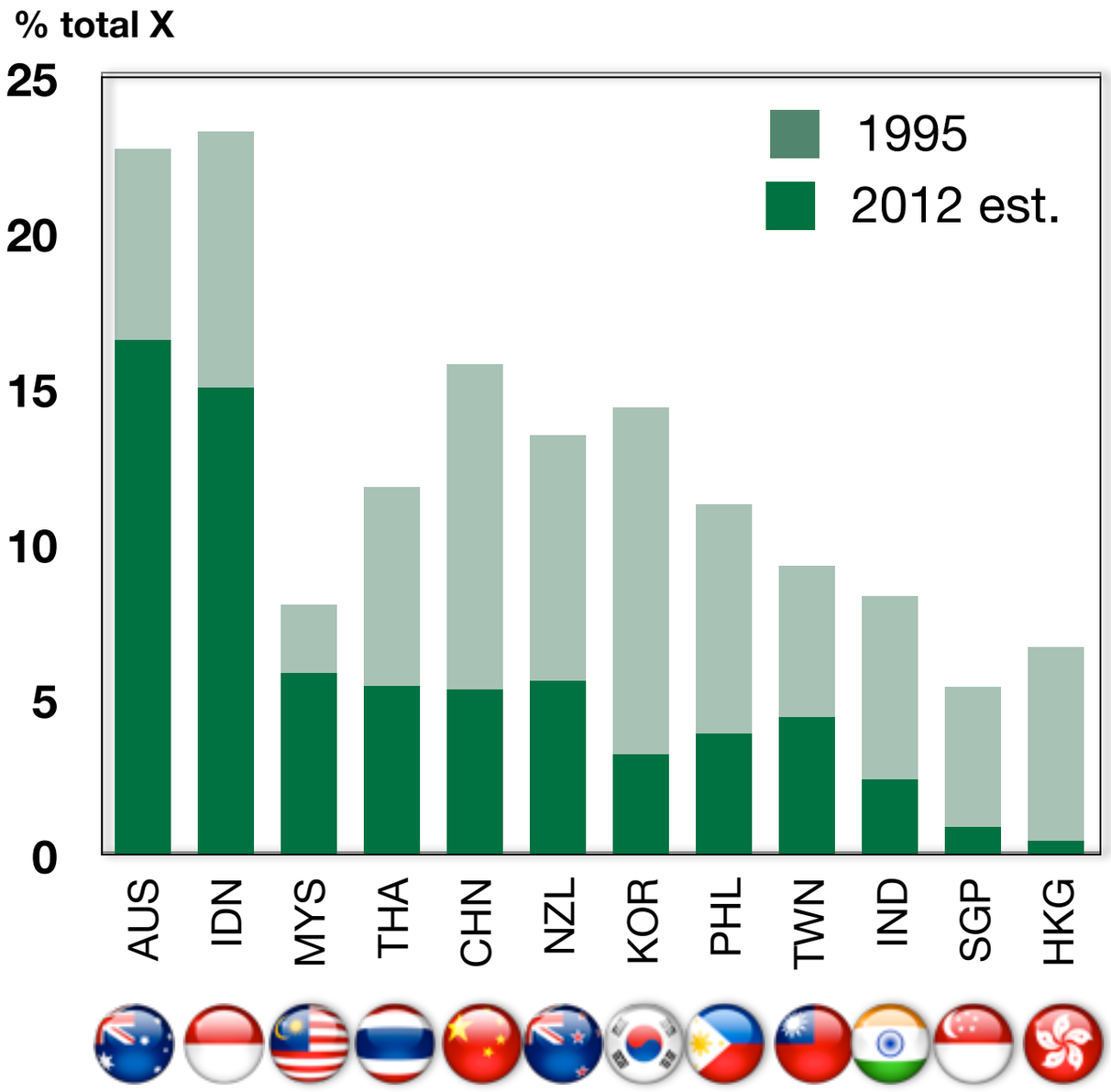
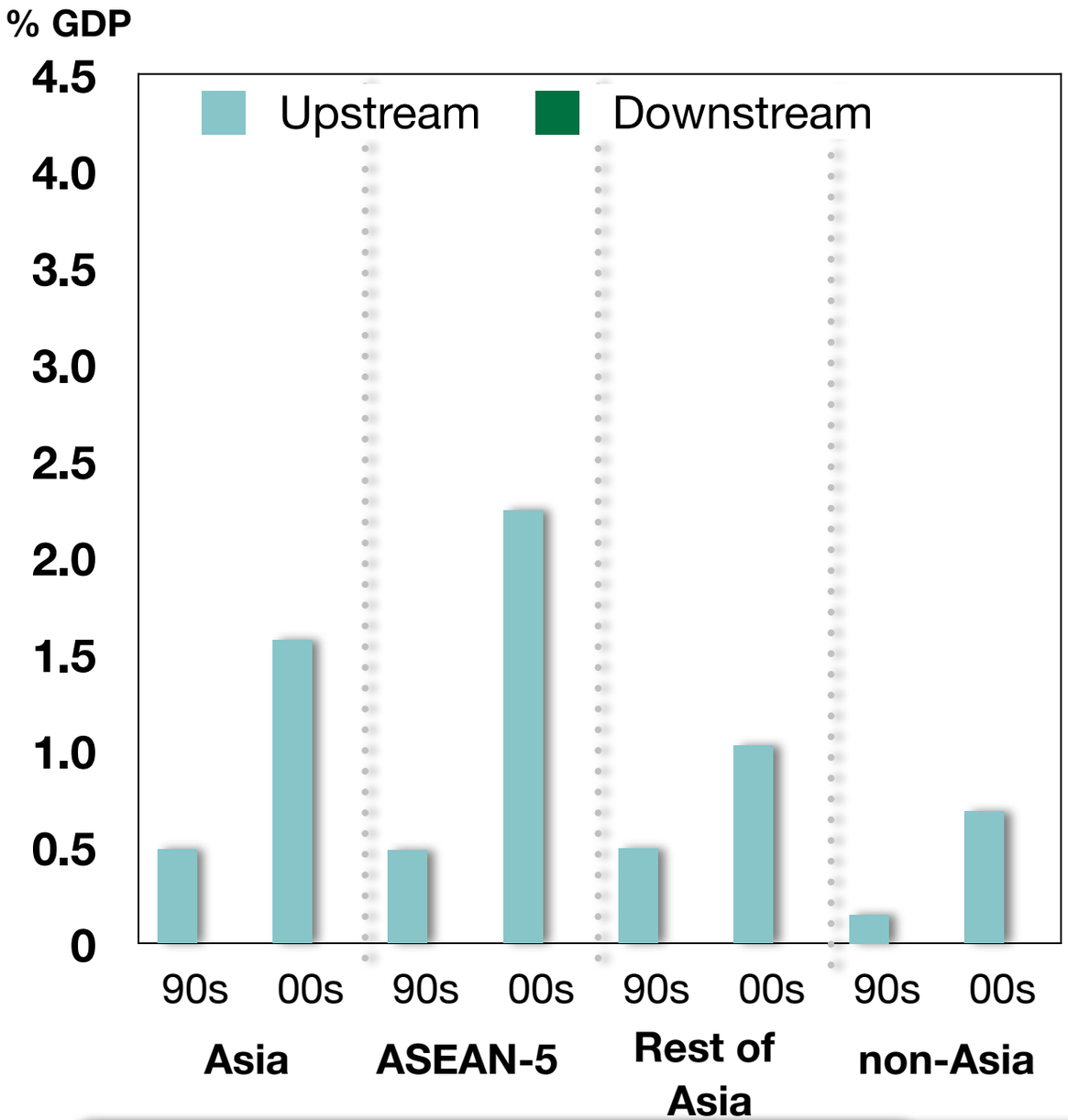


China's and Japan's positions in regional supply chain have also diverged

Median Vertical Trade with China



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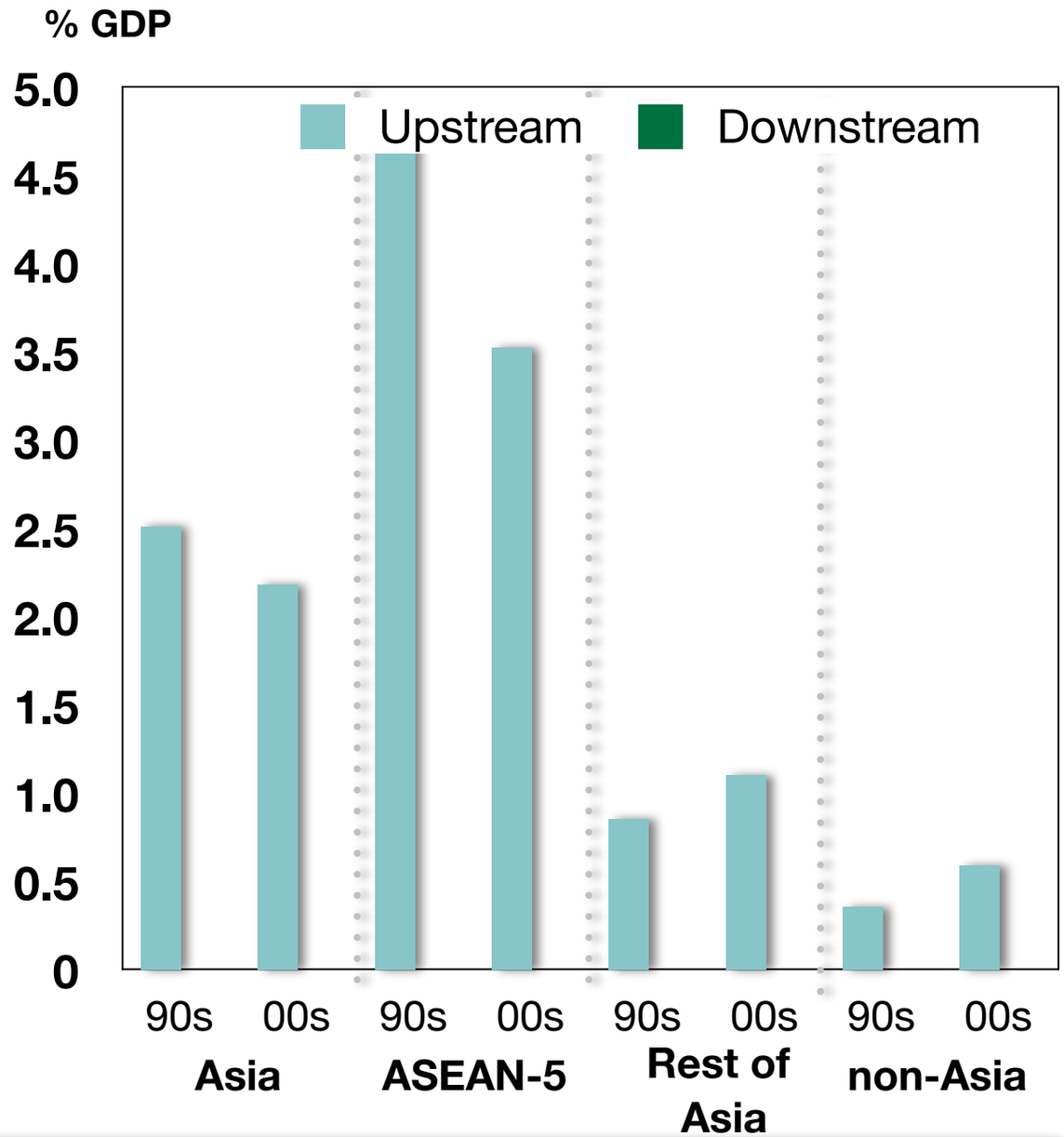

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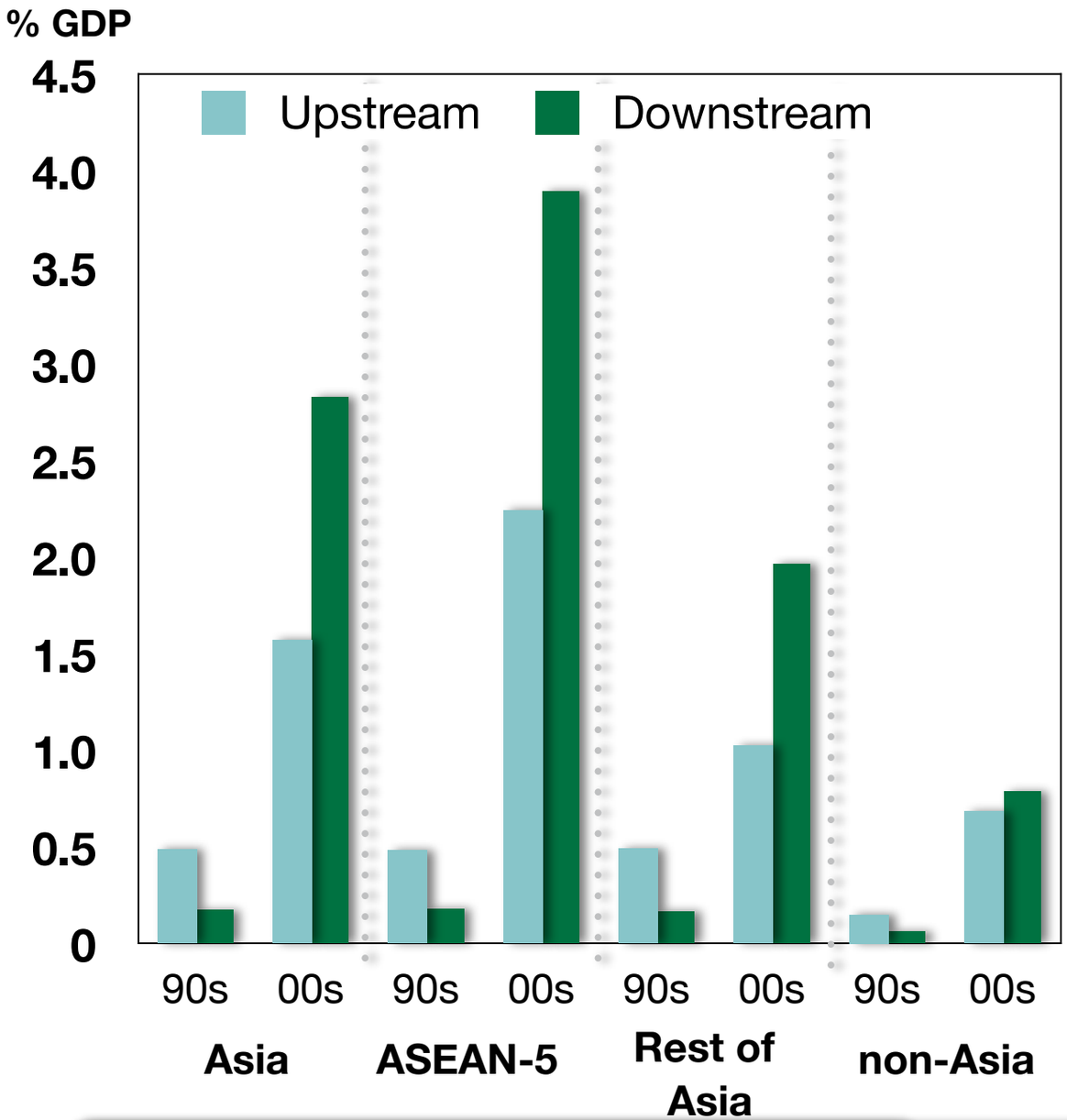

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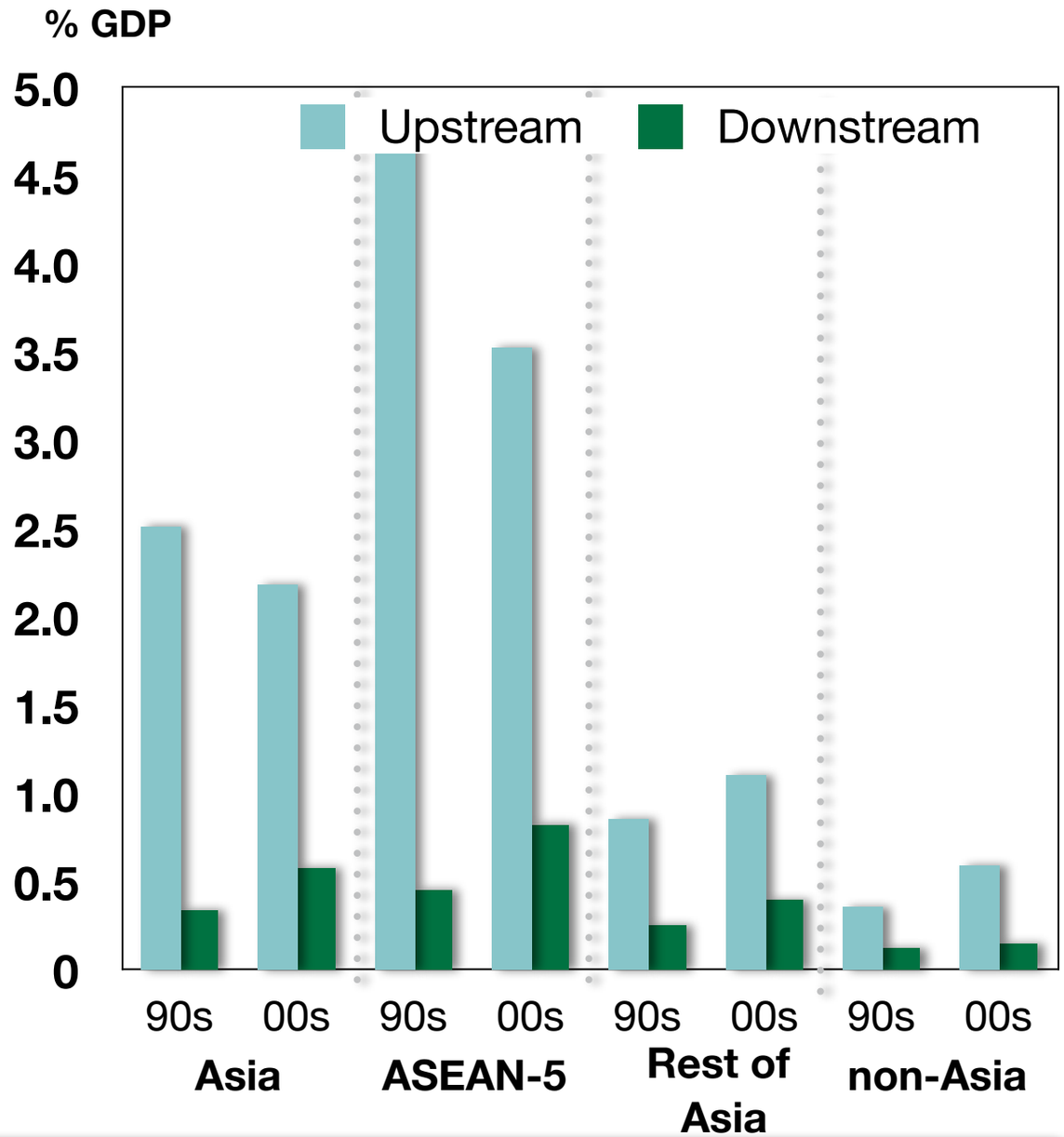
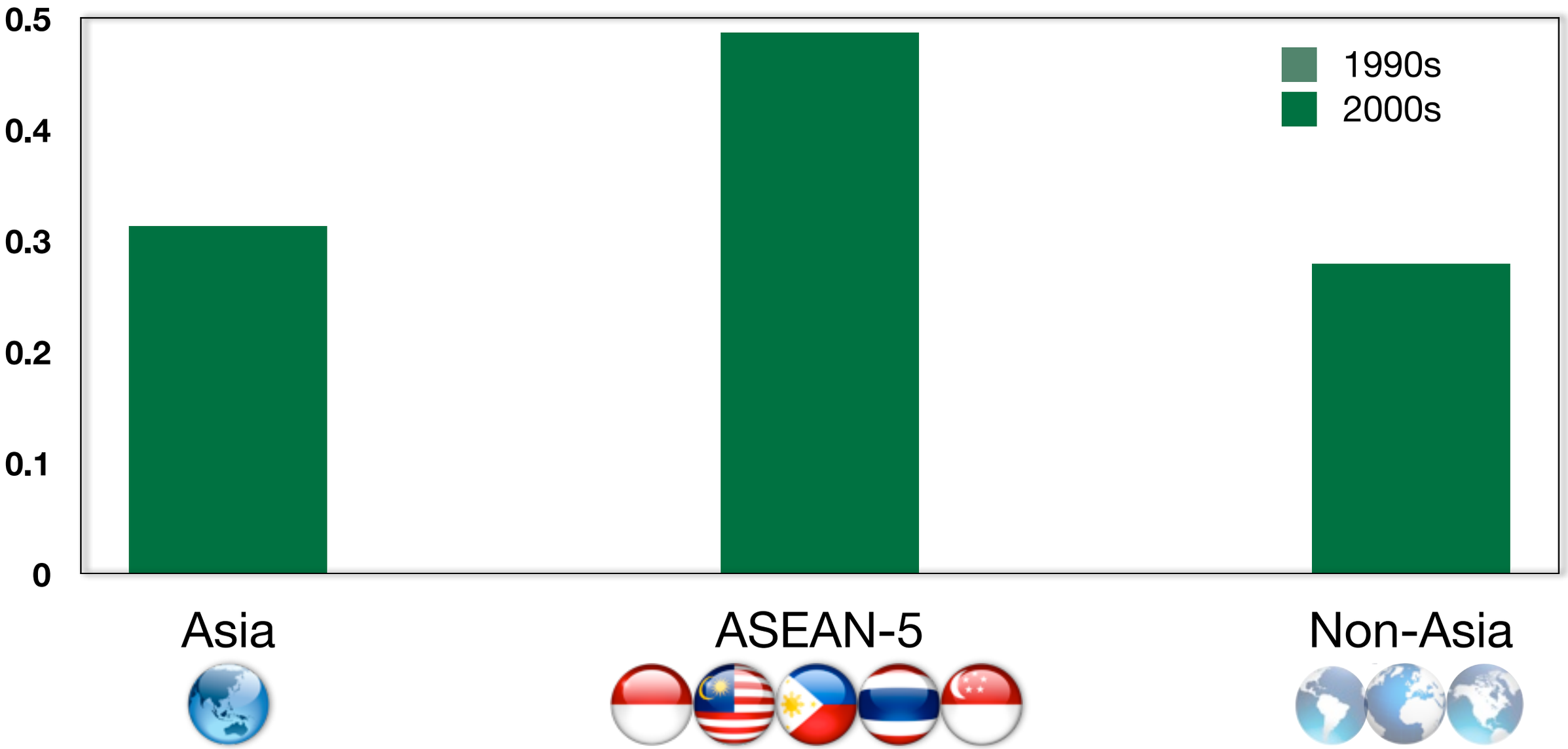


Intra-industry trade: rather high, especially within ASEAN

Degree of Intra-Industry Trade

(Median Bilateral Grubel-Lloyd Index; ranges from 0 to 1)



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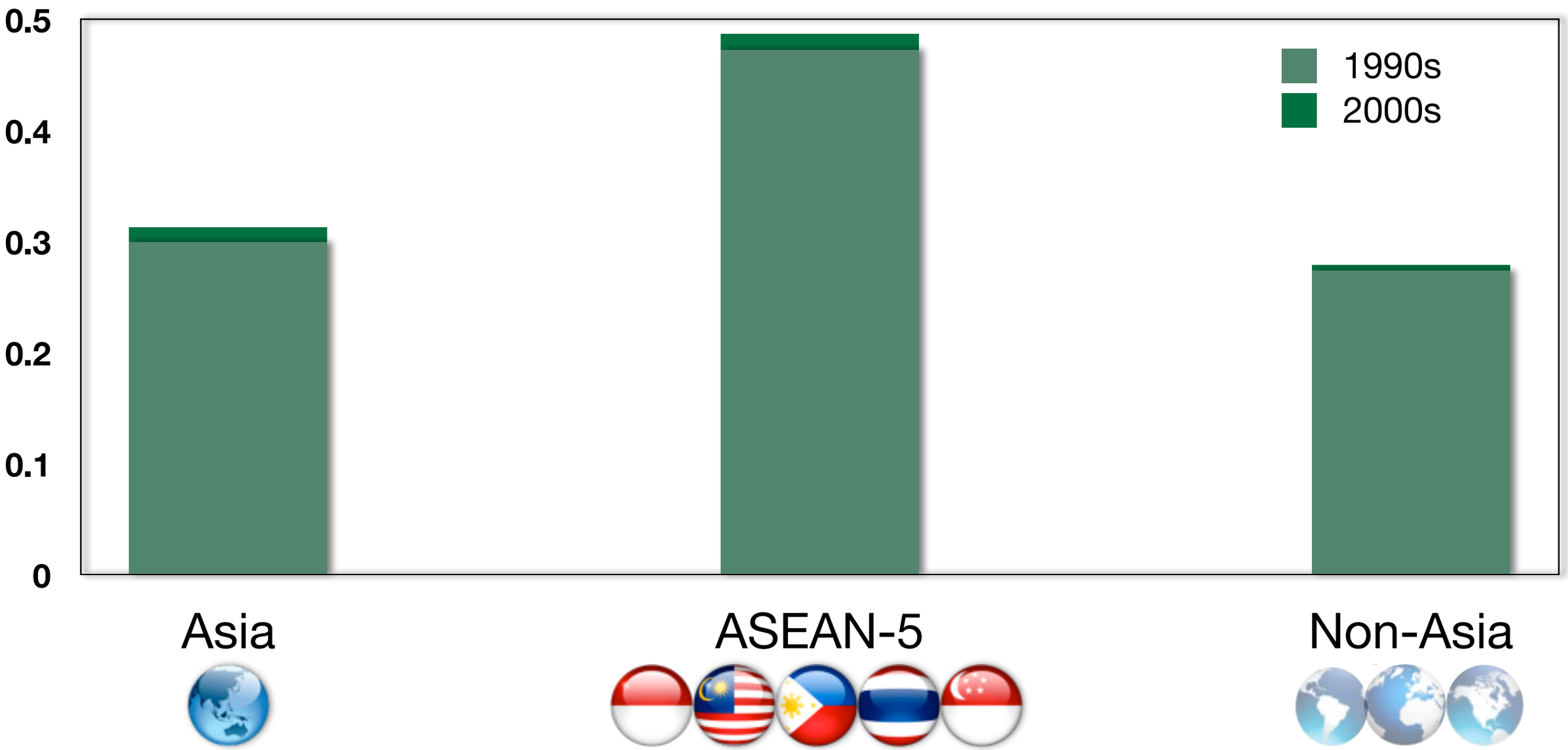
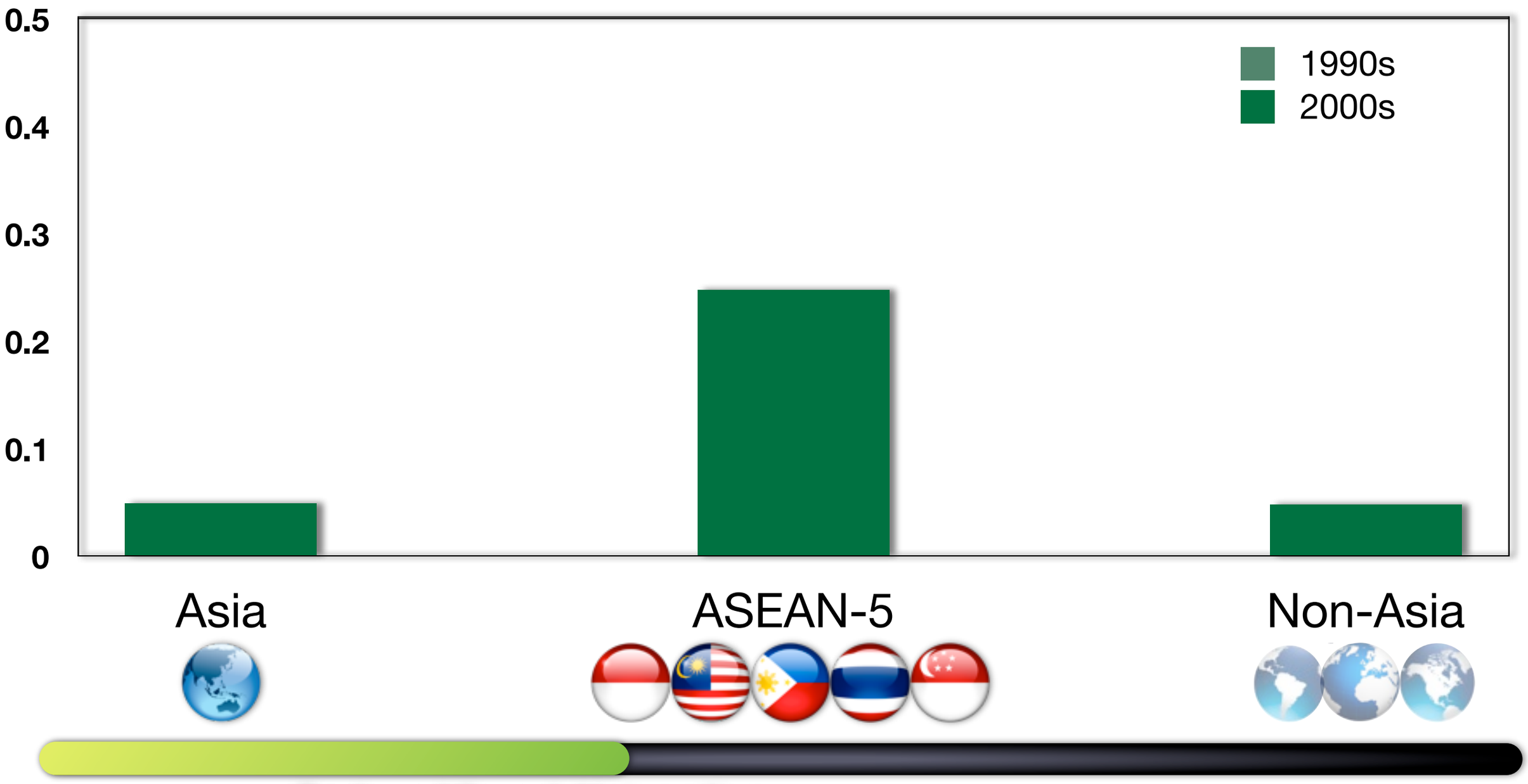


Similarity of trade specialization: less than in past, but still high in ASEAN

Correlations of Trade Specializations

(Median Bilateral Correlations of Trade Specialization with the World)



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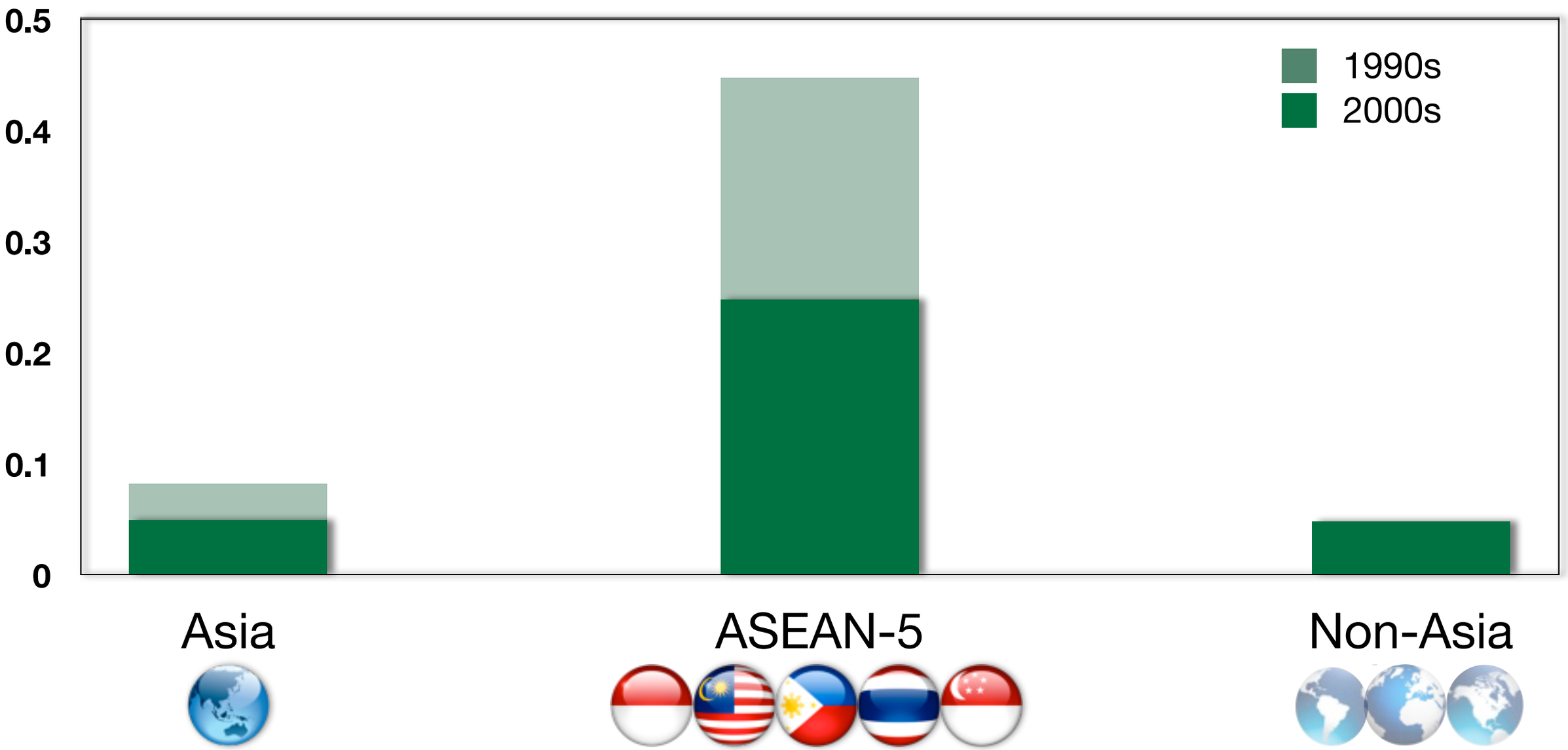
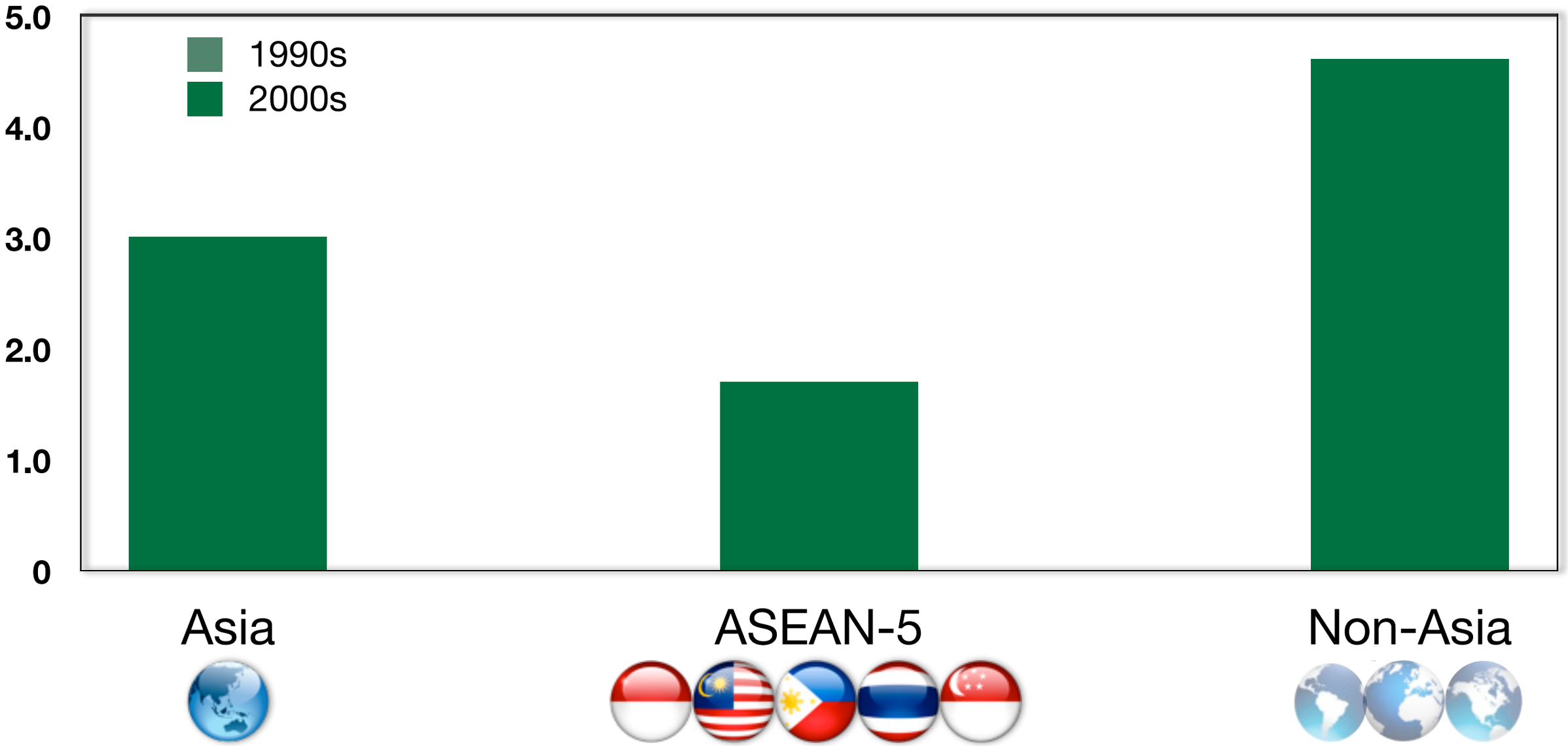


Financial integration: still lagging behind, but on the rise

Median Bilateral Banking Integration

(In percent of total external position with the world)



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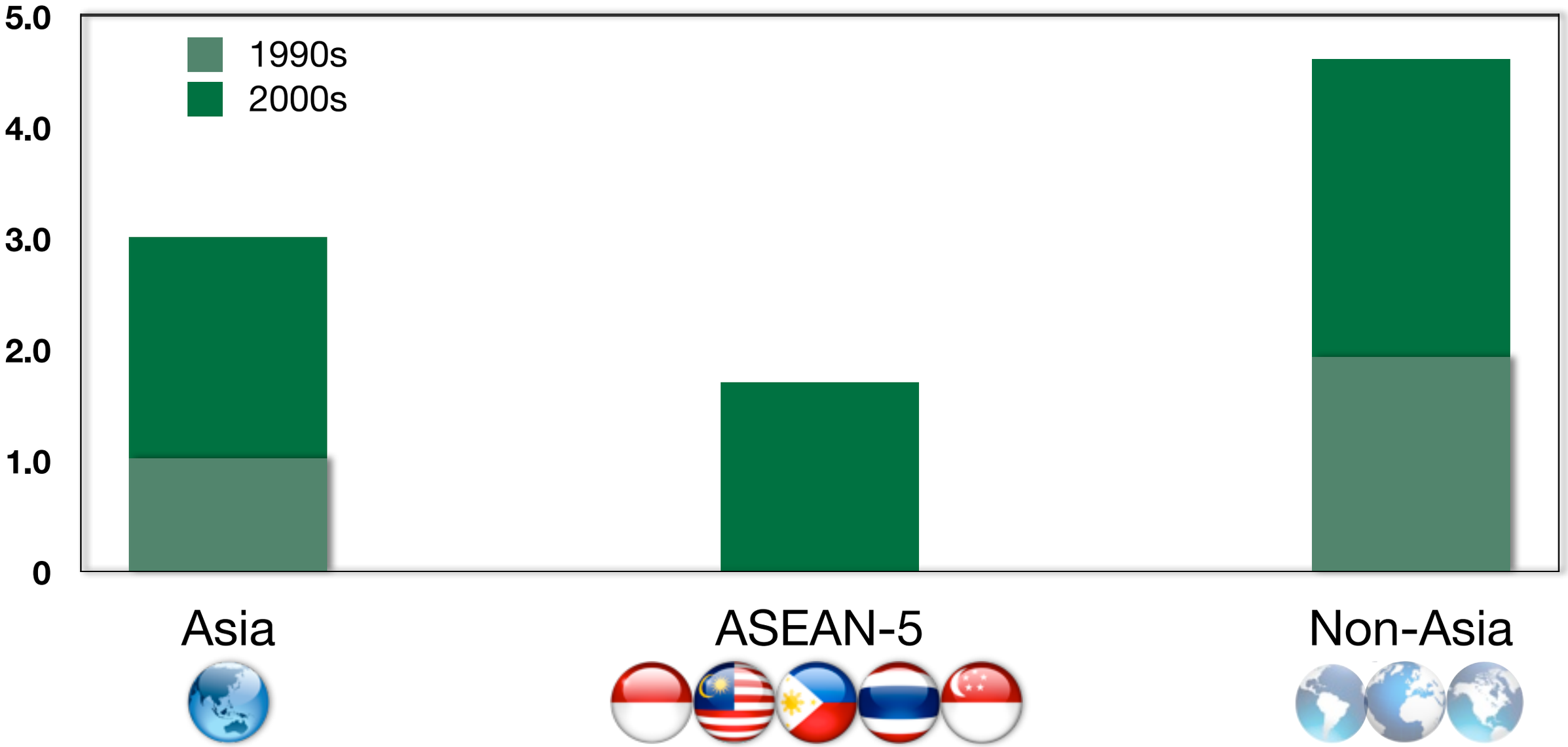


Estimating impact of integration on co-movement: methodology

$$QCORR_{ijt} = \alpha_{ij} + \alpha_t + f(TRADE_{ijt-1}, FINANCE_{ijt-1}, POLICY_{ijt-1}) + \varepsilon_{ijt}$$

Where,

TRADE =	Trade Intensity, Intra Industry trade Vertical Integration and Trade Similarity
FINANCE =	Banking Integration, Portfolio Integration and FDI Integration
POLICY =	Fiscal Policy Sync, Monetary Policy Sync and Exchange Rate Policy Sync
α_{ij} and α_t =	country-pair and year dummies

- Instruments for bilateral trade intensity: WTO membership, degree of trade cooperation, remoteness index; average import tariff;
- Instruments for vertical integration (% exports): remoteness index; average tariff for intermediate imports

Trade and financial integration matter, with different effects in crisis times

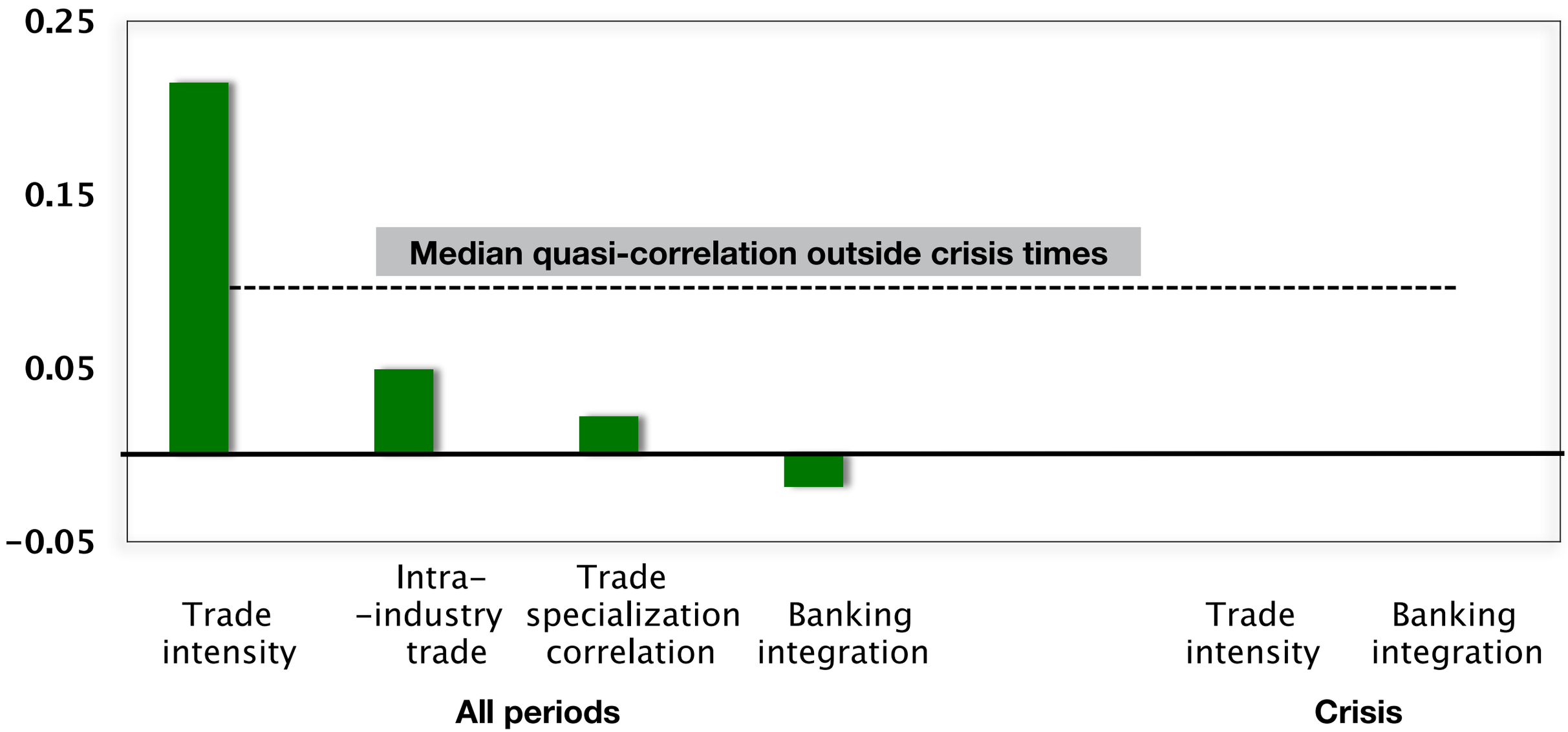
Results

	A: Trade Integration				B: Financial Integration/ Policy Synchronization			C: Crisis/ non-crisis
	(1) ; OLS	(2) ; OLS	(3) ; OLS	(4) ; IV	(5) : IV	(6) : IV	(7) : IV	(8) : IV
Trade Intensity (Gross)	0.0399							
Trade Intensity		0.0488***	0.0632***	0.295***	0.575***	0.851***	0.466***	0.430***
Intra-industry Trade			0.00313***	0.00326***				
Trade Specialization Correlation			1.261***	1.419***				
Banking Integration					-0.0343***	-0.0488***	-0.0543***	-0.00410
Portfolio Integration						-4.897*		
FDI Integration						-1.338		
Fiscal Policy Coordination							0.0587***	
Monetary Policy Divergence							-0.00339**	
Exchange Rate Volatility							-0.136***	
Trade Int. * GFC dummy								0.753***
Banking Int. * GFC dummy								0.383***

Estimated impact/results

Trade intensity matters most, as well as banking integration in crisis times

Illustrative Impact of Explanatory Variables on Co-movement: Crisis vs. Non-crisis Times
(Estimated Impact on BCS of Moving from the 25th Percentile to 75th Percentile of the Cross-country Distribution of the Variable Considered)



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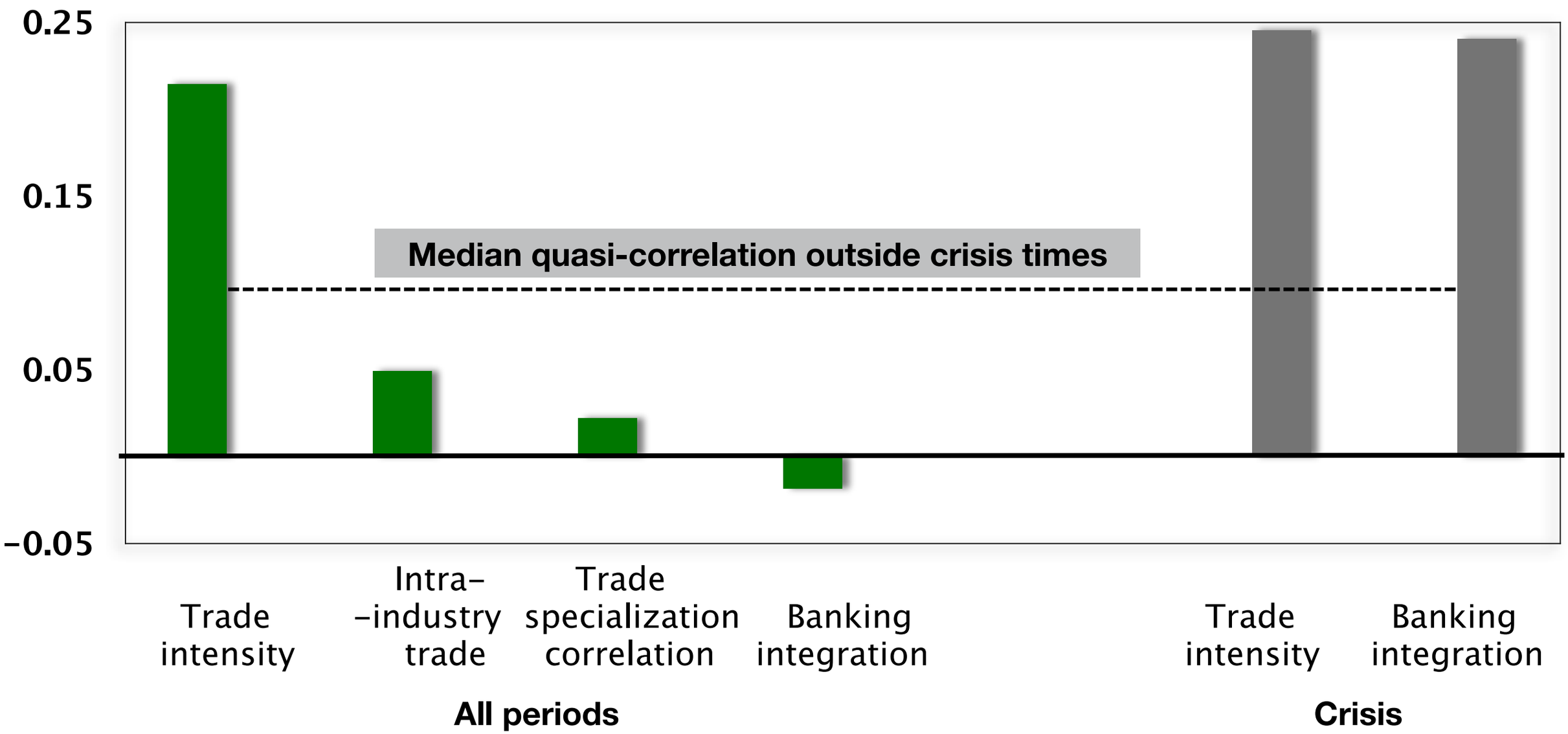
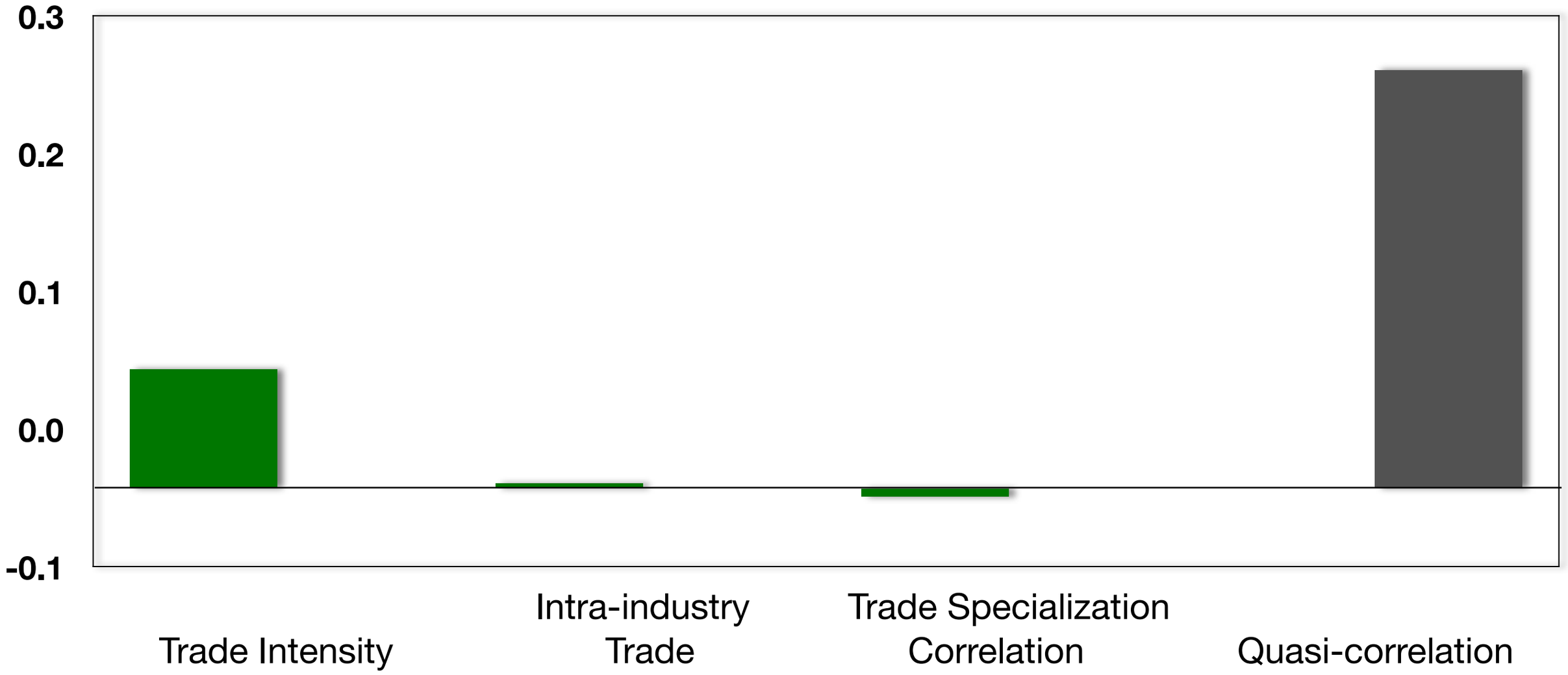


Estimated impact/results

Rising trade intensity accounts for about one-fourth of trend rise in BCS

Asia: Estimated Contribution of Trade Variables to the Trend Increase in BCS

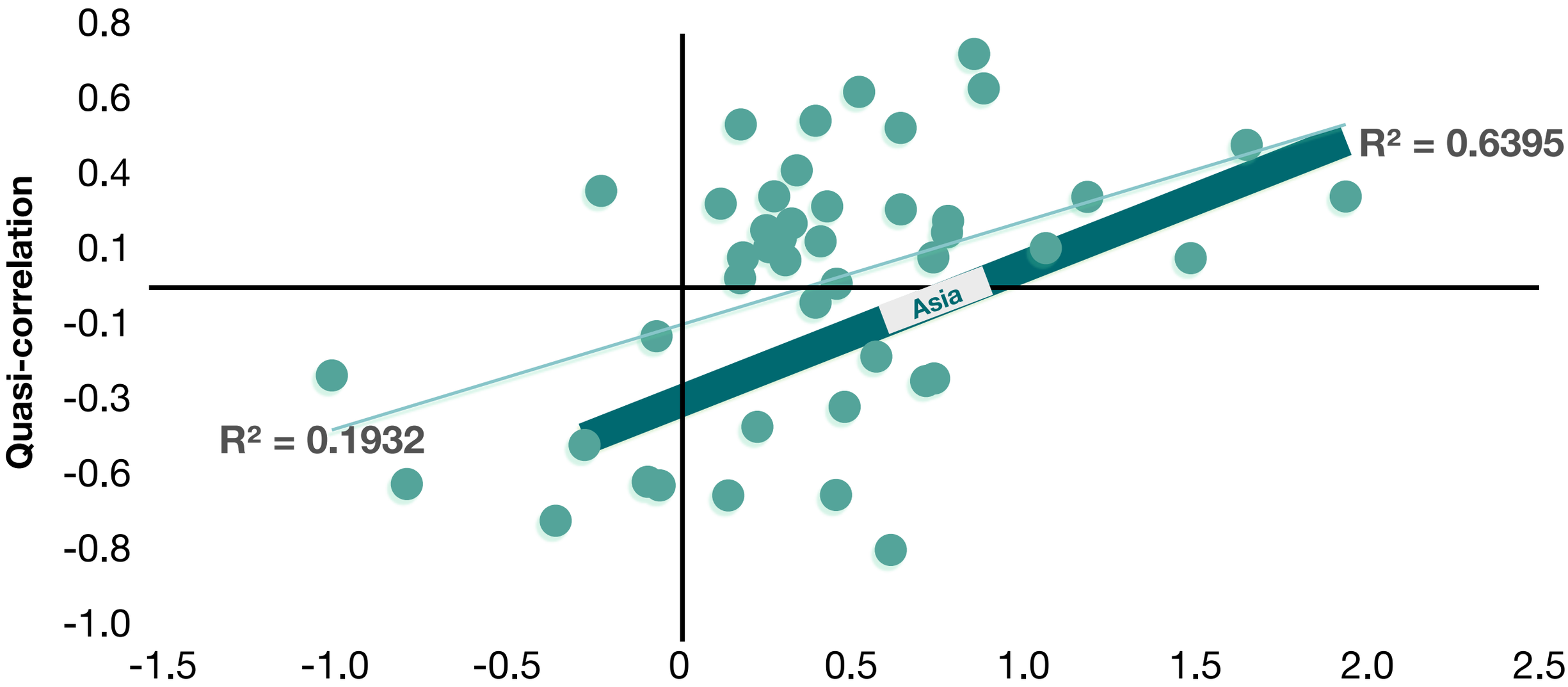
(Change in median quasi-correlation between 1999-2005 and 2006-2012 (excl. 2009) and contributions of the explanatory variables)



Final demand from China seems to be playing a role for co-movement

Change in Output Co-movement with China and Value-added Exported to China for Final Demand

(Change from early 2000s to latest)



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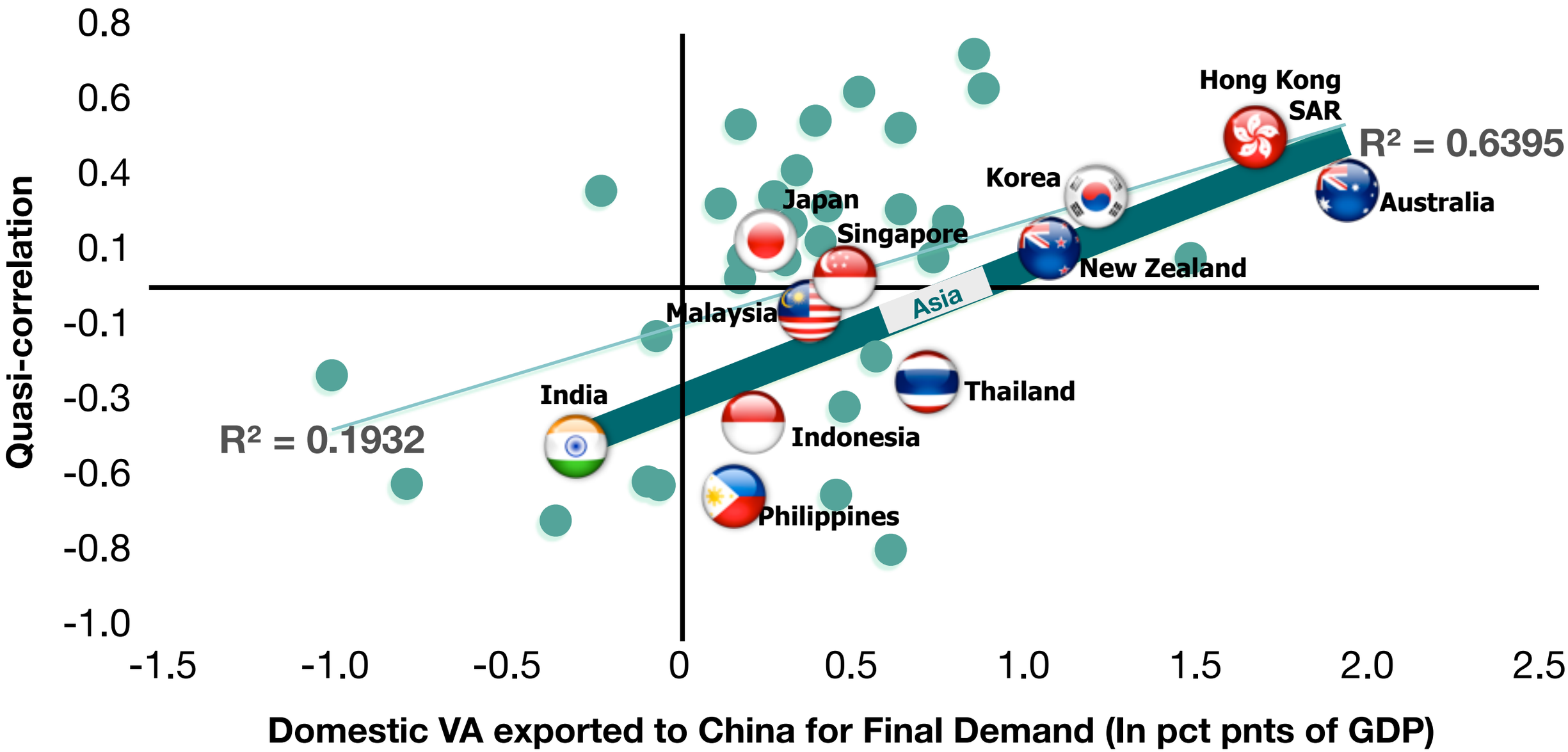


Estimating China spillovers through trade channel: methodology

$$g_{it} = \alpha_i + \beta t + \emptyset_1(l) shock_{China,t} + \emptyset_2(l) shock_{China,t}\, TradeLink_{ichina,t-1} + \emptyset_3(l)\, TradeLink_{ichina,t-1} + \boldsymbol{X}'_{it}\beta + \varepsilon_{it}$$

Where,

Δy_{it} = Change in the log of quarterly real GDP of country *i* at time *t*

$Shock_{China,t}$ = China growth shock in quarter t and its lags

$TradeLink_{China,t}$ = Bilateral trade intensity / Trade dependence on China/ Final demand coming from China

X = Global oil price, CBOE Volatility Index (VIX)

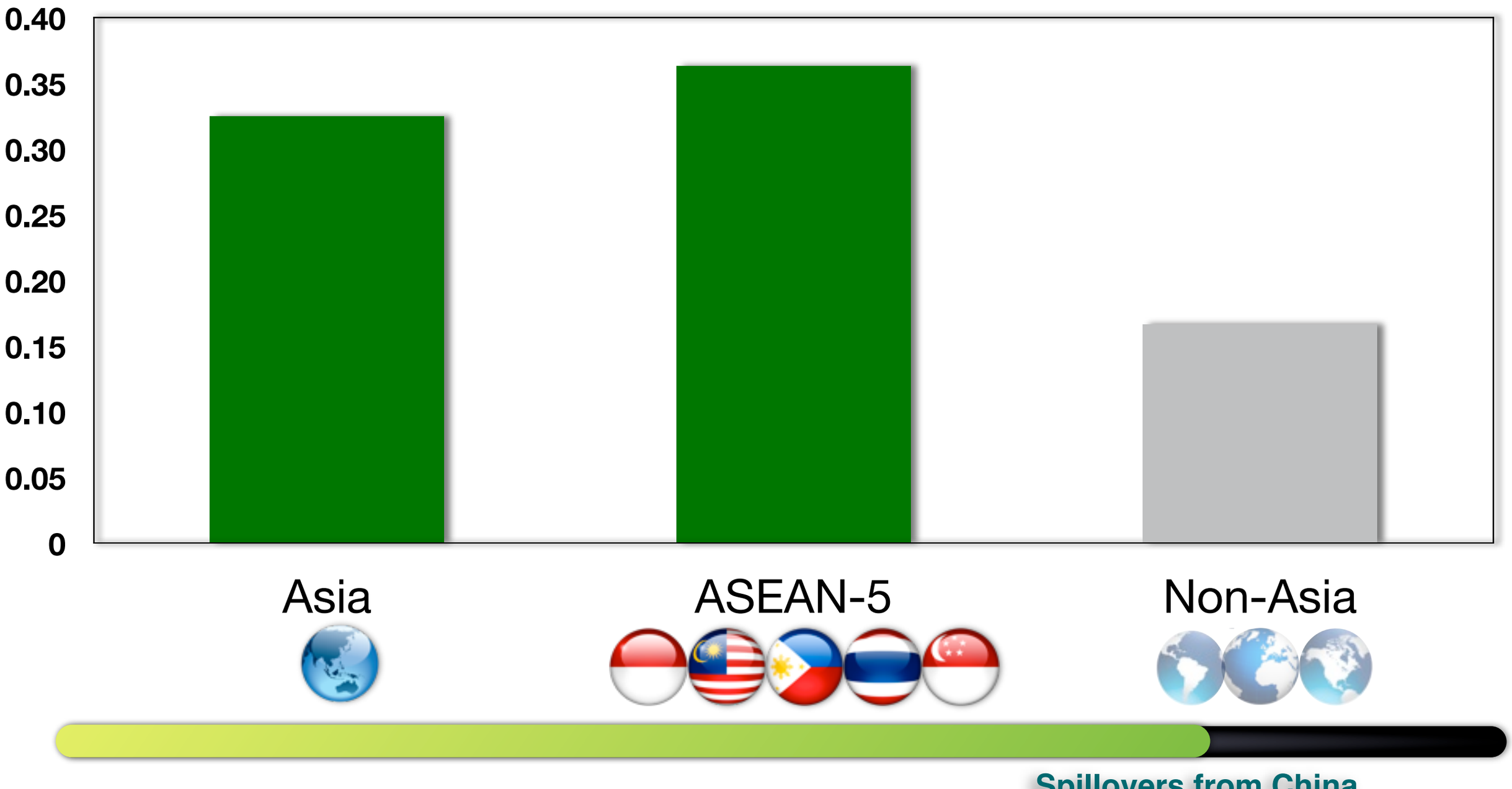
αi and βt = Country fixed effects and timetrend

China growth shock is computed as the residuals for China from the equation $g_{it} = \alpha_i + \alpha_t + \delta_{it}$, *where* g_{it} *is the growth rate of country I in year t,* α_i *and* α_t *are country and time dummies.*

Results: spillovers from China growth shocks twice as large in Asia

Estimated Impact of 1% Growth Surprise in China on Partner Country Growth

(GDP growth impact after one year, in percentage points: Median)



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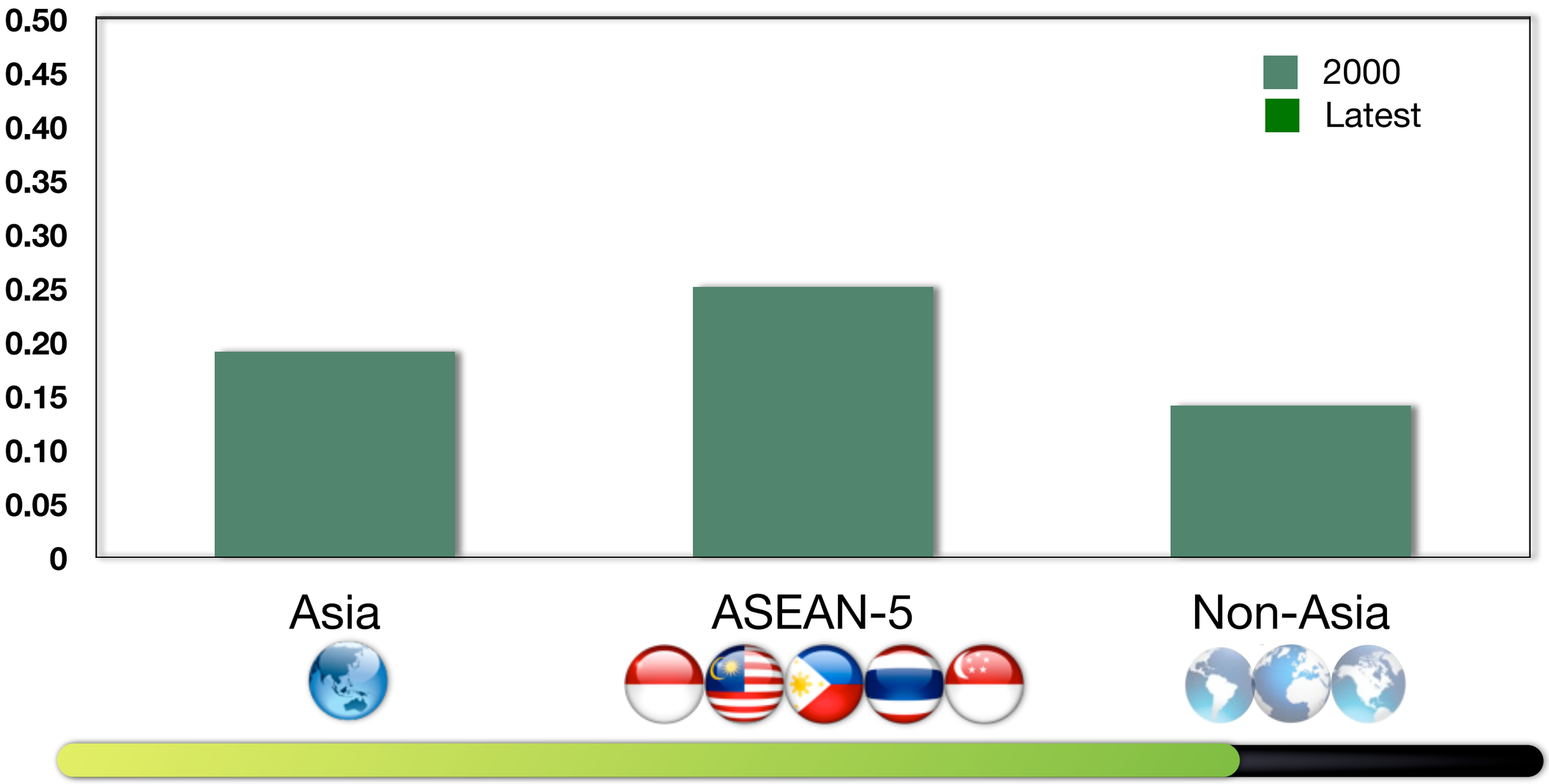

Spillovers from China

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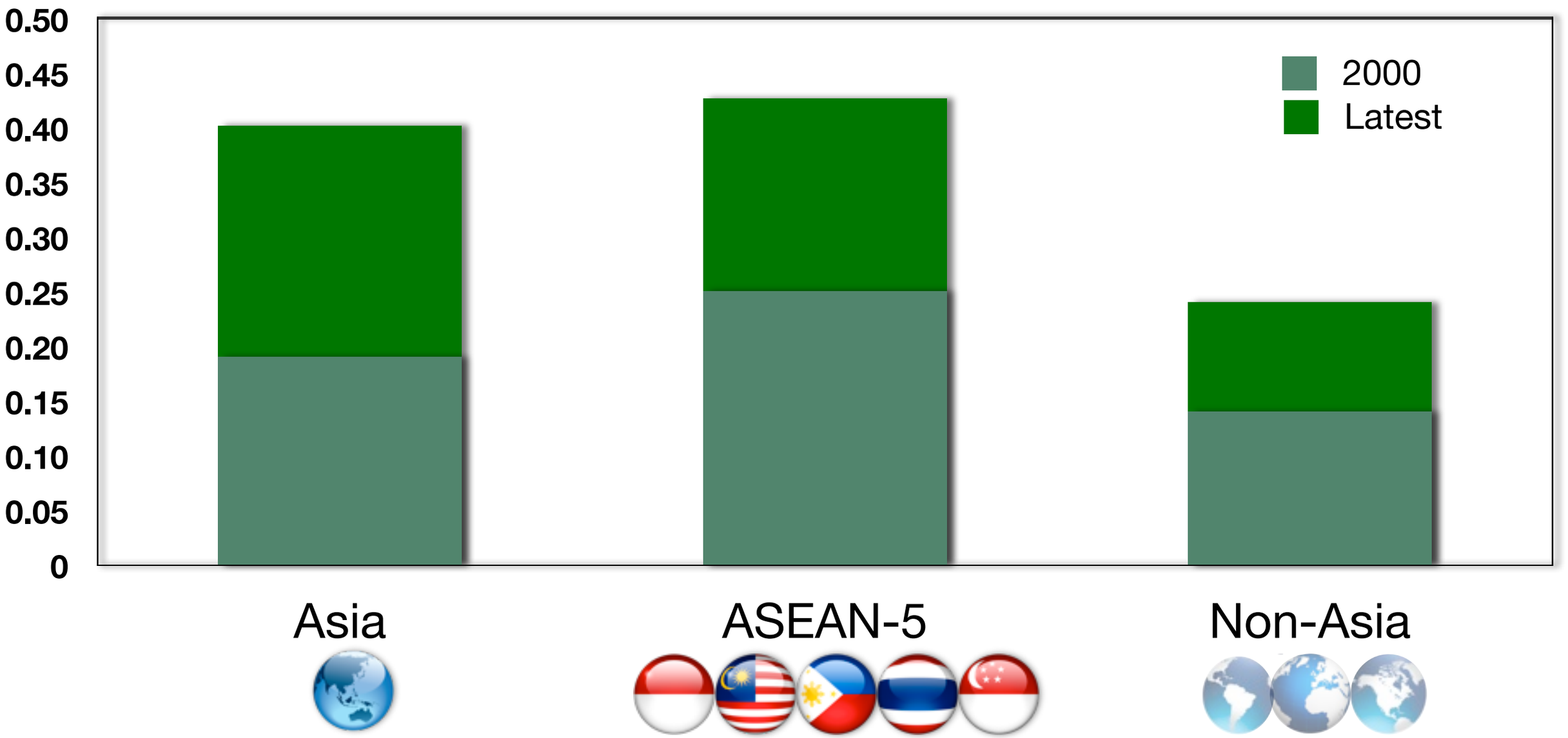

Spillovers from China

Implications: The Future

- **BCS to rise if economic integration increases further, especially in crisis times (financial integration)**

- **Role of China:** increasing as a final demand source, declining as "assembly hub" ➡ greater spillovers from China shocks, but China less of a conduit for global shocks

- **Higher BCS:** bad for risk sharing ➡ need for individual policies to strengthen resilience and broad (regional and global) safety nets; global safety net especially useful in event of regional shocks/shocks originating from China

Thank You

Asia and Pacific Department, April 2014

Annex: Definitions—BCS

instantaneous Quasi-correlation

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

where QCORR_ijt is the quasi-correlation of real GDP growth rates of country i and j in year t, g_it denotes the output growth rate of country i in year t and; g*_i and sigma*_i represent the mean and standard deviation of output growth rate of country i, respectively, during the sample period. The growth rate is measured as the first difference of the log of real GDP.

Annex: Definitions—Trade

Trade Intensity

$$T_{ijt} = \frac{DVA_t^{ij} + DVA_t^{ji}}{GDP_{it} + GDP_{jt}}$$

where T_ijt represents the bilateral trade intensity of country-pair *i* and *j* at time *t*; GDP_it is the GDP of country *i* at time *t*; DVA_ijt denotes the domestic value added exported, both directly and indirectly, from country *i* to country *j* in year *t*. The indirect component includes the domestic value added exported by country *i* to a third country *k*, as intermediate inputs into the production of goods and services exported by country *k* to country *j*.

Vertical Integration

$$VI_{ijt} = \frac{FVA_t^{ij} + FVA_t^{ji}}{DVA_t^{ij} + DVA_t^{ji}}$$

where VI_ijt denotes the vertical trade integration between countries *i* and *j*; FVA_ijt represents the share in country *i*'s exports that is attributable to the (foreign) value-added content coming from country *j*.

Annex: Definitions—Trade (cont.)

Intra-industry Trade (Grubel-Lloyd Index)

$$IIT_{ijt} = 1 - \left[\frac{\sum_{h=1}^{n} |X_t^{ij,h} - M_t^{ij,h}|}{\sum_{h=1}^{n} (X_t^{ij,h} + M_t^{ij,h})}\right]$$

where X_ijt,h (M_ijt,h) are the exports from (imports to) country *i* to (from) country *j* in industry *h*. The higher the index value, the greater the share of intra-industry trade relative to inter-industry trade between the two countries.

Trade Specialization Correlation

Formally, the measure is defined as:

$$TSC_{ijt} = \frac{\sum_{h=1}^{n} \left(TSI_t^{i,h} - \overline{TSI_t^{i,h}}\right)\left(TSI_t^{j,h} - \overline{TSI_t^{j,h}}\right)}{\sqrt{\sum_{h=1}^{n} \left(TSI_t^{i,h} - \overline{TSI_t^{i,h}}\right)^2 \left(TSI_t^{j,h} - \overline{TSI_t^{j,h}}\right)^2}}$$

such that $TSI_t^{i,h} = \frac{X_t^{i,h} - M_t^{i,h}}{X_t^{i,h} + M_t^{i,h}}$

where TSC_ijt represents the trade specialization correlation between countries i and j in year t, TSI_it,h denotes the trade specialization index of country i for year t in industry h, $\overline{TSI\_it,h}$ is the average trade specialization of country i over all n industries in year t. X_it,h (M_it,h) is the measure of gross exports (imports) of country i in industry h to (from) all its trading partners.

Annex: Definitions—Financial Integration

Banking Integration

Defined as the ratio of the stock of bilateral assets and liabilities between countries i and j in year t to the sum of these two countries' external assets and liabilities vis-à-vis the entire world in the previous year:

$$BI_{ijt} = \frac{BP_t^{ij} + BP_t^{ji}}{BP_{t-1}^{iworld} + BP_{t-1}^{jworld}}$$

where BI_ijt is bilateral banking integration between countries i and j in year t, BP_ijt is the stock of assets and liabilities of country i's banks vis-à-vis country j, and BP_i*world*t-1 is the total stock of asset and liabilities of country i vis-à-vis the world in year t-1.

Portfolio Integration

$$PI_{ijt} = \frac{I_t^{ij} + I_t^{ji}}{GDP_{it} + GDP_{jt}}$$

where I_ijt denotes the investment holdings (equity and debt securities) of country i in country j.

FDI Integration

$$DI_{ijt} = \frac{FDI_t^{ij} + FDI_t^{ji}}{GDP_{it} + GDP_{jt}}$$

where FDI_ijt is the FDI stock held by country i in country j.

Annex: Definitions—Macroeconomic Policy Synchronization

Fiscal Policy Synchronization

$$FPC_{ijt} = \frac{(f_{it} - f_i^*) * (f_{jt} - f_j^*)}{\sigma_i^f * \sigma_j^f}$$

where f_it is the structural balance of country i in year t purged from the impact of the cycle by regressing the structural balance on the output gap, f*_i and sigma_fi are, respectively, the average and standard deviation of the structural balance of country i over the sample period.

Monetary Policy Synchronization

Defined as the negative of the absolute difference in the short-term real interest rate of the two countries, -|r_it- r_jt |, where r_it and r_jt are respectively the short-term real interest rates of countries i and j in year t purged from the impact of the cycle.

The Exchange Rate Rigidity

Measured as the negative of the volatility of monthly nominal bilateral exchange rates. Specifically, for a country pair i-j and year t, it is defined as the standard deviation of the monthly changes in the nominal bilateral exchange rate between i and j during year t.

Annex: Definitions—Instrumental Variables

Instrumental variables: geographical distance index, the degree of trade cooperation between countries, a time-varying dummy for the membership to the WTO, the average import tariff of the two countries, and the average intermediate goods import tariff of the two countries .

Geographical Distance Index

Geographical distance index of country i is defined as the sum of the physical distances of country i from all its trade partners (except country j), weighted by the share of trade partners in world GDP. Similarly, geographical distance index of country j is defined as the sum of the physical distances of country j from all its trade partners (except country i), weighted by the share of trade partners in world GDP. Bilateral distance is the distance between the most important cities (in terms of population) of the two countries, which is obtained from CEPII's GeoDist database.

Degree of Trade Cooperation

Based on the type of RTAs (WTO RTA database), the degree of trade cooperation variable is constructed on a scale of 0 to 5, where 5 indicate the highest degree of cooperation. Specifically, a score of 5 indicates that the two countries belong to a Currency Union and Economically Integrated Area starting year t, 4 indicates that the two countries are integrated in the form of a Currency Union only, 3 is for countries that are in a Free Trade Area and Economically Integrated Area, 2 indicates that the countries are in a Free Trade Area only, 1 indicates a Partial Scope Agreement between the countries, and 0 represents No trade agreement.

Import Tariffs (both total and intermediate goods)

Data starting 1995 are obtained from the WTO Integrated Database (IDB) and the TRANS database. Tariff data for all countries in our sample based on HS classifications are obtained, and further refined in the case of tariffs applied only to intermediate goods (based on BEC).