



# Asia-Pacific Regional Cooperation and Integration Index

## Enhancing Framework and Methodology

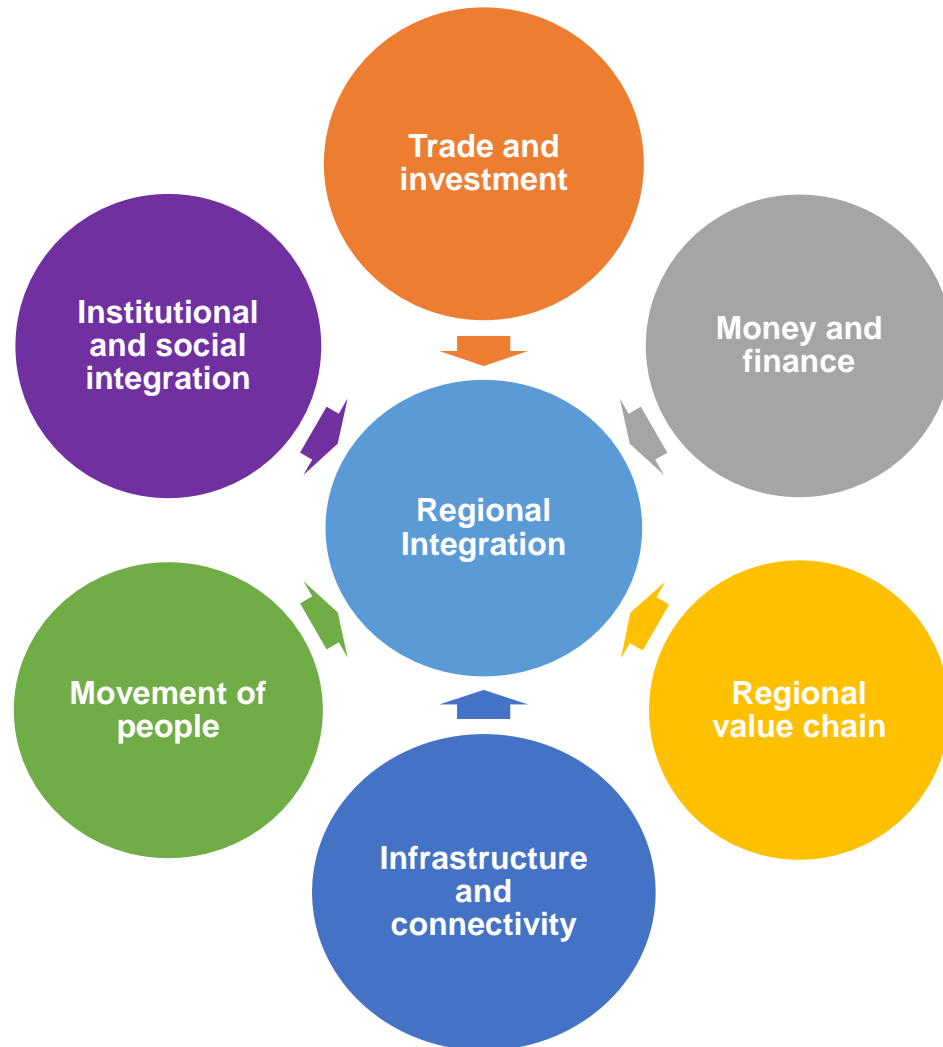
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# Asia-Pacific Regional Cooperation and Integration Index (ARCII)

- Takes the form of a 'composite index' or a weighted average of 6 dimension-specific achievements in Asia and the Pacific
- Allows monitoring of the progress of regional integration over time or against set goals
- Shows strengths and weaknesses across different geographic regions and different dimensions

# Regional integration is a multi-dimensional process



# Indicators to construct ARCII

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

# Constructing the ARCII

- **Imputation of missing data:** Linear interpolation, averaging, regression imputation and substitution by closest available observation
- **Normalization:** Panel min-max scaling with percentile transformation
- **Weighting and aggregation:** Two-stage panel principal components analysis (PCA) to compute weights for each component to aggregate them into a single composite index
  1. PCA is applied to indicators in each dimension to create dimensional sub-index for the specific dimension
  2. PCA is utilized again to sub-dimensional indexes to compute overall ARCII

# Imputation of Missing Data

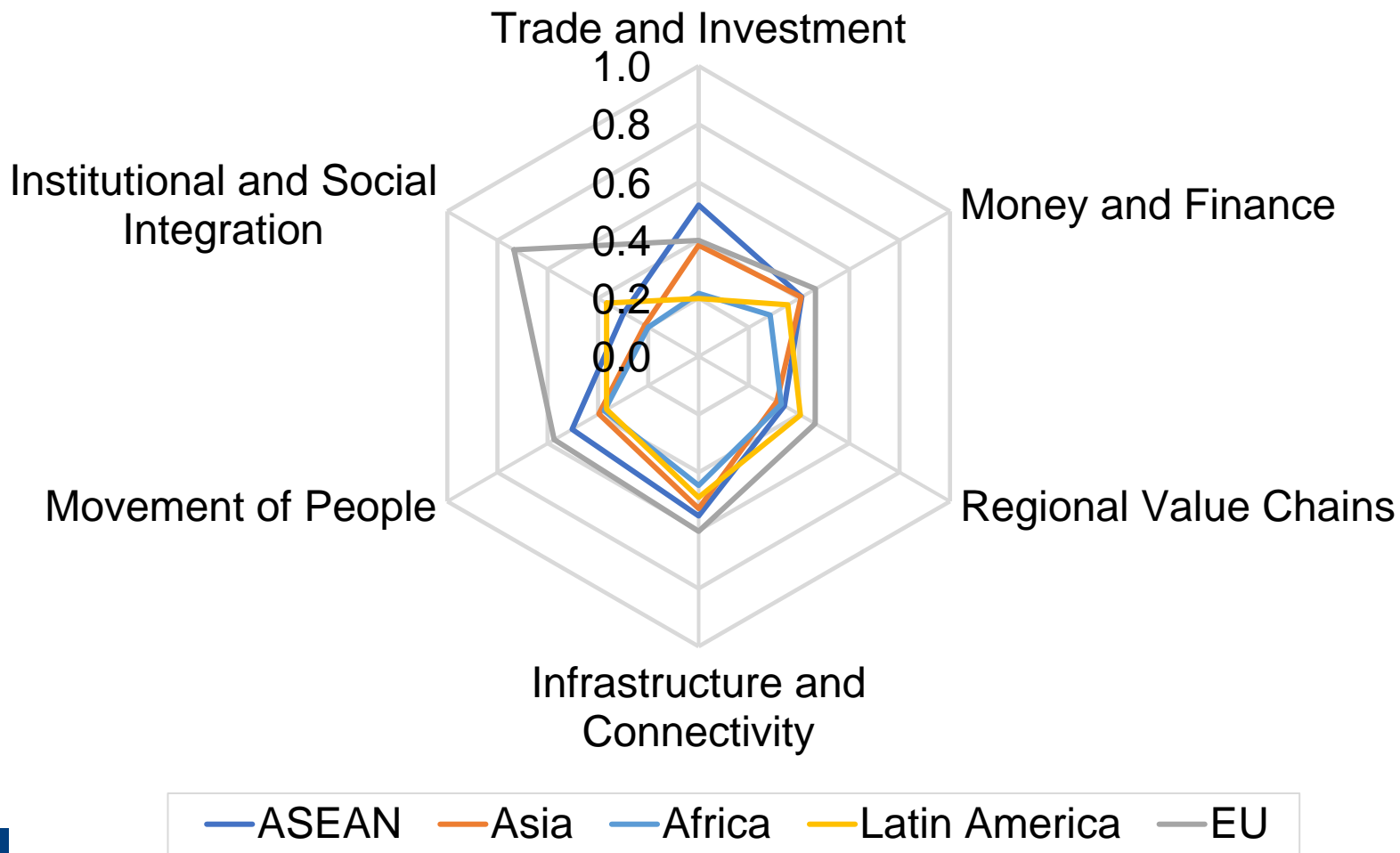
Dimension	Indicator	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
I. Trade and Investment Integration	I-a	Proportion of intraregional goods exports to total goods exports										
	I-b	Proportion of intraregional goods imports to total goods imports										
	I-c	Intraregional trade intensity index										
	I-d	Proportion of intraregional foreign direct investment (FDI) inflows to total FDI inflows										
	I-e	Proportion of intraregional FDI inflows plus outflows to total FDI inflows plus outflows										
II. Money and Finance Integration	II-a	Proportion of intraregional cross-border equity liabilities to total cross-border equity liabilities										
	II-b	Proportion of intraregional cross-border bond liabilities to total cross-border bond liabilities										
	II-c	Pair-wise dispersion of deposit rates averaged regionally relative to those averaged globally										
	II-d	Pair-wise correlation of equity returns averaged regionally minus those averaged globally										
III. Regional Value Chain	III-a	Ratio between the averaged trade complementarity index over regional trading partners and the averaged trade complementarity index over all trading partners										
	III-b	Ratio between the averaged trade concentration index over regional trading partners and the averaged trade concentration index over all trading partners										
	III-c	Proportion of intraregional intermediate goods exports to total intraregional goods exports										
	III-d	Proportion of intraregional intermediate goods imports to total intraregional goods imports										
IV. Infrastructure and Connectivity	IV-a	Ratio between the averaged trade cost over regional trading partners and the averaged trade cost over all trading partners										
	IV-b	Ratio between the averaged liner shipping connectivity index over regional trading partners and the averaged liner shipping connectivity index over all trading partners										
	IV-c	Logistics performance index (overall)										
	IV-d	Doing Business Index (overall)										
V. Movement of People	V-a	Proportion of intraregional outbound migration to total outbound migration										
	V-b	Proportion of intraregional tourists to total tourists (inbound plus outbound)										
	V-c	Proportion of intraregional remittances to total remittances										
	V-d	Proportion of other Asian countries that do not require an entry visa										
VI. Institutional and Social Integration	VI-a	Proportion of other Asian countries that have signed free trade agreements (FTAs)										
	VI-b	Proportion of other Asian countries that have an embassy										
	VI-c	Proportion of other Asian countries that have signed business investment treaties										
	VI-d	Proportion of other Asian countries that have signed double taxation treaties										
	VI-e	Cultural proximity with other Asian countries relative to that with all other countries										

Legend: ■ Data available ■ Used latest available data ■ Used earliest available data ■ Used average of available data for even years before and after ■ Linearly interpolated

Source: Authors' compilation

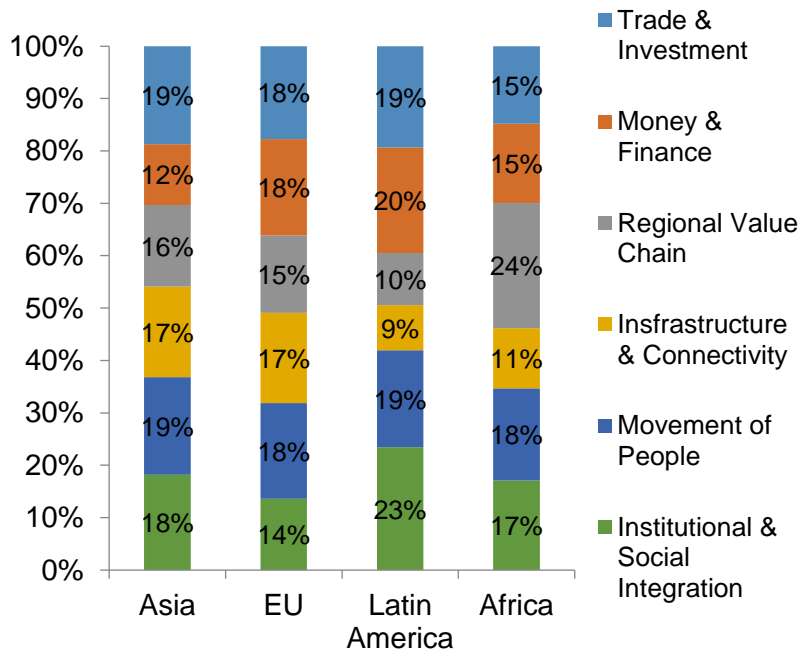
# ARCII 2016 (Worldwide)

## *Asia vs Other Regions*



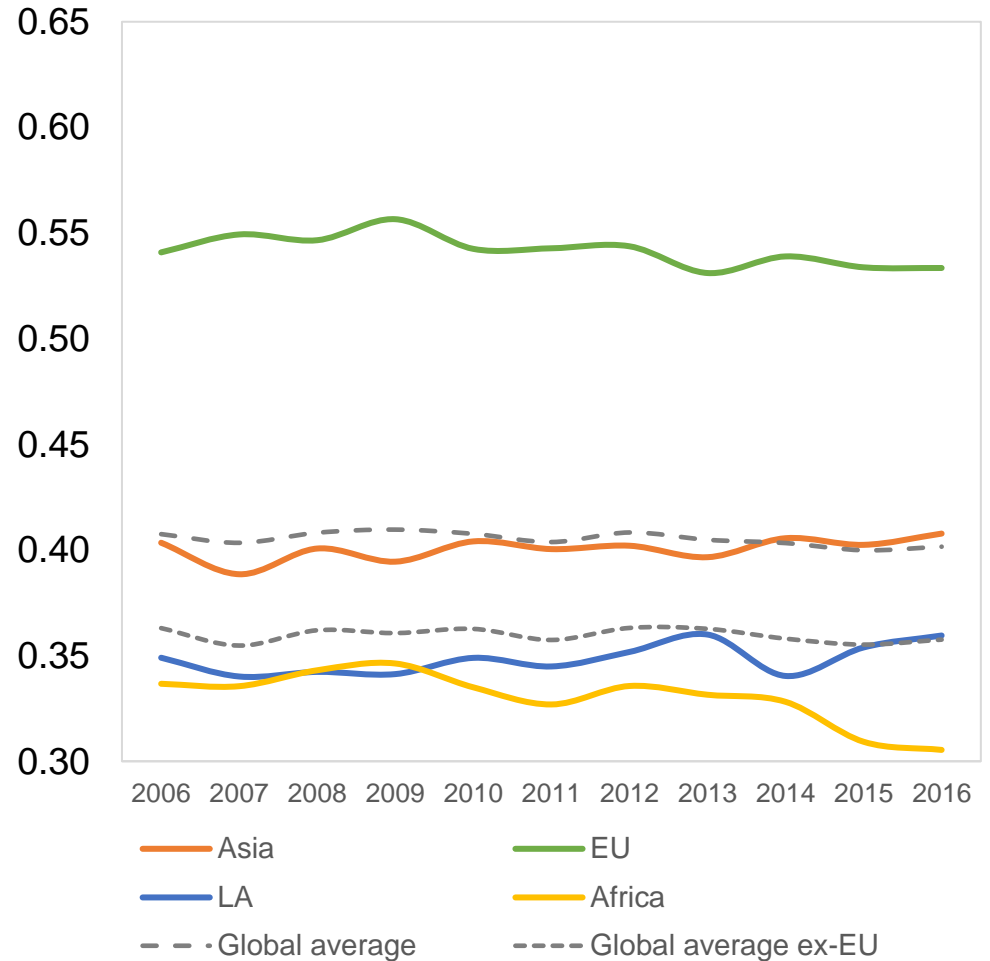
# Regional Integration Index: Asia vs. Other Regions

## Summary of Panel PCA-Derived Weights



PCA = Principal Component Analysis. EU = European Union  
 Source: Park and Claveria (2018a).

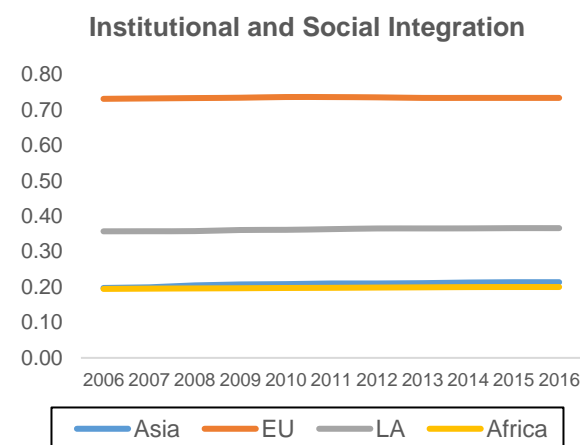
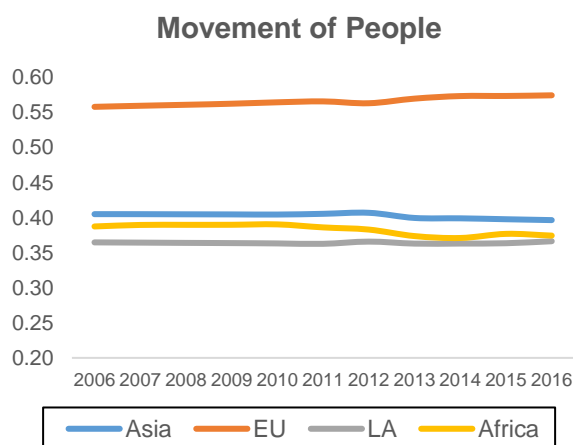
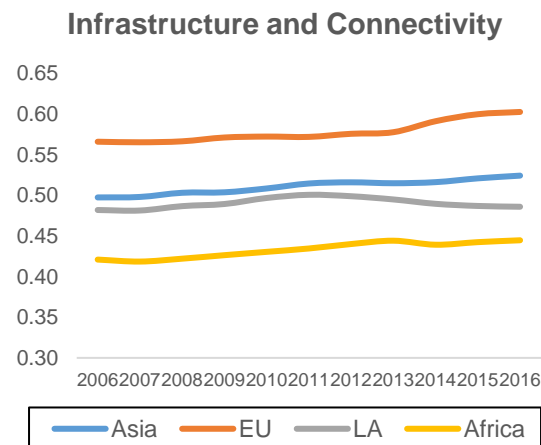
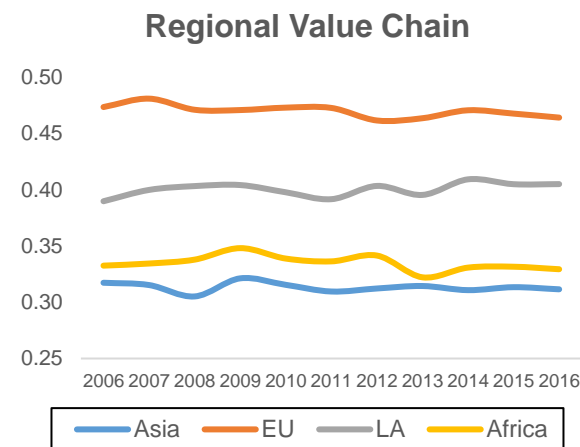
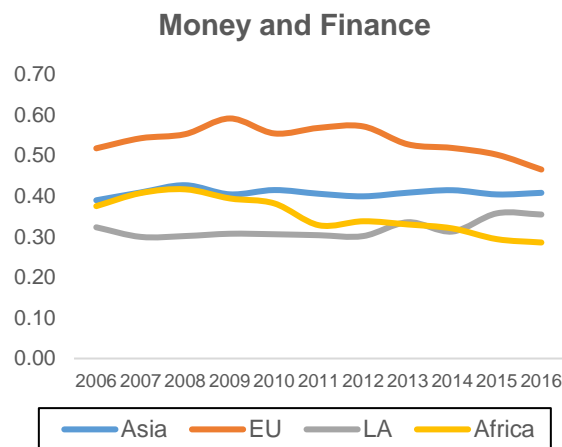
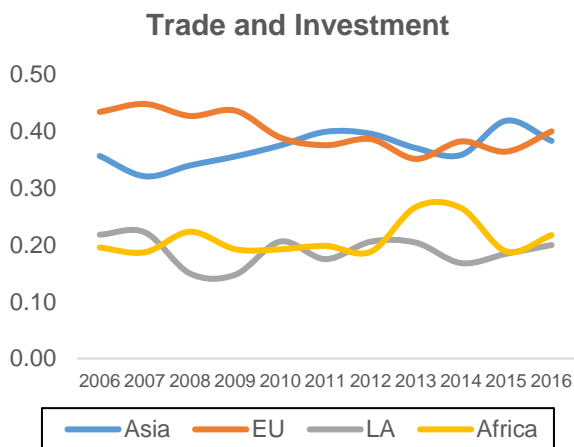
## Regional Integration Index





# Dimensional Subindexes: Asia vs. Other Regions

EU consistently scores highest in all dimensions, except in trade and investment



# Enhancing the ARCI index



# Project Objectives

- **Main outcome**

To improve and update ARCII methodology and estimates – with expanded country coverage – for RCI-related work and research.

- **Outputs**

1. **ARCII database and methodology** are improved
2. **Support** for ADB RCI operations is provided
3. **Research** on RCI using ARCII is produced and disseminated

# Current ARCII structure and data coverage

Dimension	Indicator	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
I. Trade and Investment Integration	I-a	Proportion of intraregional goods exports to total goods exports										
	I-b	Proportion of intraregional goods imports to total goods imports										
	I-c	Intraregional trade intensity index										
	I-d	Proportion of intraregional foreign direct investment (FDI) inflows to total FDI inflows										
	I-e	Proportion of intraregional FDI inflows plus outflows to total FDI inflows plus outflows										
II. Money and Finance Integration	II-a	Proportion of intraregional cross-border equity liabilities to total cross-border equity liabilities										
	II-b	Proportion of intraregional cross-border bond liabilities to total cross-border bond liabilities										
	II-c	Pair-wise dispersion of deposit rates averaged regionally relative to those averaged globally										
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III. Regional Value Chain	III-a	Ratio between the averaged trade complementarity index over regional trading partners and the averaged trade complementarity index over all trading partners										
	III-b	Ratio between the averaged trade concentration index over regional trading partners and the averaged trade concentration index over all trading partners										
	III-c	Proportion of intraregional intermediate goods exports to total intraregional goods exports										
	III-d	Proportion of intraregional intermediate goods imports to total intraregional goods imports										
IV. Infrastructure and Connectivity	IV-a	Ratio between the averaged trade cost over regional trading partners and the averaged trade cost over all trading partners										
	IV-b	Ratio between the averaged liner shipping connectivity index over regional trading partners and the averaged liner shipping connectivity index over all trading partners										
	IV-c	Logistics performance index (overall)										
	IV-d	Doing Business Index (overall)										
V. Movement of People	V-a	Proportion of intraregional outbound migration to total outbound migration										
	V-b	Proportion of intraregional tourists to total tourists (inbound plus outbound)										
	V-c	Proportion of intraregional remittances to total remittances										
	V-d	Proportion of other Asian countries that do not require an entry visa										
VI. Institutional and Social Integration	VI-a	Proportion of other Asian countries that have signed free trade agreements (FTAs)										
	VI-b	Proportion of other Asian countries that have an embassy										
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	VI-d	Proportion of other Asian countries that have signed double taxation treaties										
	VI-e	Cultural proximity with other Asian countries relative to that with all other countries										

Legend: ■ Data available ■ Used latest available data ■ Used earliest available data ■ Used average of available data for even years before and after ■ Linearly interpolated

Source: Authors' compilation

# Proposed extensions

- I. Integrating new dimensions to framework
- II. Integrating new indicators on existing dimensions
- III. Customizing ARCII indicator to specific regions

# I. New dimensions

## 1. Integrate 2 new dimensions to framework

- **Technology and Digital connectivity.** RCI through technology transfer (e.g. ICT/technology goods trade, intellectual property), and digital connectivity (e.g. mobile phone calls, internet traffic and internet capacity)
- **Environmental sustainability.** RCI through trade in environmental goods, ratification of environmental agreements and ecological footprint of exports/imports. --> **RPG dimension?**

## 2. Other areas being considered (examples)

- Air transportation
- Power generation/distribution and energy flows
- RCI for natural disasters / vaccination programs

# II. New indicators on existent dimensions

## II. Money and Finance

- II-d. Capital account openness: Chinn-Ito index (de jure)
- II-e. Correlations of exchange rates vis-à-vis USD averaged regionally minus those averaged globally
- **Index of banking integration?**

## III. Regional Value Chains

- III-e. Ratio between the sum of the value added contributed by regional trading partners and that contributed by all trading partners
- **Proxy for services trade?**

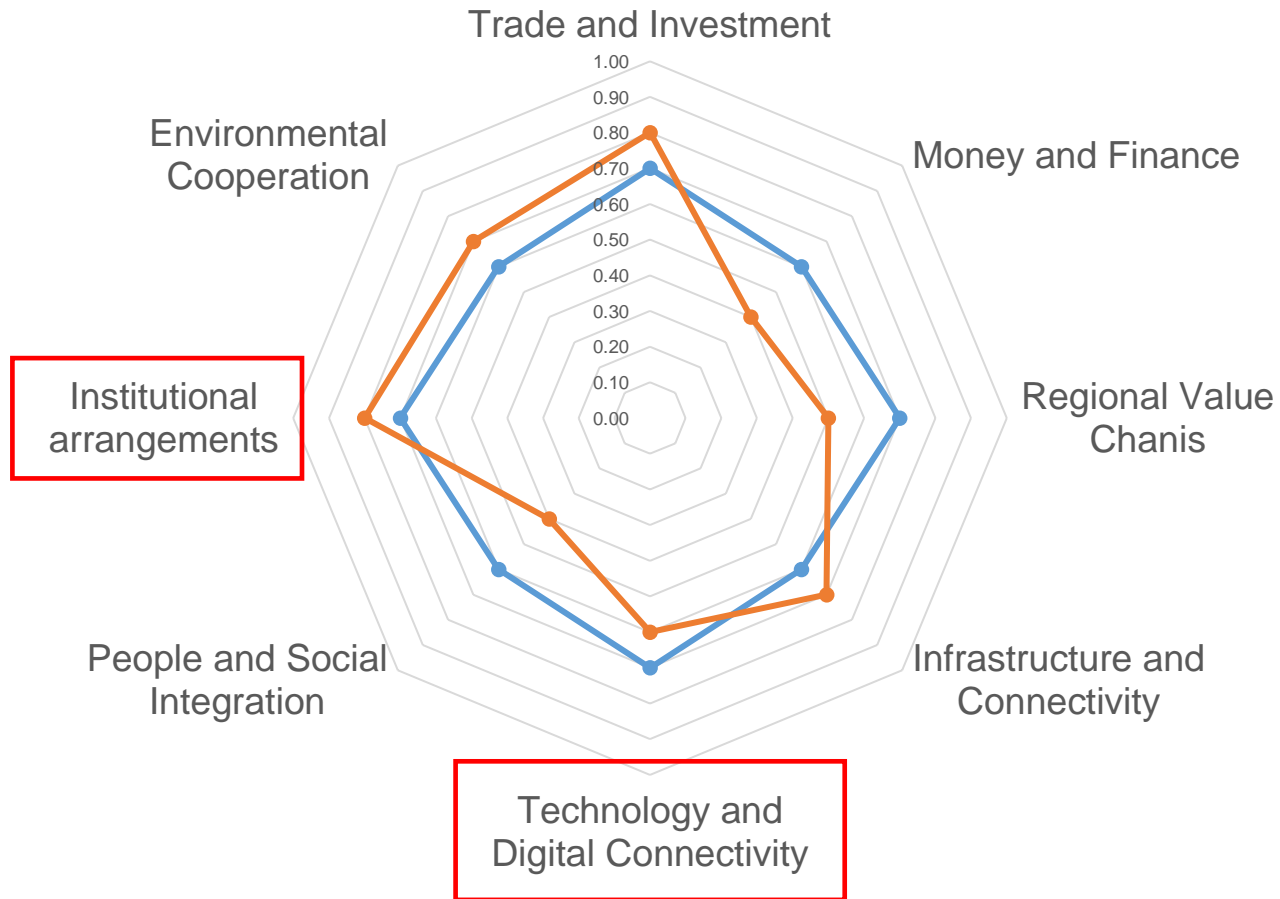
## IV. Infrastructure and Connectivity

- International flights passenger capacity / number of flights between two countries (ICAO)

## VI. Institutional arrangements

- Number of international inter-government organizations in which a country is a member

# ARCI enhanced framework



Note: Illustrative figure. Values for new dimensions to be estimated.

Source: Authors elaboration



# I. Trade and investment Integration

Indicator	Source
I-a. Proportion of intra-regional goods exports to total goods exports	Direction of Trade, IMF
I-b. Proportion of intra-regional goods imports to total goods imports	Direction of Trade, IMF
I-c. Intra-regional trade intensity index	Direction of Trade, IMF
I-d. Proportion of intra-regional FDI inflows to total FDI inflows	Greenfield FDI: FDI Markets
I-e. Proportion of intra-regional FDI inflows plus outflows to total FDI inflows plus outflows	M&A FDI: Zephyr

## II. Money and Finance Integration

Indicator	Source
II-a. Proportion of intra-regional cross-border equity liabilities to total cross-border equity liabilities	Coordinated Portfolio Investment Survey, IMF
II-b. Proportion of intra-regional cross-border bond liabilities to total cross-border bond liabilities	Coordinated Portfolio Investment Survey, IMF
II-c. Pair-wise dispersion of deposit rates averaged regionally relative to that averaged globally	CEIC, Haver Analytics, IMF.
II-d. Capital account openness: Chinn-Ito index (de jure)	Portland State University
II-e. Correlations of exchange rates vis-à-vis USD averaged regionally minus those averaged globally	CEIC, Bloomberg

## III. Regional value chains

Indicator	Source
III-a. Ratio between the averaged trade complementarity index over regional trading partners and the averaged trade complementarity index over all trading partners	UNCTAD
III-b. Ratio between the averaged trade concentration index over regional trading partners and the averaged trade concentration index over all trading partners	UNCTAD
III-c. Proportion of intra-regional intermediate goods exports to total intra-regional goods exports	UN Comtrade
III-d. Proportion of intra-regional intermediate goods imports to total intra-regional goods imports	UN Comtrade
III-e. Ratio between the sum of the value added contributed by regional trading partners and that contributed by all trading partners	ADB-MRIO/EORA

## IV. Infrastructure and Connectivity

Indicator	Source
IV-a. Ratio between the averaged trade cost over regional trading partners and the averaged trade cost over all trading partners	World Bank/UNESCAP
IV-b. Ratio between the averaged liner shipping connectivity index over regional trading partners and the averaged liner shipping connectivity index over all trading partners	UNCTAD
IV-c. Proportion of passenger seats sold on regional flights to those sold on all international flights	International Civil Aviation Organization (ICAO)
IV-d. Logistics performance index (overall)	World Bank
IV-e. Doing Business Index (overall)	World Bank

# New dimension: V. Technology and Digital Connectivity

	Indicator	Source
<b>Tech transfer</b>	V-a. Proportion of intra-regional ICT goods trade (exports plus imports) to total ICT goods trade	UNCTAD, UNComtrade
	V-a2. Proportion of intra-regional high technology goods trade to total high technology goods trade	UNCTAD, UNComtrade
<b>R&amp;D and IP</b>	V-b. Research outputs with intra-regional collaborators relative to research outputs with all international collaborators	Web of Science Database
	V-c. Patent applications made with intra-regional residents relative to patent applications made with all foreign residents	OECD, WB, WIPO
	V-d. Sum of in- and out-bound international students within the region relative to all in- and out-bound international students	UNESCO UIS
<b>Digital / telecom</b>	V-e. Proportion of persons using the internet	ITU
	V-f. International Internet Bandwidth	ITU
	V-g. Proportion of fixed and mobile calls (incoming plus outgoing) with intra-regional residents per person to total fixed and mobile calls with all foreign residents per person	Telegeography
	V-h. Ratio between the average internet bandwidth/traffic with intra-regional countries and the average internet bandwidth with all countries	Telegeography

## VI. People and Social Integration

	Indicator	Source
<b>Movement of people</b>	VI-a. Proportion of intra-regional inbound plus outbound migration to total inbound plus outbound migration	United Nations Population Division
	VI-b. Proportion of intra-regional tourists to total tourists (inbound plus outbound)	WTO
	VI-c. Proportion of intra-regional remittances to total remittances	World Bank
	VI-d. Cultural proximity with inter-regional countries relative to that with all other countries	CEPII
<b>Cultural trade</b>	VI-e. Proportion of intra-regional cultural goods (and services) trade (exports plus imports) to all cultural goods trade	UNCTAD, UN Comtrade
	VI-f. Trademark applications made with intra-regional residents relative to trademark applications made with all foreign residents	WIPO

## VII. Institutional Arrangements

Indicator	Source
VII-a. Proportion of intra-regional countries that have signed FTAs	DESTA
VII-b. Proportion of intra-regional countries that have an embassy	Europa World Yearbook or Lowry Global Diplomacy Index
VII-c. Proportion of intra-regional countries that have signed business investment treaties	UNCTAD, DESTA
VII-d. Proportion of intra-regional countries that have signed double taxation treaties	IBFD International
VII-e. Number of international inter-government organizations in which a country is a member	CIA or UIA
VII-f. Proportion of intra-regional countries that do not require an entry visa to the total number of intra-regional countries	Henley passport

**Multilat.  
cooperation** }

# New dimension: VIII. Environmental Cooperation

	Indicator	Source
<b>Environmental trade</b>	VIII-a. Proportion of intra-regional environmental goods trade (exports plus imports) to total intra-regional goods trade	UNCTAD, UNComtrade
	VIII-b. Proportion of inter-regional natural resources trade (exports plus imports) to total intra-regional goods trade	UNCTAD, UNComtrade
<b>Environmental outcomes</b>	VIII-c. Number of international environmental agreements ratified	CIA, EIU, WTO
	VIII-d. CO <sub>2</sub> emissions per capita	WB
	VIII-e. Ecological footprint of imports and exports as a share of biocapacity	Global footprint network



# New data sources in ARCI

TeleGeography



## Telegeography

- International Internet capacity (bandwidth), internet traffic, service providers, ASN connectivity and pricing.
- Bilateral internet traffic data for 89 countries
- Historical internet bandwidth for 173 countries (2010-2019) from 129 backbone operators
- IP transit service pricing



## ICAO

- **On-flight origin and destination:** number of passengers, freight and mail tonnes carried between all international city-pairs
- **Airport traffic:** Monthly traffic data for major international airports: aircraft movements, number of passengers and tons of freight and mail carried.

# New data sources



## **IBFD (International Bureau of Fiscal Documentation)**

- Contains over 10K global taxation treaties (DTT).
- Texts on global tax treaty network, double taxation treaties, domestic and cross-border rates on dividends, royalties and interest.
- Tax, exchange of information documents, supplementary agreements and exchanges of notes to these treaties.



## **Global Footprint Network**

- Data on ecological footprint of imports and exports as a share of biocapacity (national-level data).

# III. Customizing ARCII

- Use original 6–dimension ARCII as baseline index
- Adopt dimensions to reflect specific needs of regional departments. Example:
  - Estimation of Eurasia index excluding Money & Finance
  - Including Energy flows dimension for specific subregions
- Construction of Intra-subregional indexes
- Use of national-level data to extend time and country coverage, with NSOs and other data producers

# Summary

- **Expanding ARCII relevant dimensions for RCI**
  - Technology and Digital Connectivity
  - Environmental Sustainability → RPG dimension?
- **Improving indicators for existing dimensions**
  - Money and Finance: CA openness, co-movement FX
  - Regional Value Chains: Value added in exports.
  - Infrastructure and Connectivity: passenger flights
  - Institutional arrangements: regional inter-gov. cooperation
- **Customizing ARCII to region/subregion needs**
  - 6-dimension indicator as baseline
  - Include relevant dimensions/indicators

# Next steps

Date	Activities
Nov. 2019 – Feb. 2020	Initial consultations with ADB departments
Feb 2020 – July 2020	Work with ARCII's experts to improve methodology
Apr. 2020	<b>Inception workshop on ARCII initiative</b>
Jun-Sep 2020	Regional workshops on RCI Measurement
Aug.-Sep. 2020	Research inputs from international consultants
Oct. 2020	Regional seminar on RCI Measurement
Nov. 2020 – Apr. 2021	Production of ARCII Report and CB



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