Asia-Pacific Regional Cooperation and Integration Index
Enhancing Measures of RCI in the Pacific

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Economic Research and Development Impact Department
Asian Development Bank

ADB-Asian Think Tank Development Forum 2023
Pacific Island Economies: Aiming for Sustainable Economic Development in the Midst of Growing Uncertainties
Suva, 26-27 September 2023
Asia’s regional integration has been resilient amid the pandemic

### Intraregional shares Developing Asia (% of total)

<table>
<thead>
<tr>
<th>Category</th>
<th>2022</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>47%</td>
<td>43%</td>
</tr>
<tr>
<td>FDI</td>
<td>61%*</td>
<td>40%</td>
</tr>
<tr>
<td>ICT goods</td>
<td>58%*</td>
<td>54%</td>
</tr>
<tr>
<td>Air transport</td>
<td>41%*</td>
<td>57%</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>70%*</td>
<td>63%</td>
</tr>
</tbody>
</table>

Notes:
*Data as of 2021
**Values represent intraregional shares for developing Asia

### Enhanced ARCI framework

- **Trade and Investment**
- **Money and Finance**
- **Environmental Cooperation**
- **Regional Value Chain**
- **People and Social Integration**
- **Technology and Digital Connectivity**
  - ICT goods trade
  - Intraregional research outputs
  - Intraregional patents
  - Mobile subscriptions
  - Bandwidth traffic
- **Institutional Arrangements**
- **Infrastructure and Connectivity**
  - Environmental goods trade
  - Int. environmental agreements
  - Environmental health score
  - Ecological footprint

### New dimensions
Why a RCI index?

Planning and policy reform

- Input in policy planning and national budgeting process
- Provide insights in project selection and prioritization
- RCI dashboards to track performance and spillovers in key policy areas

Benchmarking

- Gauge progress in economic integration and regional performance
- Compare integration of an economy at the indicator or dimension level
- Assess performance against set goals
- Understand regional vs. extraregional linkages and associated risks

Changing priorities

- Energy flows
- Value chain participation
- Services trade
- International migration
- Carbon content of trade
# Enhanced ARCl Index: Improved data coverage in the Pacific

## Current data coverage for Pacific economies

<table>
<thead>
<tr>
<th>Category</th>
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<th>Medium</th>
<th>Deficient</th>
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<tbody>
<tr>
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<tr>
<td>Exports</td>
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<td>Trade Intensity Index</td>
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<td>FDI Inflows</td>
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<td>FDI Outflows</td>
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<td>Money and Finance Integration</td>
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<td>Equity Liabilities</td>
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<td>Bond Liabilities</td>
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<td>Deposit Rates</td>
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<td>Chinn-It Index</td>
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<td>Exchange rate</td>
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<td>Trade Complementarity Index</td>
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<td>Trade Concentration Index</td>
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<tr>
<td>Intermediate Good Exports</td>
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<tr>
<td>Intermediate Good Imports</td>
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<td>Value-added Contributions</td>
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<tr>
<td>Infrastructure and Connectivity</td>
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<td>Trade Costs</td>
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<td>Passenger seats</td>
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<td>Logistics Performance Index</td>
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<td>Doing Business Index</td>
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<td>People and Social Integration</td>
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<td>Outbound Migration</td>
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<td>Cultural Proximity</td>
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<td>Cultural goods</td>
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<tr>
<td>Trademark applications</td>
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<td>Institutional Arrangements</td>
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<td>Embassy Presence</td>
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<td>IGO</td>
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<tr>
<td>Technology and Digital Connectivity</td>
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<tr>
<td>ICT goods</td>
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<tr>
<td>Research outputs</td>
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<tr>
<td>Patent applications</td>
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<tr>
<td>Persons using internet</td>
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<tr>
<td>Mobile subscriptions</td>
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<tr>
<td>Internet bandwidth</td>
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<tr>
<td>Environmental Cooperation</td>
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<tr>
<td>Environmental goods trade</td>
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<tr>
<td>Environmental agreements</td>
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<tr>
<td>Environmental health score</td>
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<tr>
<td>Ecological footprint</td>
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</tbody>
</table>
Example. Data gaps in regional indicators in the Money & Finance dimension

Data coverage for Pacific Economies – Money and Finance Dimension (2006 – 2021)

Comparison of Exchange Rate Correlation Indicator:
Pegged with one or multiple currencies

Note: The x-axis labels correspond to the five indicators in ARCII money and finance dimension.

Note: The currency for several economies in the Pacific are tied to those of other economies (e.g., USD, AUD, NZD), including Cook Islands, Kiribati, Marshall Islands, Micronesia, Fed. States, Nauru, Niue, Palau, Timor-Leste, and Tuvalu. The rest of the Pacific economies’ currencies are pegged to a weighted basket of currencies, except for Papua New Guinea.

Source: ADB. Asia-Pacific Regional Cooperation and Integration Index Database.
Integration in Asia and among subregional initiatives progressed steadily in key dimensions

Integration in Asia and the Pacific, 2006, 2014, 2021

Integration in Asia and the Pacific vs. other regions, 2021

Intrasubregional integration by dimension, 2021

Asia’s integration in multiple dimensions has improved since 2006.

Asia performed similar to EU in regional trade, investment, and value chain participation

Integration within subregions differs across dimensions

Notes: Worldwide normalization is used for all estimations, where the indicators are normalized using global maximum and minimum values across all regions. Estimates represent integration within the region (intraregional) or within each subregional initiative (intrasubregional). Higher values denote greater regional integration. Values for the Pacific subregion are partial due to data coverage.

Drivers of RCI in Asia underscore several areas for improvement

**Infrastructure and connectivity and people and social integration** sustained integration in Asia in 2021

**RVCs, infrastructure and connectivity and institutional arrangements** are the largest contributing dimensions to RCI among subregional initiatives.

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**Dimensional Contributions to RCI index by Region (2021)**

- **Infrastructure and Connectivity**
- **People and Social Integration**
- **Institutional Arrangements**
- **Technology and Digital Connectivity**
- **Regional Value Chain**
- **Trade and Investment**
- **Money and Finance**

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**Dimensional Contribution to Intrasubregional Integration (2021)**

- **Pacific**
- **CAREC**
- **SASEC**
- **GMS**

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Note: Dimensional contributions are computed as the weight of a dimension (indicator) multiplied by the dimensional index (indicator). The totals represent overall integration within the subregional initiatives.

Subregional clusters show different trajectories in RCI

Intra-subregional integration offers **economies of scale** while inter-subregional integration encourages **diversification**

**Intra-subregional vs Inter-subregional Integration**

**CAREC (Central Asia)**

**GMS (Southeast Asia)**

**SASEC (South Asia)**

**Pacific**

**Notes:** Worldwide normalization is used for all estimations, where the indicators are normalized using global maximum and minimum values across all regions. Estimates represent integration within the subregional initiative (intrasubregional) and with other Asian economies outside the subregional initiative (intersubregional). Higher values denote greater regional integration. Source: ADB. *Asia-Pacific Regional Cooperation and Integration Index Database* (accessed August 2023).
Pacific’s integration with Asia has improved in infrastructure, social, digital integration.

Integration with Asia by subregion (Intraregional RCI)

Pacific – 2006 vs. 2021

- Trade and Investment: 0.47 (2006), 0.46 (2021)
- Money and Finance: 0.28 (2006), 0.22 (2021)
- Regional Value Chain: 0.52 (2006), 0.47 (2021)
- Infrastructure and Connectivity: 0.48 (2006), 0.50 (2021)
- People and Social Integration: 0.54 (2006), 0.55 (2021)
- Institutional Arrangements: 0.09 (2006), 0.10 (2021)
- Technology and Digital Connectivity: 0.34 (2006), 0.54 (2021)
- Environmental Cooperation: 0.38 (2006), 0.41 (2021)

By subregion

- Trade and investment
- Money and finance
- Regional value chain
- Infrastructure*
- People and social integration
- Institutional arrangements
- Technology*
- Environment

Central Asia, East Asia, Southeast Asia, South Asia, Pacific
Integration within Pacific economies offers a contrasting picture.

**Integration within subregions (Intra-subregional RCI)**

Pacific, 2006 vs. 2021

<table>
<thead>
<tr>
<th>Category</th>
<th>2006</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade and Investment</td>
<td>0.19</td>
<td>0.19</td>
</tr>
<tr>
<td>Money and Finance</td>
<td>0.24</td>
<td>0.37</td>
</tr>
<tr>
<td>Regional Value Chain</td>
<td>0.23</td>
<td>0.42</td>
</tr>
<tr>
<td>Infrastructure and Connectivity</td>
<td>0.11</td>
<td>0.44</td>
</tr>
<tr>
<td>People and Social Integration</td>
<td>0.09</td>
<td>0.47</td>
</tr>
<tr>
<td>Institutional Arrangements</td>
<td>0.16</td>
<td>0.17</td>
</tr>
<tr>
<td>Technology and Digital Connectivity</td>
<td>0.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Environmental Cooperation</td>
<td>0.32</td>
<td>0.37</td>
</tr>
</tbody>
</table>

By subregion

- Trade and investment
- Money and finance
- Regional value chain
- Infrastructure & connectivity
- People & social integration
- Institutional arrangements
- Technology
- Environment

Central Asia | East Asia | Southeast Asia | South Asia | Pacific
At the economy level, integration within the Pacific remains limited.

Integration within Pacific economies - Example

Notes: Worldwide normalization is used for all estimations, where the indicators are normalized using global maximum and minimum values across all regions.
Source: ADB, Asia-Pacific Regional Cooperation and Integration Index Database (accessed August 2023).
Pacific’s integration with AUS-NZ and USA is strong in some dimensions and has increased over time.

Pacific integration with Australia & New Zealand, Developing Asia, and the USA

### Overall Index

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>with AUS and NZL</td>
<td>0.43</td>
<td>0.45</td>
</tr>
<tr>
<td>with developing Asia</td>
<td>0.27</td>
<td>0.31</td>
</tr>
<tr>
<td>with USA</td>
<td>0.22</td>
<td>0.25</td>
</tr>
</tbody>
</table>

### Dimensional indexes

- **Trade and investment**
- **Regional value chain**
- **Infrastructure**
- **People and social integration**
- **Institutional arrangements**
- **Technology**
- **Environment**

#### Notes:
- Worldwide normalization is applied for comparability. Estimates represent integration of the Pacific separately with: 1) Australia and New Zealand, 2) developing Asia, and the 3) USA.
- Money and finance dimension was included to improve covered of the overall index.
- Source: ADB. Asia-Pacific Regional Cooperation and Integration Index Database.
Some caveats and alternatives for Pacific indicators

SIZE OF PACIFIC ECONOMIES
- The ARCII indicators may underrepresent or overrepresent regional integration levels for certain economies due to their size, geographical location, or economic structure.

DATA AVAILABILITY
- Using international data sources to ensure comparability in ARCII created some possible data deficiencies on some of the indicators included.

REGIONALIZATION BIAS
- By construction, ARCII focuses on intraregional flows, without sufficient consideration of the extraregional linkages economies have outside their region.

DENOMINATOR CHOICE
- Alternative denominators can be applied to address under and over representation of economies, particularly in small and least developed economies.

INDEX CUSTOMIZATION
- The index could be calibrated according to the socio-economic context and data availability of Pacific economies.

EXTRA-REGIONAL LINKAGES
- A broader measure of integration (capturing both extra and intra regional linkages) would provide a comprehensive picture of the overall degree of economic integration.
Can high-level RCI indicators capture RCI spillovers?

<table>
<thead>
<tr>
<th>RCI spillovers</th>
<th>Example of ARCI indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding and technology transfer through FDI</td>
<td>FDI flows, intrareg. research outputs</td>
</tr>
<tr>
<td>Improved transport and communications</td>
<td>Trade costs, liner shipping, LPI</td>
</tr>
<tr>
<td>Agglomeration effects through linking of urban centers</td>
<td>Air transport, SEZs, migration/tourism flows</td>
</tr>
<tr>
<td>Economies of scale through specialization</td>
<td>Value chain participation, trade concentration, trade intensity</td>
</tr>
<tr>
<td>Mitigation of cross-border environmental and public health risks</td>
<td>Environmental goods trade, env. health score</td>
</tr>
<tr>
<td>Institutional support for regional collaboration</td>
<td>FTAs, IGOs, BITs</td>
</tr>
</tbody>
</table>
Extraregional linkages are increasingly important in the current context

Notes: Dots describe regression coefficients assessing the association of global integration index with GDP growth, income inequality (using the Gini Index developed by the World Inequality Database) and inclusive growth (defined by growth adjusted for income inequality). Hollow dots denotes coefficients not significant at 10% level.

*Upper and lower-middle income; **Lower-middle and low income
Conclusion

• **Standardized** RCI measures across economies and dimensions, beyond infrastructure, can strengthen RCI strategies

• Taking stock in the Pacific:
  • Keep plugging the gaps – do not forget the importance of basic data
  • Enhance finance indicators to better reflect the level of dof financial integration in the Pacific
  • Institutional regulatory cooperation is key → Education and research collaboration has strong RCI element

• **Customization** of indicators can better reflect RCI progress
  • Potential areas: fisheries, labour mobility, environmental cooperation
  • Synergies among dimensions (e.g. institutional arrangements and tourism)

• **Extraregional** linkages are increasingly relevant to explain RCI (e.g. value chains). ARClII can inform how
Thank you!
# Imputation of missing data

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold deck imputation</td>
<td>- Copying the closest available observation (e.g., carrying over the value of 2018 to 2019 (if missing)</td>
</tr>
<tr>
<td>Averaging</td>
<td>- Taking the average value between two years (e.g., if 2015 is missing, average 204 and 2015 values)</td>
</tr>
<tr>
<td>Linear interpolation</td>
<td>- Assumes a linear relationship between data points – straight line between two given points</td>
</tr>
<tr>
<td>Regression imputation</td>
<td>- Replaces missing data with the predicted values based on a regression equation.</td>
</tr>
</tbody>
</table>

\[
DBI_j = 3.216 + 19.83LPI_j + \varepsilon_j \\
LPI_j = 0.912 + 0.032DBI_j + \varepsilon_j
\]
Example of indicators

Capital Account Openness

Exchange rate correlation

Cultural proximity

Oceania
East Asia
Southeast Asia
Central Asia
Pacific
South Asia
East Asia
Central Asia

2006 2018

Oceania
Southeast Asia
Pacific
South Asia
East Asia
Central Asia

2.74 2.41 2.22 1.72 1.13 1.13

East Asia Central Asia South Asia Southeast Asia Oceania Pacific
Economic corridors facilitate regional integration

Notes: Worldwide normalization is used for all estimations, where the indicators are normalized using global maximum and minimum values across all regions. Estimates represent integration within the subregional initiative (intrasubregional) and with other Asian economies outside the subregional initiative (intersubregional). Higher values denote greater regional integration. Source: ADB. Asia-Pacific Regional Cooperation and Integration Index Database (accessed August 2023).

Intraregional integration index – 2022

• **Location.** Geography affects economies’ ability/potential to forge linkages with other economies.

• **Network effects.** Degree of regional integration is influenced by neighbors, but channels can vary across clusters.

• **Emerging trends**
  - Supply chain reconfiguration
  - Harmonization of regulatory frameworks
  - Alignment with NDPs and subnational strategies
Higher integration of the Pacific with Asia tends to be fueled by its linkages to other Asian economies outside the subregion.

Integration of Pacific economies with the rest of Asia

RCI index, 2006 vs. 2021

<table>
<thead>
<tr>
<th>Category</th>
<th>2006</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade and Investment</td>
<td>0.60</td>
<td>0.62</td>
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<td>Money and Finance</td>
<td>0.22</td>
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<td>Infrastructure and Connectivity</td>
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<td>People and Social Integration</td>
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<td>Technology and Digital Connectivity</td>
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</tr>
<tr>
<td>Environmental Cooperation</td>
<td>0.38</td>
<td>0.42</td>
</tr>
</tbody>
</table>

By selected Asia economies

Trade and Investment

Infrastructure

People and Social Integration

Institutional Arrangements
Extraregional linkages are increasingly important for development outcomes

Assessing the impact of global economic integration

Promotes economic growth across all income groups
Induces income inequality in several income groups
Fosters inclusive growth for high income group

Global Integration Estimates (2021), By subregion

Correlation of Global Integration with growth, inequality and inclusive growth

Notes: Dots represent the global integration estimates.

Notes: Dots describe regression coefficients assessing the association of global integration index with GDP growth, income inequality (using the Gini Index developed by the World Inequality Database) and inclusive growth (defined by growth adjusted for income inequality). Hollow dots denotes coefficients not significant at 10% level.

*Upper and lower-middle income; **Lower-middle and low income